



The Green Side of One Health:
from basics to industrial applications

ABSTRACT BOOK

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XXVIII Biotechnology Summer School

Biotechnology Summer School aims to promote knowledge about the newest biotechnological achievements and build a vast scientific network between students, PhD students and young scientists together with many experienced researchers from the leading institutions in Poland and abroad. We also want to encourage young scientists to improve their skills in the area of science communication.



Targeted audience

XXVIII BSS (Biotechnology Summer School) is dedicated to students and young scientists interested in experimental and life sciences. The Summer School will supplement existing knowledge with valuable practical and applied training and allow to discuss research in depth with the academics who are leading experts in their area. It will prepare and enhance appeal to potential employers and graduate schools. The international study will enable gaining a deeper understanding of another culture, make life-long friends from a wide variety of backgrounds and benefit from globally renowned academic excellence.

Before we start

Remember to **always** have your ID on you. Inside your ID there is a condensed version of the BSS programme.

Please pay attention to the organizers' announcements during the whole event.

Check out a Facebook group we made for this year's event. Meet other participants and share info! You can find this group by scanning the QR code on the right or typing the following web address: <https://www.facebook.com/groups/766013093057041>



About Biotechnology Summer School

Biotechnology Summer Schools are organized annually since 1994. The idea of Biotechnology Summer School (BSS) came from the late Professor Anna J. Podhajska (1938–2006), who implied that students and young scientists should actively participate in obtaining knowledge and establishing contacts with scientists from all over the world, not only in formal conditions but also outside the University. That is why the participants of BSS are not only biotechnology students but also students in related biological fields from Poland and from abroad, young scientists and even advanced pupils interested in this topic. The main aim of this event is to provide students with a wide range of courses which are not available in the standard syllabus. We create a relaxed learning environment and give Polish and foreign students a chance to meet highly renowned specialists during lectures as well as in rather informal circumstances. Moreover, Biotechnology Summer Schools give Polish and foreign scientists a chance to develop cooperative relationships and create a forum for integration. Topics of BSS vary from year to year. Prof. Anna Podhajska gained many people's support over her initiative. The number of sponsors increased every year and thanks to all these companies and institutions the organization of Biotechnology Summer School has been possible. BSS was also supported by big projects like MOBI4Health, which fully financed the XX BSS or Horizon 2020 which financed XXIV BSS.

Biotechnology Summer Schools were honored with the presence of many eminent scientists such as professors: Ewa and Ernest Bartnik, Stanisław Bielecki, Charles Cantor, Klaus Halhlbrock, Waleria Hryniewicz, Robert Huber (Nobel Prize winner in Chemistry in 1988), Berndt Jastorf, Adam Jaworski, Roman Kaliszan, Władysław Kunicki Goldfinger, Andrzej



Legocki, Janusz Limon, Mirosław Małuszyński, Jerzy Paszkowski, Andrzej Płucienniczak, Richard P. Sinden, Piotr Stępień, Wacław Szybalski, Dan Tawfik, Tomasz Twardowski, Jacques H. Weil, Robert Wells, Paul Williams, Brigitte Wittman - Liebold, Maciej Zenktler, Maciej Żylicz.

No less important than learning is having fun. Many entertaining activities for Summer Schools are always planned. A fancy-dress party, a bonfire with singing, field games, sports, playing on words, and integrational workshops are part of every School. We also organize some visits to local, historical places and regional trips. We hope that



this year's Biotechnology Summer School will be as successful as previous ones and will be an unforgettable experience for all participants.

Visit us on the web:



www.bss.ug.edu.pl



<https://www.facebook.com/BiotechnologySummerSchool>



https://www.instagram.com/bss_ifb/

BSS timeline

No	Place	Year	Topic examples
I	Wilga	1994	Miscellaneous
II	Łączyño	1995	Miscellaneous
III	Stegna	1996	Miscellaneous
IV	Stegna	1997	Miscellaneous
V	Gołuń	1998	Plant biotechnology, molecular medicine
VI	Łączyño	1999	Fundamentals for bioprocess engineering
VII	Twardy Dół	2000	Genetic modifications in plants and animals
VIII	Łączyño	2001	Ethical aspects of biotechnology
IX	Sobieszewo	2003	Bioinformatics (molecular evolution and protein structure)
X	Sobieszewo	2004	Biotechnological applications in agriculture
XI	Sobieszewo	2005	Bioprocess engineering
XII	Łapino	2006	Immunotherapy (cancer research), clinical stages
XIII	Łapino	2007	Cancer causes, diagnosis and therapy
XIV	Sobieszewo	2008	Virology, mostly involved with HCV
XV	Gdańsk	2009	Plants as a “green factory”
XVI	Sobieszewo	2010	Viral research, HCV, influenza virus
XVII	Gdańsk Górki-Zachodnie	2011	Biochemistry and biotechnology of plant lipids
XVIII	Jurata	2012	Current scientific research and its practical application
XIX	Gdańsk	2013	Molecular evolution
XX	Stegna	2014	Model organisms
XXI	Kadyny	2015	Biotech innovations
XXII	Wielimowo	2016	Biotechnologists love every bit of life
XXIII	Stężycza	2017	Iron metabolism; Biological plant protection
XXIV	Sobieszewo	2018	Responsible Research and Innovation
XXV	Ostrzyce	2019	Introduction to Translational Research
XXVI	Szarłota	2023	RNA in biology and medicine
XXVII	Szarłota	2024	Immune-mediated diseases and approaches to immunotherapy

Memories from previous editions

2015



2016





2017





2018



2019



2023





2024





XXVIII BSS Venue



XXVII Biotechnology Summer School takes place on 22–26 September 2025 in the “SZARLOTA” Holiday Complex located in a picturesque area of Kashubia in Kościerzyna, close to the beach by the lake Osuszyno.

Comfortable hotel rooms and cottages are surrounded by the natural richness of nature. Specially prepared attractions will make integration trips unforgettable for a long time. The cuisine of Szarlota will treat you with regional specialties, as unique as Kashubia itself. Their chefs will satisfy your expectations and try to recall the flavors of childhood.

Szarlota holiday complex is a perfect hot spot for sightseeing Kashubian area. Kościerzyna is the main city of the Kashubia region with almost 800 years of history.

3 km from the city, is Wdzydze landscape park with diverse landscapes and plant-life allowing from mind calming jogging, cycling or walking.



Organizing committee

Scientific supervision

Prof. Rafał Sądej



Prof. Rafał Sądej, vice-Dean for Science at Intercollegiate Faculty of Biotechnology UG & MUG, head of the Laboratory of Molecular Enzymology and Oncology. He has been working in cancer research for nearly 20 years. He is interested in mechanisms of breast cancer progression and resistance to anticancer drugs. His group is studying the role of growth factor receptors in communication within the tumour microenvironment. This investigation involves detailed molecular and clinical analyses as well as animal model studies. He is beneficent of multiple Polish and international grants and a committee member of the European Network for Breast Development and Cancer (ENBDC labs).
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Anna Ihnatowicz, PhD



Dr. Anna Ihnatowicz obtained her PhD in natural sciences from the University of Cologne, conducting her doctoral research in the group of Prof. Dario Leister at the Max Planck Institute for Plant Breeding Research (MIPZ) on the functional genomics of photosynthesis in *Arabidopsis thaliana*. She then pursued postdoctoral research in the Department of Prof. Maarten Koornneef at MIPZ, focusing on plant responses to abiotic stresses, particularly low temperatures. After returning to Poland with an FNP HOMING grant, she joined the group of Prof. Ewa Lojkowska to study the biosynthesis of coumarins - an important class of phytochemicals beneficial to both plants and humans.

She is currently an assistant professor in the Laboratory of Plant Protection and Biotechnology at the Intercollegiate Faculty of Biotechnology of the University of Gdansk and the Medical University of Gdansk. Her research combines naturally occurring genetic variation in *Arabidopsis* with genomics, metabolomics, ionomics, and mutational approaches to identify and characterize genes involved in coumarin biosynthesis and plant responses to various biotic and abiotic stress factors, particularly iron deficiency and bacterial infection. She has served as principal investigator of multiple research projects funded by NCN, FNP, and NAWA.

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Agata Motyka-Pomagruk, PhD



Dr. Agata Motyka-Pomagruk works as an assistant professor and deputy head of the accredited by Polish Centre for Accreditation for compliance with ISO 17025 and certified according to ISO 14001 Research & Development Laboratory of Intercollegiate Faculty of Biotechnology University of Gdańsk and Medical University of Gdańsk. Co-author of 45 scientific publications and 4 book chapters, principal investigator of Preludium 11 (National Science Centre in Poland), executor in other 22 projects, completed research internships at Institut National des Sciences Appliquées (Lyon, France), University of Florence (Italy) and Norwegian Institute of Bioeconomy Research (As, Norway), co-author of the implementation, 5 national patents and 8 patent applications (including two international ones), scholarship holder of the Ministry of Science and Higher Education in

the competition for outstanding young scientists (2023), awarded by Prime Minister of Poland for outstanding doctoral dissertation (2020), obtained distinctions from PAS Branch in Gdańsk for young scientists (2019, 2021), awarded by the Polish Phytopathological Society for publication achievements (2018), winner of the 2nd edition of the Young Fahrenheit competition (2023), co-author of inventions awarded in the 9th edition of the Eureka! competition of Dziennik Gazeta Prawna (2022), distinguished in the 7th edition of the Eureka! competition (2020), granted with Silver Medal at the International Warsaw Invention Show (2022), distinguished with a Special Award from the Polish Association of Pharmaceutical Industry Employers in the 12th Student-Inventor competition (2022) and a Special Award from the President of the Patent Office of the Republic of Poland in the 10th Student-Inventor competition (2020). Co-author and author of 97 conference reports. President of Gdańsk Branch of Polish Phytopathological Society, member of the Main Board of Polish Phytopathological Society, member of Polish Biochemical Society, head of Gdańsk Branch of FEBS JR. Editor in *Frontiers in Microbiology* and *Journal of Plant Pathology*, guest editor in *Agronomy*, reviewer in journals indexed in Web of Science. Her interests include phytopathology, environmental and clinical microbiology, application research, bioinformatics, statistics and popularization of scientific skills and knowledge.

