

