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Sylwia Klińska-Bąchor, PhD



Sylwia Klińska-Bąchor, PhD, Laboratory of Plant Biochemistry, Intercollegiate Faculty of Biotechnology UG & MUG. In 2022, she earned her PhD in Biological Sciences for her research on phospholipid remodeling in the oily crop *Camelina sativa*. After doctoral studies she completed an internship at Swedish University of Agricultural Sciences in Alnarp, Sweden, and then she worked as a post-doc in a Polish-Chinese project at IFB UG&MUG. Currently, as the Principal Investigator of a National Science Center OPUS 26 project, she is investigating the physiological role of LPCAT enzymes, key players in remodeling dominant membrane phospholipid - phosphatidylcholine, in the context of their role in plant adaptation to environmental conditions, such as extreme temperatures, drought and flooding. In 2025, she was awarded the START scholarship for outstanding young scientists by the Foundation for Polish Science.

Her research interests focus on two areas related to plant lipid metabolism. The first is the efficient biosynthesis of omega-3 long-chain polyunsaturated fatty acids (ω -3 LC-PUFAs) in plants. The second concerns understanding the physiological role of enzymes involved in lipid metabolism and determining their potential role in plant adaptation to environmental stress. Beyond the laboratory, she actively engages in the popularization of science through participation in events such as the Night of Biologists, BiotechWeek, and the Pomeranian Night of Scientists.

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Weronika Babińska-Wensierska, PhD



Weronika Babińska-Wensierska, PhD, is an Assistant Professor at the Laboratory of Physical Biochemistry, Intercollegiate Faculty of Biotechnology UG & MUG. She earned her PhD in 2024 for research on pectinolytic *Dickeya* and *Pectobacterium* species, focusing on the virulence determinants and environmental factors influencing blackleg and soft rot disease development in potatoes. She is currently advancing studies on microbiomes from various environments, with a strong focus on plant-soil-microbe interactions and the quest for sustainable, eco-friendly strategies against bacterial pathogens. As the Principal Investigator of an NCN Preludium 21 project, she investigates how soil microbial communities can exacerbate or suppress disease outbreaks caused by *Dickeya* and *Pectobacterium*.

Dr. Babińska-Wensierska has co-authored over a dozen scientific publications, holds two granted patent, and has multiple international patent applications related to antimicrobial and plant-protection technologies. She has presented her findings at more than 40 conferences worldwide, contributing to innovative approaches in plant pathology and crop management. Her notable accolades include, among others, the Minister of Science and Higher Education Scholarship for outstanding scientific achievements (2018/2019) and 3rd place in the Young Fahrenheit competition (2024).

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Organizing team

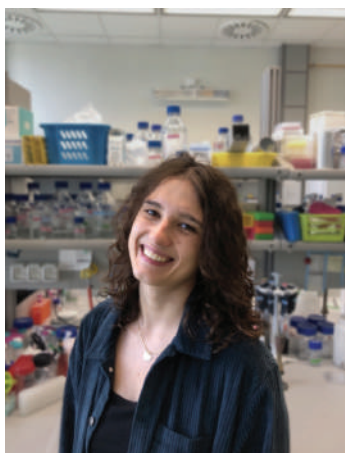
Michał Prusiński



PhD student at Laboratory of Plant Protection and Biotechnology. Avid herbalist and cyclist combining hobbies with laboratory work. He is activist involved with Polish Children's Fund to show promising young people world of science by tutoring and organizing workshops.

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Zuzanna Hirsz



PhD student at the Laboratory of Molecular Biology. With a passion for science and education, she has dedicated herself to organizing this summer school to inspire and engage the next generation of biotechnologists. When not immersed in the lab, she enjoys spending time with her beloved cats and exploring the wonders of nature. She is also an avid dancer and a voracious reader, always eager to discover new stories and perspectives.

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Kamil Dąbrowski



PhD student at the Laboratory of Plant Protection and Biotechnology. Passionate about applied research and molecular diagnostics, he also enjoys sharing science with a wider audience through pop-science events. Outside the lab, cooking is his favorite way to experiment and unwind.

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Katarzyna Kalinowska



PhD student at the Laboratory of Evolutionary Biochemistry.

Passionate about RPG games and fantasy literature, she enjoys immersing herself in imaginative worlds both on the page and on screen. Creativity plays a big role in her life, and she loves coming up with new ideas and solutions. At home, she shares her life with two cats who keep her on schedule.

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IFB Dean's Office

Behind-the-scenes IFB staff is doing all the administrative and financial work of the event. They are also responsible for contact with the participants and lecturers.

Patrycja Tucholska



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Intercollegiate Faculty of Biotechnology UG & MUG

The Intercollegiate Faculty of Biotechnology at the University of Gdańsk and the Medical University of Gdańsk (IFB) was established in 1993 by a decision of the Senates of the University of Gdańsk (UG) and the Medical University of Gdańsk (MUG). The Faculty was founded through the initiative of Prof. Anna Podhajska, Prof. Waław Szybalski, and Prof. Karol Taylor. It is a unique institution in Poland, created by two universities, conducting interdisciplinary research and education that integrates biomedical and biomolecular studies with biotechnological applications for health and quality of life.

Since 1999, the IFB has been authorized to confer doctoral degrees. Since 2010, it has been able to grant the postdoctoral (habilitation) degree, initially in biochemistry and, since 2023, in the field of biotechnology. Including PhD students, a total of 219 people are now engaged in research and teaching at IFB.

IFB is a leading research and teaching institution that has held the European Centre of Excellence in Biosafety and Molecular Biomedicine status since 2002 (as part of the EU FP5 program). It is highly ranked by the Ministry of Science and Higher Education (MNiSW) for its scientific effectiveness. In 2017, IFB received the highest rating, Category A+, in a parametric assessment.



The quality of education at IFB is among the highest in Poland. In 2011, the Polish Accreditation Committee awarded the Faculty a distinction for teaching excellence. In 2012, the Ministry of Science and Higher Education granted IFB's Biotechnology program the title of "Best Major". The Central Council of Science and Higher Education recognized IFB's learning outcomes for the Biotechnology program as the highest standard. In 2020, the Polish Accreditation Committee awarded IFB's Biotechnology program the Certificate of Educational Excellence in the category "Excellent Programme – Excellence in Education". Additionally, we consistently achieve high positions in the study program rankings by the Perspektywy Foundation. In 2023 and 2024, the IFB secured 2nd and 3rd place among all biotechnology programs in Poland, respectively.



Faculty members play an important role in international societies and scientific commissions. Prof. Ewa Łojkowska is President of the Polish Academy of Sciences Committee on Biotechnology, President of the Polish Jury for the L'Oréal-UNESCO for Women in Science award and a member of the International Selection Committee of the Award L'OREAL-UNESCO For Women in Science International Rising Talents. Prof. Łojkowska has been also appointed as a member of the Committee on Ethics and Good Practices for Foundation of Polish Science (FNP). Prof. Łojkowska and Prof. Bogusław Szewczyk have been appointed to the Biotechnology Committee of the Polish Academy of Sciences, with Prof. Łojkowska elected as its Chairperson. Prof. Igor Konieczny has been appointed to the Council of Scientific Excellence for the 2024–2027 term in the field of natural sciences. Prof. Krzysztof Liberek is an expert of the Foundation of Polish Science and a member of the European Executive Research Agency panel of the European Research Council (ERC). Professor Krystyna Bieńkowska-Szewczyk in 2023 was the organizer of the 8th European Congress of Virology (held in Gdansk), the largest



virology congress in Europe. This prestigious event attracted distinguished scientists from across the globe and underscored our prominent position in the field of virology. Prof. Anna Żaczek and Prof. Jacek Bigda, are directly involved as Vice-Rector of Development and Chancellor, respectively, in governing of Medical University of Gdansk.

In 2023, IFB staff member Prof. Dr. hab. Krzysztof Liberek was awarded the Foundation for Polish Science Prize, the most prestigious scientific distinction in Poland.

IFB staff members are also laureates of renowned programmes (ERC Starting Grant, EMBO YIP, HHMI, EUPHRESKO ERANET, InfectEra, STRATEGMED, Polish-Norwegian Research Programme, Polish-South Africa Programme, Polish-Chinese Programme, Polish-French Polonium Programme, and Polish national programmes granted by National Science Center, National Centre for Research and Development, Medical Research Agency and Foundation for Polish Science such as LIDER, TOP 500 Innovators, MISTRZ, START, HOMING PLUS, TEAM, and First TEAM).

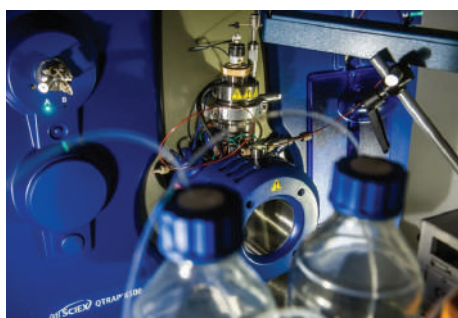
We have recently enhanced the quality of our publications, leading to a growing number of Q1 publications. In 2023-2024, IFB researchers published 186 papers, nearly all in indexed journals, with approximately 50% involving international collaborators. Our research has been featured in high-impact journals such as Nucleic Acids Research, Proceedings of the National Academy of Sciences of the United States of America, Nature



Communications, Journal of the American Chemical Society, Plant, Cell & Environment, Chemical Engineering Journal, Advanced Science, Clinical Chemistry, and Cancer Cell.

The Intercollegiate Faculty of Biotechnology is widely collaborating at the national and international levels. This collaboration resulted in publications with more than 100 institutions in Poland and abroad, including esteemed foreign institutions such as the University of Oxford, Cancer Research UK Cambridge Institute, University of Southern Denmark, Max Planck Institute for Biophysical Chemistry, Max Planck Institute for Plant Breeding Research, Max Planck Institute for Molecular Genetics, Heidelberg University, Wageningen University and Research Centre, Karolinska University, University Medical Center Hamburg-Eppendorf, University Medical Center Utrecht, Leiden University Medical Center University of Bremen, University of Wisconsin-Madison, University of Texas, University of Washington, Wellcome Sanger Institute, Lawrence Berkeley National Laboratory, Princeton University, Cornell University, University of Missouri, University of Utah and Soochow University.

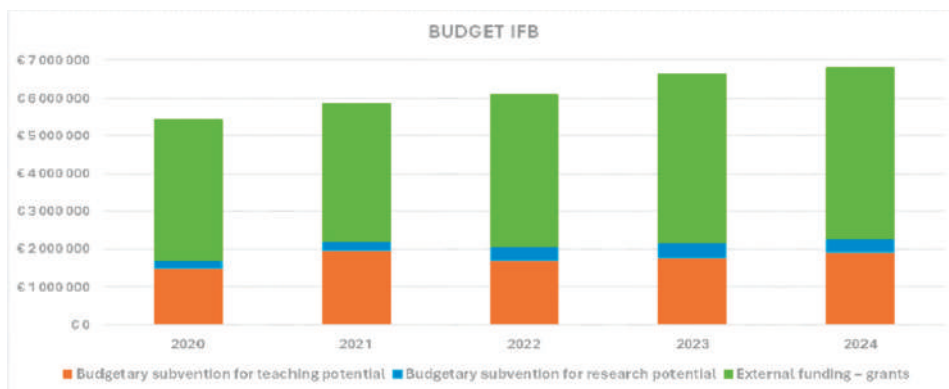
We are also intensively collaborating within various European Union initiatives, such as COST (European Cooperation in Science and Technology) actions or European Institute of Innovation & Technology (EIT) HEI Initiative. IFB is involved in the following COST actions: CA21135 - Modelling immunotherapy response and toxicity in cancer (IMMUNO-model) coordinated at MUG by Natalia Bednarz-Knoll, PhD; CA21108 – European



Network for Skin Engineering and Modeling (NETSKINMODELS) coordinated at IFB by prof. Danuta Gutowska-Owsiak; CA21115 - Iron-sulphur (FeS) clusters: from chemistry to immunology (FeSIImmChemNet) coordinated at IFB by prof. Rafał Dutkiewicz. EIT HEI Initiative entitled “Increasing the entrepreneurial innovation capacity of higher education institutions in AI and data science in healthcare (innovAId)” is run by the consortium of University Medical Center Utrecht, Medical University Gdansk, PXL University of Applied Sciences and Arts, and Lisbon School of Nursing and coordinated at MUG by Anna Supernat, PhD.

IFB comprises 20 teams involved in research activities. In 2024, we organized an open call for a new group leader. Dr. Maciej Adamowski won the position and has now established his own lab. The basic and applied research areas at IFBs cover virology, molecular microbiology, molecular diagnostics, medical and molecular plant biology. These areas are the basis of biotechnology development. The relationships and synergy between these research areas give added value in the form of common thematic areas. Maintaining three main research areas increases the number of interactions between research teams, improves their effectiveness and broadens competence.

The IFB continuously increases the budget for research obtained from various external sources, reaching nearly 7 M EUR in 2024.



In 2024, over 65% of the Faculty budget came from competitive grants from national and international agencies. The key ongoing projects include grants from National Science Centre, (~ 3,3 M EUR), Medical Research Agency (~ 0.6 M EUR), EMBO and ERC grants (~ 0.25 M EUR).



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<https://biotech.ug.edu.pl/>



<https://www.facebook.com/MWB.UGiGUMed>



<https://www.youtube.com/@IFBUGandMUG>



<https://www.linkedin.com/company/intercollegiate-faculty-of-biotechnology/>

XXVII BSS Support

This year's edition of BSS was kindly supported by MegaMocni and KAWA.SKA.



Business profile

We are a supplier of innovative solutions for scientific and research centers in the field of biotechnology. As a trading company, our product portfolio includes devices and consumables used in biology, biophysics, molecular biology, biotechnology, environmental protection, molecular diagnostics, histopathology and quantum optics. We are a Polish company that has been operating for over 24 years. We represent global brands on the domestic market, such as: Leica Microsystems, Leica Biosystems, Pico-Quant, Kurabo, Agena Bioscience, Anathomic Solutions, Cerus, Indica Labs.

Mission

Slogan: "We teach. We advise. We support." is the motto of our daily work. Our overriding goal is to provide substantive support to clients in making decisions that are satisfactory for them, regarding the purchase of research and development equipment that will be best suited and profiled in terms of their research.

Vision

Our future is development. Both the biotechnology market and the solutions we offer, as well as our team. We believe that thanks to the top-class equipment, professional service and substantive support of our specialists, clients receive comfort of work, repeatability of processes and credibility of results. We strive to be a reliable partner for our clients.

Strategy

We believe that the key to success are the latest biotechnological solutions and people who see the potential of modernity. Our employees have extensive knowledge and skills in the field of offered solutions. We conduct microscopy training for our current clients,

as well as for students and researchers who want to deepen their knowledge in the field of microscopy, imaging and to work on the most modern equipment on the market. Our authorized Leica service supports our customers during the installation of devices, as well as during the entire life of the devices purchased from us. As part of marketing activities, we participate in many conferences, seminars and workshops, thus wanting to meet your expectations and make it easier for you to get to know the systems and devices we offer. We are open to new markets and new interesting cooperation proposals.

The beginnings of the company through the eyes of the President

And how did it start? Imagine that although the company is only 24 years old, it all started almost 43 years ago, so in the last century. In 1980, I left the Medical Academy in Warsaw and started working for an American company. The company produced scientific, research and diagnostic equipment. The recipients of this highly specialized equipment were biologists (I am a biologist - geneticist), chemists, physicists, biophysicists and medical diagnosticians.

At that time, access to the application knowledge and technology of Western research and diagnostic centers was very limited. This was the motive for my action aimed at bringing this knowledge and technical solutions closer to Polish users. This is how selling through education began. An American company allocated the appropriate funds for this and in the mid-1980s we started educational activities. Unfortunately, all good things come to an end sometimes. This was to be the case here. The company turned off the money tap. But I decided to continue my educational activities further. Education cannot be interrupted just like that. That is why KAWA.SKA was founded 24 years ago with the mission WE TEACH. WE ADVISE. WE SUPPORT., which sets the direction of our activity to this day.

Have we been successful? I will say immodestly: Yes. We managed to survive crises, overcome difficulties and start another year of existence and activity. The success of our company would not be possible without the wonderful people around. Clients with a vision and willingness to conduct new research, employees with charisma, knowledge and willingness to work, and a family with holy patience. Many, many thanks. I wish us all success together for the next 20 years.

Marian Kawczynski

President of the Management Board of KAWA.SKA

More information about the company:



https://www.facebook.com/people/Kawaska/100039796579365/?paipv=0&eav=AfbKH-22HEK7qG5V3eOsLfg4PXuqYUC2ZdbA-foueaCUcrZdoNGmK-tTn8dxjl4k100I&_rdr



<https://www.linkedin.com/company/kawa-ska/?originalSubdomain=pl>

MegaMocni

MegaMocni is a leading brand in a private sector of nurseries, preschools and schools in Pomeranian district in Poland. The brand, which was founded in Gdansk in 2013, is owned by DyNaMo Creative Development Association.

MegaMocni settings aim to offer high quality education to children and students in order to further support their cognitive, social, emotional and physical development. All settings follow Polish curriculum but our educational offer covers much more than this.



Pedagogical foundations that shape everything that we do are independence and communication. We also offer plenty of opportunities to learn through exploring and experimenting.

Communication

Giving opportunities to speak openly about our thoughts and feelings, using dialogue, interacting through modern technology all contribute to the development of strong communication skills.

Independence

Through acting independently children develop confidence, take challenges, make decisions and ultimately, develop critical thinking skills.

Exploring

Learning through play and active exploration of the world generates positive emotions amongst children which in turn help to develop their concentration skills and lead to effective learning.



Our professional team of pedagogues, psychologists and speech therapists support children's holistic development. We offer specialist guidance to our families and put a lot of focus on staff training so that we can provide exceptional support to children and students in our care. Since 2022 MegaMocni have been particularly engaged in developing social and emotional skills amongst children through Positive Discipline programme that was introduced across the company. We believe that promoting children's



wellbeing in these areas will enable them to become confident communicators and will benefit them in every aspects of their life.

Keeping children safe is our priority. Our commitment to ensure safety in our settings includes daily health and safety checks and regular health and safety and child protection training provided to our staff. We carefully recruit our staff and perform criminal record checks so that only the right people look after children and students in our care. Additionally, our settings are equipped in monitoring systems and intercom on sites.

MegaMocni are aware of the importance of educational environment that surrounds children and students. Our beautiful and spacious settings are designed and decorated to enrich learning experiences and support children's focus. All spaces are adjusted to children's needs, interests and developmental abilities. All of our facilities cater for children with health issues such as asthma, diabetes or food intolerance.

Our modern facilities are located in some of the key districts of Gdańsk (Jasień, PG, Strzyża, Suchanino, Stogi, Ujeścisko, Zaspą), Gdynia (Mały Kack), as well as in Banino, Borkowo, Rotmanka, Gościcino and Gowidlino. In addition to nurseries and preschools, we also run a primary school in Gowidlino. In September 2023 two new settings will be opened: in Rotmanka and in Gdańsk, the latter in cooperation with the Gdańsk University of Technology.

Learn more about us at www.megamocni.edu.pl

Speakers Introduction

Prof. Jane Parker

Max-Planck Institute for Plant Breeding Research
Max-Planck Institute, Cologne, Germany



Professor Jane Parker is internationally recognized for her research on plant immunity. Her main interest is to understand how plants and pathogenic microbes communicate and mechanisms plants have evolved to effectively combat disease. She received her PhD at The University of Wales, Swansea UK in 1987. Since 2001 Parker has been a Senior Research Group Leader at The Max-Planck Institute for Plant Breeding Research in Cologne, Germany.

Parker has made leading contributions to identifying and characterizing genetic and biochemical pathways which regulate immune responses in seed plants. She has contributed to the recent discovery of plant nucleotide-based immune second messengers and their modes of action in host disease resistance and cell death. These findings have significance for fundamental plant biology and modern agriculture.

Talk abstract: see page 55 (Opening lecture)

Prof. Johnathan A. Napier

Rothamsted Research, Harpenden, England



Professor Jonathan A. Napier is a Science Director at Rothamsted Research. Originally from County Down, Northern Ireland, Johnathan obtained his BSc in Agricultural Sciences from the University of Nottingham, followed by a PhD in plant biochemistry from King's College, London. He carried out post-doctoral research at the University of Cambridge, then taking up a position at Long Ashton Research Station in Bristol. His research group relocated to Rothamsted Research in 2003 where he is currently Science Director. Johnathan is also an Affiliated Lecturer at the University of Cambridge and Honorary Professor at the Institute of Aquaculture, University of Stirling. He has published over 200 peer-reviewed papers and is the inventor on multiple granted patents relating

to the biotechnology of plant oils. He was awarded his DSc from the University of Nottingham in 2006 for outstanding contributions to the field of plant lipid research. He is passionate about the importance of public engagement in gaining social license for new technologies and is a regular contributor to discussions about GM food and agriculture. Johnathan is currently Editor-in-Chief of Plant Biotechnology Journal.

Talk abstract: see page 56 (Lecture 2)

Prof. Agnieszka Zienkiewicz

Centre for Modern Interdisciplinary Technologies
Nicolaus Copernicus University in Toruń, Poland



Dr hab. Agnieszka Zienkiewicz, prof. UMK is an Associate Professor and group leader at the Centre for Modern Interdisciplinary Technologies of Nicolaus Copernicus University in Toruń.

In 2002, she completed her master's degree in biology, and in 2007, she obtained her PhD from the then Faculty of Biology and Earth Sciences at UMK (now the Faculty of Biological and Veterinary Sciences). From 2008 to 2014 she worked as post-doctoral fellow at the Estación Experimental del Zaidín (EEZ) Institute in Granada, which is part of the Consejo Superior de Investigaciones Científicas (CSIC) network in Spain. In 2014 she moved to the Michigan State University (East Lansing, USA)

and she joined the group of Prof. Christopher Benning. From 2016 to 2020, she continued her research at the University of Göttingen (Germany) in the Department of Plant Biochemistry, led by Prof. Ivo Feussner.

Currently, as the principal investigator of two research grants funded by the National Science Centre (OPUS 18 and Sonata Bis 9), she conducts studies on lipid metabolism in the cells of higher plants.

Talk abstract: see page 57 (Lecture 3)

Prof. Krzysztof Zienkiewicz

Centre for Modern Interdisciplinary Technologies
Nicolaus Copernicus University, Toruń, Poland.



Dr hab. Krzysztof Zienkiewicz, prof. UMK is an Associate Professor at the Centre for Modern Interdisciplinary Technologies of Nicolaus Copernicus University in Toruń.

In 2002 he obtained Master Degree in biological sciences and in 2006 he was awarded a PhD at the then faculty of Biology and Earth Sciences of Nicolaus Copernicus University in Toruń (currently the Faculty of Biology and Veterinary Sciences). In 2008-2014 he completed his first of the three long-term postdoctoral internships at the Estación Experimental del Zaidín (EEZ) institute in Granada, which belongs to Spanish network of Consejo Superior de Investigaciones Científicas (CSIC). From 2014 to 2016, as a beneficiary of the Marie Skłodowska-Curie fellowship, he completed two long-term scientific internships – the first, two year-long, at the Michigan State University (East Lansing, USA) in the group of prof. Christoph Benning, and the second one, one year-long, at the University of Göttingen (Germany) in the Department of Plant Biochemistry, headed by prof. Ivo Feussner. He continued his scientific work at this prestigious university until 2020, when he returned to his alma mater in Toruń, where he continues research on lipid metabolism in microalgae cells with a high potential for biofuel production.

Talk abstract: see page 58 (Lecture 4)

Prof. Arthur Korte

Center of Computational and Theoretical Biology
University of Würzburg, Würzburg, Germany



Arthur Korte is a German plant biologist specializing in molecular and evolutionary genomics. He earned his PhD in Botany from TU Munich in 2009 before conducting postdoctoral research at the Gregor-Mendel Institute in Vienna. His expertise lies in computational and theoretical biology, with a particular focus on plant adaptation. From 2015 to 2021, he was a Junior Professor of Evolutionary Genomics at the University of Würzburg and has since held interim professorships in plant ecophysiology. His research in basic plant biology and quantitative genetics has earned widespread

recognition. He has published over 50 papers, accumulating more than 10,000 citations, with an h-index of 32. In 2022, he obtained a *Venia Legendi* in Computational and Theoretical Biology. Currently, he serves as an interim professor of Molecular Plant Biology at the University of Würzburg. Outside academia, he lives in Frankfurt, Germany, and enjoys rock climbing.

Talk abstract: see page 59 (Lecture 5)

Oana Dima, PhD

Science Policy Manager

VIB-Ghent University Center for Plant Systems Biology, Gent, Belgium



Oana Dima is Science Policy Manager at VIB-Ghent University Center for Plant Systems Biology. In her daily work, she shapes the European and international policies related to crop improvement using new plant breeding techniques including genome editing. In addition, she coordinates the activities of the European Sustainable Agriculture through Genome Editing (EU-SAGE) network, which consists of over 150 research institutes and associations across Europe.

Oana Dima is passionate to facilitate open dialogues on the latest technological advancements in plant sciences and to contribute to the policy environment through consultation, education and discussion on the European level. During her PhD in Belgium in the frame of the Stanford's University Global Climate and Energy Project, she researched the lignification process in the context of biofuel production. Currently, as Science Policy Manager at VIB-Ugent and Managing Director of EU-SAGE, she facilitates shaping policies to enable genome editing in plants for the transition to sustainable agriculture in Europe.

Talk abstract: see page 60 (Lecture 6)

Magdalena Miklaszewska, PhD

Faculty of Biology, Center for Biotechnology (CeBiTec)
Bielefeld University, Bielefeld, Germany



Dr. Magdalena Miklaszewska is a Marie Skłodowska-Curie Postdoctoral Fellow at the Center for Biotechnology (CeBiTec), Bielefeld University (Germany), where she explores the potential of oleaginous microalgae for wax ester production. She also holds a position as an Assistant Professor at the Department of Plant Physiology and Biotechnology, Faculty of Biology, University of Gdansk (Poland).

Magdalena obtained her PhD in Biochemistry in 2015 from the Intercollegiate Faculty of Biotechnology UG-MUG. From 2018 to 2020, she was a Visiting Postdoctoral Researcher at the Department of Plant Biochemistry, University of Göttingen, supported by the Polish Ministry of Science and Higher Education through the Mobility Plus Program. During this time, she worked under the supervision of Prof. Ivo Feussner and Prof. Agnieszka Zienkiewicz. She also received several international scholarships, including a DAAD Fellowship and a French Embassy Scholarship supporting a scientific stay at the Laboratory of Membrane Biogenesis, CNRS/Bordeaux University (France). Between 2021 and 2024, she held a Postdoctoral Fellowship within the REWIRE (REinforcing Women In REsearch) Programme at the University of Vienna.

Her research focuses on lipid metabolism and metabolic engineering of photosynthetic organisms, with a particular interest in the production of industrially valuable lipids in microalgae and plants through synthetic biology approaches.

Talk abstract: see page 61 (Lecture 7)

Prof. Per Hofvander

Department of Plant Breeding
Swedish University of Agricultural Sciences, Alnarp, Sweden



Per Hofvander is an Associate Professor, Division Manager and Subject Leader Plant Biotechnology at the Department of Plant Breeding at the Swedish University of Agricultural Sciences (SLU). His research spans both basic and applied plant biotechnology, integrating academic and industry experience. He focuses on the genetic regulation of transitions from vegetative to reproductive and storage organ development including the molecular biology and biochemistry of storage products as starch, oil and protein, as well as the advancement of gene editing technologies. One of the areas of his work is the regulation of storage compound accumulation in sink tissues such as seeds and tubers, aiming to uncover genetic circuits and motifs that control the formation of our major food components. He also investigates how genetic and environmental in-

teractions affect tuberization and sink development in potato, with the goal of improving potato cultivation under long-days and/or heat stress. His research further explores the starch biosynthesis in potato to develop novel starch qualities for industrial and food applications. He also works on optimizing plant architecture and breeding strategies for faba bean. He is also involved in the production of insect pheromone precursors and wax esters as part of the oil in seeds of *Camelina sativa*, contributing to the development of environmentally friendly pest management strategies.

His research has contributed to the formation of two plant biotech companies and resulted in ten patent applications. In addition to research, he teaches and supervises undergraduate, graduate, and PhD students in molecular biology, metabolism, bioinformatics, and regulatory frameworks for plant breeding.

Talk abstract: see page 63 (Lecture 8)

Monika Kałużna, PhD

Plant Pathology Department

The National Institute of Horticultural Research, Skierniewice, Poland.



Monika Kałużna is a researcher in Plant Pathology Department of The National Institute of Horticultural Research, Skierniewice, Poland. She has completed her PhD in 2014. During her PhD she worked on phenotypic and genotypic characterization of *Pseudomonas syringae* pathovars causing bacterial canker of stone fruit trees. Then extended her work to include bacteria of *Xanthomonas* genus and based on the results obtained in 2024 she did habilitation on biological diversity of the most harmful pathogenic bacteria for fruit plants.

Her main research activities are concentrated on bacterial diseases of fruit plants, ornamental plants and vegetables studying etiology and epidemiology of the diseases, molecular biology of pathogens, bacterial taxonomy including development of methods for their detection and description of the new taxa.

She has published over 30 publications in journals with IF, over 70 presentations on international and national conferences as well about 80 other scientific articles.

Talk abstract: see page 64 (Lecture 9)

Prof. Elżbieta Sarnowska

Laboratory of Experimental Immunotherapy

Maria Skłodowska-Curie National Institute of Oncology, Warsaw, Poland



Professor Elżbieta Sarnowska is an outstanding researcher in the field of genetics and molecular biology. At the Maria Skłodowska-Curie National Institute of Oncology – National Research Institute, she heads the Laboratory of Experimental Immunotherapy. Her work focuses on the mechanisms of the immune system's response to developing cancer and on the search for new therapeutic strategies based on cancer immunology.

Prof. Sarnowska's team is also conducting, m.in, work on the development of CAR-T therapy, nano-antibody technology and mechanisms of T cell depletion by cancer, as well as many grant projects. He constantly cooperates with research units and

clinicians from NIO-NRI, as well as with experts and leading researchers from Poland and abroad

Prof. Sarnowska has completed numerous scientific internships at the renowned Max Planck Institute in Cologne, and maintains constant cooperation with leading research centers in the world, m.in: the University of Leeds (Great Britain), the Max Planck Institutes in Cologne and Golm (Germany), the National Cancer Institute (NCI) in Bethesda (USA) and the MD Anderson Cancer Center in Houston (USA).

The Professor is also the initiator and originator of the Warsaw Conference on Perspectives of Molecular Oncology series of international scientific conferences, which have already been hosted nine times by the National Institute of Molecular Oncology. This conference, which is a permanent fixture in the calendar of scientific events in Central Europe, is an important forum for the exchange of knowledge and experience between researchers from all over the world dealing with the molecular basis of cancer and innovative strategies of oncological therapy.

Talk abstract: see page 65 (Lecture 10)

Prof. Tomasz Sarnowski

Institute of Biochemistry and Biophysics
Polish Academy of Sciences, Warsaw, Poland



Since 1998, Prof. Tomasz J. Sarnowski has been associated with the Institute of Biochemistry and Biophysics of the Polish Academy of Sciences (IBB PAS), where he completed his doctoral dissertation. In January 2021, he became the head of the Laboratory of the Regulation of Gene Expression at IBB PAS. From 2008 to 2010, he conducted a postdoctoral fellowship under the prestigious Marie-Curie Intra-European Fellowship at the Max Planck Institute in Cologne, where he holds the status of a guest scientist. In 2010, Prof. Sarnowski was awarded the Marie-Curie Re-Integration

grant (FP7), a highly competitive and prestigious honor.

Prof. Sarnowski is the author of numerous publications in the fields of molecular biology, genetics, and oncology. He promotes the use of various model systems, including *Arabidopsis*, shrimp, and human cell lines, to better understand the processes disturbed in cancer diseases, particularly those related to epigenetics. His current research focuses on deciphering the molecular mechanisms underlying the development and progression of clear cell renal cell carcinoma, advanced bladder cancer, and salivary gland adenoid cystic carcinoma.

Together with his team and collaborators, Prof. Sarnowski has demonstrated that membrane kinase receptors, such as ERECTA in *Arabidopsis* and HER2 in humans, can migrate to the nucleus and interact with SWI/SNF chromatin remodeling complexes, thereby influencing gene expression regulation.

Prof. Sarnowski's research group collaborates extensively with both domestic and international institutions, including the University of Leeds, the National Cancer Institute, two Max Planck Institutes in Germany, and Mahidol University in Thailand. Since 2003, he has maintained a close collaboration with the Maria Skłodowska-Curie National Research Institute of Oncology.

Throughout his career, Prof. Sarnowski has received numerous accolades, including scientific prizes from the Polish Society of Clinical Oncology, the European Society for Medical Oncology (ESMO), and the Scientific Council of IBB PAS. Furthermore, his protein purification technology was awarded promotion in the EU Technology Market-place.

Talk abstract: see page 65 (Lecture 10)

Prof. Agnieszka Nielsen

Triatomic, Carlsberg Group
University of Copenhagen, Copenhagen, Denmark



My main drive is to facilitate and build research driven biosolutions with interdisciplinary partnerships in the plant and food sector. I combine experience from scientific research from university of Copenhagen and commercial innovation consultancy. Lately, I specialize in inter-disciplinary collaborations and translate research into impact.

I experienced linking innovation between industry with academic research in the agri-food biotechnology sector working in a Carlsberg group spin out company. I focus on plant-based foods, health enhancers but also new breeding tools for crops and microbes in the agri-food industry and research sectors.

Talk abstract: see page 67 (Workshop 1)

Prof. Daniel Mertens

German Cancer Research Centre, Heidelberg, Germany

University Hospital Ulm, Ulm, Germany



Prof. Dr. rer. nat. Daniel Mertens heads two research groups, one group at the German Cancer Research Centre (DKFZ) in Heidelberg and a research group at the University Hospital Ulm. As a scientist, Daniel Mertens is the author of 101 publications that have been cited 5753 times by colleagues (<https://www.webofscience.com/wos/author/record/1318302>). He has received € 6.77 million in grants from external third-party funders for his research and coordinated international research networks (cancerepisys.org and leukemia-resistance.de). Since 2011, he has been training scientists, physicians, administrators and staff in transferable skills (www.scientist-sneedmore.de). So far, >9000 participants took

part in international workshops in Europe, USA and Africa. Since 2023 he empowered 5754 participants in 126 workshops to apply AI tools in their everyday lives. After the workshops, 80.4% of participants said they will make implementation of artificial intelligence a top priority.

Talk abstract: see page 68 (Workshop 2)

Prof. Paweł Bednarek

Institute of Bioorganic Chemistry
Polish Academy of Sciences, Poznań, Poland



Professor Paweł Bednarek is group leader at the Institute of Bioorganic Chemistry, Polish Academy of Sciences in Poznań, Poland. He received his PhD at the same institution in 2001 and carried out post-doctoral research at the Max Planck Institute for Plant Breeding Research in Cologne, Germany. Paweł's scientific interest focuses on the function of plant specialized metabolites in plant-microbe interactions. This includes metabolomic investigation of plant response to microbial colonization, identification of enzymatic and regulatory components of the corresponding metabolic pathways and functional characterization of the respective end products. His research focuses mainly on tryptophan-derived metabolites known as indole glucosinolates and indole phytoalexins that appeared to be indispensable for proper immune responses in the model plant *Arabidopsis thaliana* and other Brassicaceae species. In addition to the functional characterization these metabolic pathways, he is also interested in their evolution in the context of plant-pathogen arms race.

Talk abstract: see page 69 (Lecture 11)

Prof. Alessio Mengoni

Department of Biology
the University of Florence, Italy.



Alessio Mengoni is a professor of genetics in the Department of Biology at the University of Florence, Italy. He graduated in biology and obtained a PhD in genetics from the University of Pavia, Italy, in 2000. During his PhD, he worked on the evolutionary genetics of plants, then shifted his focus to studying microbial communities. He also conducted research at SCK-CEN in Belgium and at the Vrije Universiteit in Amsterdam. He has been a visiting professor at the universities of Gdansk in Poland and Guangzhou (Sun Yat-sen University) in China, where he taught courses in genomics and systems biology.

His main research interests revolve around studying bacterial genome evolution, especially concerning plant-microorganism interactions and symbiosis, for designing applications in agricultural and environmental biotechnology.

He is the author of over 200 scientific articles and a founding associate of a spin-off company from the University of Florence (EcolGene S.r.l.) specializing in microbiological and genetic analysis.

Talk abstract: see page 70 (Lecture 12)

Prof. Magdalena Frąć

Institute of Agrophysics

Polish Academy of Sciences, Lublin, Poland



Magdalena Frąć is the Professor in agricultural sciences at the Institute of Agrophysics, Polish Academy of Sciences in Lublin, Poland. She is the Head of Department of Soil and Plant System and Supervisor of her Laboratory of Molecular and Environmental Microbiology, which organised. She set up and is chair-holder of the Molecular and Environmental Microbiology group with >15 years of experience in research in microbial activity and biochemical properties, including microbiomes in agroecosystems, functional and genetic diversity of soil microbial communities. She is also focused on agricultural organic production of healthy food, waste utilization and valorization, bioproducts and biofertilizers for agroecology, microbial indicators of soil quality and micro

biological markers of ecological soil status as well as soil, plant and food health. Her interests concern plant-soil-microbiome interactions, plant holobiont concept, and biotechnological solutions for diagnostics, control and monitoring of key pathogens in sustainable agriculture. Soil mycology, phytopathogenic fungi and heat-resistant fungi are also of her interest. Other relevant experiences include coordination and implementation of national (NCN, NCBR, MNSzW) and international (Horizon Europe, H2020, EJP SOIL, ERA-NET SusCrop, Eastern Poland Programme) research and infrastructure projects (~10 Mio €).

Talk abstract: see page 71 (Closing lecture)

**Lecture 2: The Road Less Travelled – Translating Discovery
into Product: Lessons from the Rothamsted Omega-3
Project Or: “Making Fish Oils in Plants”**

Prof. Johnathan A. Napier

Rothamsted Research, Harpenden, England

For over two decades now we have been evaluating the production of omega-3 fish oils in transgenic plants, to provide a sustainable source of these important nutrients independent of oceanic sources. Attempts to metabolically engineer plants with the biosynthetic pathway for these fatty acids has ultimately led to the production of a transgenic oilseed crop (*Camelina sativa*) which contains over 20% EPA+DHA in its seed oil. This omega-3 trait represents the most complex plant metabolic engineering trait to attempt the transition from a research phase into development, regulatory approval and commercialisation, and all of these represent activities beyond the normal scope of academic research. Given the pressing need for answers to the global challenges facing the human race, increased focus and effort could be placed on translation and my talk will consider how this can be achieved without comprising curiosity-driven research. Specifically, there are lessons from our omega-3 project which might yield useful learnings. The fact that it takes 25 years to get to a point where impact is only now likely to be realised also confirms the need for realistic estimates in the time required for basic research to delivery societal benefits. In addition, the challenges of carrying out GM field trials will be considered, along with the regulatory and IP hurdles associated with using proprietary technology.

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Lecture 3: Lipid Engineering in Plants: From Growth and Development to Sustainable Industrial Applications

Prof. Agnieszka Zienkiewicz

Centre for Modern Interdisciplinary Technologies

Nicolaus Copernicus University in Toruń, Poland

Neutral lipids (triacylglycerols; TAGs) play essential roles in plant growth and development and also serve as edible oils, animal feed components, and sustainable feedstocks for the chemical industry and biofuel production. Therefore, enhancing TAG synthesis in plant tissues represents a promising strategy to increase the energy density of crop biomass. One approach to boosting TAG biosynthesis involves a combined strategy: increasing fatty acid (FA) production (push), enhancing TAG assembly (pull), and reducing TAG degradation (protect). The *push* strategy focuses on stimulating FA synthesis in plastids to elevate FA levels, followed by their incorporation into TAGs in the endoplasmic reticulum (ER). Efficient assembly of FA into TAGs at the ER can be achieved through metabolic engineering of key biosynthetic enzymes such as diacylglycerol acyltransferase (DGAT). Since TAGs are stored in lipid droplets (LDs), the protect strategy aims to inhibit LDs degradation and enhance LDs stability. During the lecture we will explore the role of TAGs in plant growth and development as well their potential industrial applications. We will also discuss the genetic and metabolic engineering techniques designed to implement the push–pull–protect approach and their relevance for improving the energy content of crop biomass. Funding: This research was financially supported by the project no. 2019/34/E/NZ1/00023 from the Polish National Science Center (NCN).

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Lecture 4: Microalgae, Lipids and Biofuels: A Sustainable Connection

Prof. Krzysztof Zienkiewicz

Centre for Modern Interdisciplinary Technologies
Nicolaus Copernicus University, Toruń, Poland

As the global community confronts escalating climate and energy challenges, biofuels have emerged as a promising but complex solution. This lecture examines the transformative potential of microalgae as a sustainable source of biofuel. We begin by contextualizing the urgency of the biofuel transition through a snapshot of global energy trends, fossil fuel dependence, and emissions, highlighting why traditional crops fall short in addressing these issues. The second part of the lecture will explore the evolution of biofuel technologies, from wood and vegetable oil to modern-day ethanol and biodiesel. Here, the special focus will be placed on microalgae, highlighting their exceptional attributes: rapid growth, minimal land and water requirements, high CO₂ fixation, and non-competition with agriculture. Third part of the lecture will explore why, despite these advantages, commercialization of microalgae-based biofuels remains hindered by challenges in biomass and oil production. We will discuss how biotechnological tools such as genetic engineering and synthetic biology could help to overcome these obstacles. To bridge our lab findings with real-world impact, we will also review ongoing pilot projects, global policy frameworks, and the economic landscape that shape the viability of algal biofuels. The research leading to these results has received funding from National Science Centre of Poland (NCN) in the frame of OPUS-18 grant no. 2019/35/B/NZ9/01075.

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Lecture 5: Genome-Wide Association Studies (GWAS): Modern Approaches and Applications in Plant Science

Prof. Arthur Korte

Center of Computational and Theoretical Biology
University of Würzburg, Würzburg, Germany

Understanding the causal relationship between genotype and phenotype is a primary goal in biology. Here, Genome-Wide Association Studies (GWAS) have become a powerful tool to exploit the natural genetic variation across diverse populations and uncover the genetic basis of complex traits in many organism. These methods enable the connection of genetic variations within a population to distinct phenotypes and have wide-reaching applications in breeding, biotechnology, and crop improvement. GWAS enables the identification of genetic loci associated with important agronomic traits, such as yield, stress tolerance, and disease resistance. Recent advances in GWAS methodology—including the use of whole-genome sequencing data, advanced statistics, and multi-locus approaches—have greatly improved mapping resolution, statistical power, and the ability to control for false associations and population structure. Additionally, integrating GWAS with other omics data, such as transcriptomics and metabolomics, offers deeper insights into gene function and regulatory networks. This session will introduce the latest GWAS strategies, highlight practical applications in plant research, and discuss how GWAS can drive innovation in plant breeding and biotechnology.

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Lecture 6: European Sustainable Agriculture Through Genome Editing – the role of scientists in policy making

Oana Dima, PhD

VIB Center for Plant Systems Biology, Ghent, Belgium

The EU has set ambitious targets in the recently published Vision for agriculture and food, fostering trust and dialogue across the value chain within the EU and globally. Today, following pandemics and the current geopolitical situation, it is even more clear that we need immediate solutions for food security and to address agri-food sector's competitiveness and attractiveness. Genome editing of plants has the potential to make a critical contribution to this transition because it enables the development of the next generation of crops with high precision and efficiency.

However, the current EU legislation subjects all crop varieties obtained using genome editing techniques under strict GMO regulations, which de facto blocks Europe from using and cultivating these crops. The European Sustainable Agriculture through Genome Editing (EU-SAGE) network, representing researchers from 150 leading European plant science institutes and learned societies, is convinced that Europe needs to enable applications of genome editing through developing science-based policies. Today, I will present to you how researchers in Europe are contributing to the policy environment for instance with the launch of an interactive, publicly accessible online database. I will also give an update on the current regulatory landscape of genome-edited crops in Europe and worldwide.

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Lecture 7: Exploring Marie Skłodowska-Curie Actions: Opportunities and Application Tips

Magdalena Miklaszewska, PhD

Faculty of Biology, Center for Biotechnology (CeBiTec)
Bielefeld University, Bielefeld, Germany

The Marie Skłodowska-Curie Actions (MSCA) are a flagship funding programme of the European Union under Horizon Europe, aimed at supporting researchers by offering opportunities for training, international mobility, and career development. Designed to foster scientific excellence and international cooperation, MSCA enables both doctoral and postdoctoral researchers to conduct high-quality research in different countries and sectors.

In my talk, I will focus on three types of MSCA: Doctoral Networks, COFUND, and Postdoctoral Fellowships.

Doctoral Networks (DN) provide funding for international PhD training programmes proposed by partnerships of universities, research institutes, or companies. These consortia apply for funding and, upon selection, recruit PhD candidates to offer them research positions, combined with research training and transferable skills development.

COFUND, on the other hand, supports organisations, such as universities, research institutes, companies, or public bodies, to set up their own doctoral and postdoctoral programmes. Each application is submitted by a single legal entity, which complements the EU contribution with its own resources and is responsible for recruiting researchers.

Unlike DN and COFUND, which are open to institutions, Postdoctoral Fellowships (PF) are aimed at individual researchers who already hold a PhD. The programme supports career development through personalised research projects involving international mobility, interdisciplinary training, and collaboration across sectors. Funding covers the researchers' employment for the entire duration of the fellowship, along with costs related to research, training, networking, and project management. There are two main types of PF: European PF, for research within Europe, and Global PF, which include an outgoing phase outside Europe followed by a mandatory return to a European host institution.

During the presentation, I will explain how to find information about open calls for DN and COFUND programmes, and provide examples of application documents for these actions. For PF, I will discuss all parts of the application form in detail and highlight key elements of a strong proposal. Throughout the talk, I will also share my own experiences with applying to MSCA programmes, offering practical tips and personal insights into the proposal preparation process.

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Lecture 8: Insect pheromone precursors in Camelina oil and their use in chemical conversion for pest management

Prof. Per Hofvander

Department of Plant Breeding

Swedish University of Agricultural Sciences, Alnarp, Sweden

Many insect sex pheromones are blends of modified fatty acids in the form of aldehydes, alcohols and acetates. Carbon chain lengths between 12 and 16 are very common and they are usually monounsaturated with specific double bond positions and stereochemistry features. Synthetic insect pheromones are produced in large volumes and used for mating disruption of insect pests in field crops and in orchards. The market is increasing as it is a very specific and environmentally benign form of insect pest management. High costs provide an obstacle though for increasing the number of target insects and applications. We aim to produce pheromone precursors as fatty acids attached to the glycerol backbone as part of the vegetable oil in the oil crop Camelina. In a first generation, transformation was performed with thioesterases from *Cuphea* to release 14 or 16 carbon acyl-CoA combined with desaturases from specific insects yielded oil of three different types, containing E11-14:acid, a mix of E11-14:acid and Z11-14:acid, and Z11-16:acid respectively. Extracted oil from field grown plants was processed to pheromone blends with subsequent successful application for controlling important pests in agriculture. Camelina derived pheromones were as efficient attractants as a synthetic pheromone blends. This paves the way for a green production of insect pheromones for environmentally benign pest management.

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Lecture 9: Do our plants also 'get sick' – diagnostics of plant diseases

Monika Kałużna, PhD

The National Institute of Horticultural Research
Skierniewice, Poland

Plants, like humans and animals, are exposed to various factors, both biotic and abiotic, occurring in a given environment. Some can have a beneficial effect on plants, stimulating their growth and yield, while others can have a harmful effect and even cause their death. The causal agents of infectious diseases (necrogens, macrogens and oncogenes) that cause disease symptoms on underground and above-ground plant organs deserve special attention. These include wilting, spots, necrosis, blight, rot, cankers or tumors, which often lead to the death of entire plants. Some of them produce so-called etiological signs, i.e. symptoms characteristic of a given pathogen, e.g. mycelium, fruiting bodies, spore formation, mucoid discharge. The visible morphological changes caused by various bacteria, fungi and viruses are often similar and then diagnostic analysis using serological and molecular biology methods is necessary to determine the primary perpetrator. Correct diagnosis of diseases is of great importance in the application of the appropriate strategy for their control. The talk will present current knowledge about the most common plants diseases in pomology plants with focus on bacterial diseases, detection methods of their causal agents and possibilities of limiting of their occurrence.

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NOTES

Lecture 10: Unraveling Cancer's Regulatory Secrets through *Arabidopsis thaliana*: Insights from a Model Plant

Elzbieta Sarnowska¹, Tomasz J. Sarnowski^{2,3}

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² Institute of Biochemistry and Biophysics Polish Academy of Sciences, Warsaw, Poland

³ Max-Planck Institute for Plant Breeding Research, Cologne, Germany

In 2019, cancer was responsible for approximately 25% of male deaths and 23% of female deaths in Poland. Given the scale of this health challenge, research into the mechanisms underlying tumor formation and progression, using diverse model systems, is of vital importance. *Arabidopsis thaliana* provides an excellent model for investigating key regulatory processes that govern cellular and organismal function, including the epigenetic control of gene expression.

In our work, we use *Arabidopsis* and human cancer cell line models to gain insight into regulatory pathways that are impaired in cancer or may contribute to carcinogenesis. Malignant tumors are frequently marked by defects in the control of gene expression. Strikingly, about 25% of all cancers carry mutations in genes encoding subunits of the SWI/SNF chromatin remodeling complex, an evolutionarily conserved epigenetic regulator that remodels chromatin to control gene expression.

By studying viable *Arabidopsis* lines with mutations in SWI/SNF subunits, we uncovered previously unrecognized interdependencies between ATP-dependent chromatin remodeling and a range of regulatory pathways, including kinases involved in metabolism and plasma membrane receptors. We further demonstrated that the human counterparts of these factors, often implicated in cancer development and progression, are subject to similar modes of regulation, suggesting a conserved paradigm for transcriptional control of gene expression.

Our findings also enabled us to propose a number of novel molecular targets, which may form the basis for innovative cancer therapies, including approaches that exploit the concept of synthetic lethality.

Funding: National Science Centre 2018/30/M/NZ1/00180

NOTES

Career session: Evolving Beyond Academia: Navigating Challenges and Skills in the Transition from Academia into AgTech

Prof. Agnieszka Nielsen

Traitomic, Carlsberg Group,
Copenhagen, Dania

With an academic background in plant molecular biology, I build and manage research projects from precompetitive to applied research levels. I currently bridge innovation between industry with academic research in the agri-food biotechnology sector. I focus on plant-based foods, health enhancers or process and quality monitoring. Combining experience from both academic (University of Copenhagen) and startup sector (Aresa and Traitomic-owned by Carlsberg group), I currently scout and establish strategic and innovative partnerships between university of Copenhagen and agtech industry for future crops and microbes in the agri-food industry sector.

I will present how to combine experience from scientific research and commercial innovation consultancy in order to connect ideas to create impact.

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NOTES

Workshop: Next Level Productivity using AI Assistants for Scientists

Prof. Daniel Mertens

German Cancer Research Centre, Heidelberg, Germany
University Hospital Ulm, Ulm, Germany

This intensive workshop, led by Prof. Daniel Mertens, is designed to empower scientists to harness the transformative potential of artificial intelligence in their research and professional development.

The workshop provides a comprehensive and practical curriculum. The morning session focuses on mastering AI tools (like Perplexity, You.com, Claude, and ChatGPT) through advanced prompting techniques for efficient information retrieval and idea generation. The afternoon session is divided into two parts: first, applying AI to objectify literature reviews, enhance scientific writing for manuscripts and grants, and manage social media outreach. Second, we explore using AI for data analysis and the creation of publication-quality visuals and graphical abstracts, while also discussing the crucial ethical and regulatory considerations of AI in science.

Participants will leave with a robust toolkit of practical AI competencies, ready to significantly enhance their research productivity, scientific communication, and daily workflow.

Contact: d.mertens@dkfz.de

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Lecture 11: **Function of tryptophan-derived metabolites in the immunity of model Brassicaceae plant species**

Prof. Paweł Bednarek

Institute of Bioorganic Chemistry
Polish Academy of Sciences, Poznań, Poland

Induced defense responses in plants usually involve biosynthesis of antimicrobial metabolites. Our study on the model plant *Arabidopsis thaliana* and other Brassicaceae species revealed a pathogen triggered metabolism pathway for indole glucosinolate (IG) metabolism. We characterized several enzymatic components of this pathway together with respective end products. In addition to IG-metabolism, pathogen invasion in *Arabidopsis* triggers biosynthesis of other Trp-derived metabolites, including indole-3-carboxylic acids and camalexin. As indicated by susceptibility of mutants defective in distinct branches of Trp- and IG-metabolism, respective end products are critical for *Arabidopsis* immunity against a number of fungal and oomycete pathogens. Interestingly, particular compounds provided by these metabolic pathways play independent roles in the pre- and post-invasive stages of defense against those pathogens.

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Lecture 12: Does microbial epigenetics could be the next target for improving bacteria-plant interaction?

Prof. Alessio Mengoni

Department of Biology
University of Florence, Italy

Epigenetic information (as DNA methylation and post-translational modification of histones) has been shown to be pivotal in the control of several biological phenomena in eukaryotes, such as cellular differentiation, development and pathogenesis. In prokaryotes, DNA methylation is the primary means of epigenetic gene regulation and has found to be involved in many molecular mechanisms such as DNA repair, DNA-protein interactions, gene expression, cell cycle progression and self-DNA recognition mediated by Restriction-Modification (R-M) systems. Novel information gained in recent years on DNA methylation in bacteria, are delving into transcriptional regulation and the formation of phenotypic cell variants. In plant symbiotic bacteria, as the model nitrogen-fixing rhizobia, a large variety of DNA methylated motifs has recently been disclosed, even from strains of same rhizobial species, with a shared set of motifs (a “shell epigenome”) and a variable number of methylated DNA motifs (a “cloud epigenome”). Moreover, changes in genome-wide methylation patterns during differentiation into host plants have been observed. This large variability and uneven occurrence of methylated motifs in rhizobia genomes led to hypothesize a role of epigenome in interaction with plant, and hence on rhizobium variability in symbiotic performances. Indeed, peculiar strain-by-strain differences in transcriptome following early interaction with host plants and soil beneficial fungi have been reported, now studies are ongoing to link such differences to epigenome variation.

The talk will present current knowledge and advancements, suggesting that bacterial epigenomics could be relevant to develop tailored bioinoculants of plant symbiotic bacteria to be used in agricultural applications.

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Lecture 13: Microbiomes in agroecosystems – the importance of the plant holobiont and soil microbiomes for the development of sustainable strategies of crop cultivation

Prof. Magdalena Frąć

Institute of Agrophysics,
Polish Academy of Sciences, Lublin, Poland

The microbiomes of agroecosystems have immense potential, performing diverse and relevant functions, and are crucial for maintaining the quality of the agricultural environment. Changes of soil and plant microbiomes and mycobiomes can be sensitive biomarkers under different biotic and abiotic stresses. Moreover, microbiomes can help develop biotechnological solutions for sustainable and organic agriculture and horticulture, including biopreparations, detection methods for pathogens, as well as deepening knowledge on predicting healthy and unhealthy soil and plants.

Plants are recognised as holobionts that coexist with microorganisms in various ecological niches, including compartments such as the rhizosphere, roots, shoots, fruit, flowers, and seeds, as well as epiphytic, endophytic, saprotrophic, symbiotrophic, and pathobiotic microbes. Microbes associated with various compartments are transferred horizontally or vertically across plants, influencing the behaviour, metabolism, and physiology of plants. They can improve the adaptation of plants to climate change and (a)biotic stresses. The phyllosphere and all above-ground organs are connected to the atmosphere and serve as an interface for permanent exchange with the air microbiome. The rhizosphere represents the plant–soil interface, from which organic material and signalling compounds migrate into subsoil zones, facilitating long-term mineralisation processes. Healthy plants are associated with their microorganisms through metabolic cooperation and the exchange of signals, hormones, and nutrients. Diseases are characterised by a microbial dysbiosis and a response of specific microbes, which can act as antagonists or synergists towards pathogens.

Therefore, one critical innovative goal for the practical use of microbiomes to develop tools and strategies to support healthy soil and plants is to recognise the transfer of microbiomes across different compartments of healthy and unhealthy agroecosystems, as well as between other plants, such as those cultivated in intercropping.

Microbiomes in agroecosystems are relevant to develop sustainable strategies of crop cultivation as a new vision of resilient agriculture for the future through plant and soil microbiome management supporting the increase of the plant resistance to stresses, pests and pathogens and integration of microbiome-based solutions with crop management depending on the biogeographical regions, soil types and environmental stresses.

The research was supported by the following projects: Horizon Europe Programme, agreement no. Project 101082289 — LEGUMINOSE; Project 101157265 — SPIN-FERT; The National Centre for Research and Development in Poland, EJP SOIL, Project SOM-PACS, EJP SOIL/I/78/SOMPACS/2022; The National Science Center in Poland, OPUS-23, 2022/45/B/NZ9/04254; OPUS-27, 2024/53/B/NZ9/01058, Preludium Bis-2 2020/39/O/NZ9/03421; Minister of Science and Higher Education in Poland - Science for Society II Programme, project number NdS-II/SP/0263/2024/01, The National Centre for Research and Development in frame of the project BIOSTRATEG, contract number BIOSTRATEG3/344433/16/NCBR/2018; BIOSTRATEG3/347464/5/NCBR/2017; SUSCROP/I/POTATOMETABIOME/01/2019.

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XXVIII BSS Programme

Monday, 22.09.2025			
15:00	17:00	Departure from Gdańsk - Arrival at the Hotel Szarlota	
18:00	19:00	Welcome word + Opening Lecture L1	Jane Parker (Max Planck Institute for Plant Breeding Research, Cologne, Germany) New immune signaling paradigms and engineering opportunities for disease resistance in crops
19:00	20:00	Dinner	
20:00	Integration - field game		
Tuesday, 23.09.2025			
8:00	9:00	Breakfast	
9:30	10:30	L2	Johnathan Napier (Rothamsted Research, Harpenden, UK) The Road Less Travelled – Translating Discovery into Product: Lessons from the Rothamsted Omega-3 Project Or: “Making Fish Oils in Plants”
10:30	11:15	L3	Agnieszka Zienkiewicz (Centre for Modern Interdisciplinary Technologies, Nicolaus Copernicus University in Toruń, Toruń, Poland) Lipid Engineering in Plants: From Growth and Development to Sustainable Industrial Applications
11:15	11:45	Coffee break	
11:45	12:30	L4	Krzysztof Zienkiewicz (Centre for Modern Interdisciplinary Technologies, Nicolaus Copernicus University in Toruń, Toruń, Poland) Microalgae, Lipids and Biofuels: A Sustainable Connection
13:00	14:00	Lunch	
14:30	15:15	L5	Arthur Korte (Center for Computational and Theoretical Biology, Würzburg, Germany) Genome-Wide Association Studies (GWAS): Modern Approaches and Applications in Plant Science
15:15	16:00	L6	Oana Dima (VIB Center for Plant Systems Biology, Science Policy Manager, Ghent, Belgium) European Sustainable Agriculture Through Genome Editing – the role of scientists in policy making
16:00	16:30	Coffee break	

16:30	17:15	L7	Magdalena Miklaszewska (Bielefeld University, Faculty of Biology, Center for Biotechnology (CeBiTec), Bielefeld, Germany) <i>Exploring Marie Skłodowska-Curie Actions: Opportunities and Application Tips</i>
17:15	18:00		ROUND TABLE “From lab to fields”
19:00		Dinner barbecue	
Wednesday, 24.09.2025			
8:00	9:00	Breakfast	
9:30	10:30	L8	Per Hofvander (Swedish University of Agricultural Sciences, Alnarp), Sweden <i>Insect pheromone precursors in Camelina oil and their use in chemical conversion for pest management</i>
10:30	11:15	L9	Monika Kałużna (The National Institute of Horticultural Research, Skierniewice, Poland) <i>Do our plants also ‘get sick’ – diagnostics of plant diseases</i>
11:15	11:45	Coffee break	
11:45	12:30	L10	Elżbieta Sarnowska (Maria Skłodowska-Curie National Research Institute of Oncology, Warsaw, Poland) Tomasz J. Sarnowski (Institute of Biochemistry and Biophysics Polish Academy of Sciences, Warsaw, Poland, Max-Planck Institute for Plant Breeding Research, Cologne, Germany) <i>Unraveling Cancer’s Regulatory Secrets through Arabidopsis thaliana: Insights from a Model Plant</i>
13:00	14:00	Lunch	
14:30	15:15	W1	Agnieszka Nielsen (University of Copenhagen, Strategy and Innovation Funding Advisor, Copenhagen, Denmark) <i>Evolving Beyond Academia: Navigating Challenges and Skills in the Transition from Academia into AgTech</i>
15:15	15:30	Short break before workshops	
15:30	16:45	W2 Part 1	Daniel Mertens (Ulm University, Clinic of Internal Medicine, Schiller & MertensGermany) <i>Workshop AI-based tools in science</i>
16:45	17:15	Coffee break	
17:15	18:30	W2 Part 2	Daniel Mertens (Ulm University, Clinic of Internal Medicine, Schiller & MertensGermany) <i>Workshop AI-based tools in science</i>
19:00	20:00	Dinner	

Thursday, 25.09.2025			
8:00	9:00	Breakfast	
Kayaking			
13:30	14:30	Lunch	
15:00	15:45	L11	Paweł Bednarek (Institute of Bioorganic Chemistry of the Polish Academy of Sciences, Poznań, Poland) <i>Function of tryptophan-derived metabolites in the immunity of model Brassicaceae plant species</i>
15:45	16:30	L12	Alessio Mengoni (Department of Biology, University of Florence, Italy) <i>Does microbial epigenetics could be the next target for improving bacteria-plant interaction?</i>
16:30	17:00	Coffee break	
17:00	18:00	L13 Closing lecture	Magdalena Frąc (Institute of Agrophysics, Polish Academy of Sciences, Lublin, Poland) <i>Microbiomes in agroecosystems – the importance of the plant holobiont and soil microbiomes for the development of sustainable strategies of crop cultivation</i>
19:00	20:00	Dinner	
20:00	Fancy dress party – theme will be announced, attendance certificate and prizes ceremony		
Friday, 26.09.2025			
8:00	9:00	Breakfast	
9:00	9:45	Checking out	
11:00		Departure	

Glossary:

L = lecture

W = workshop

Please remember to sign your name on a list for workshops participation order.

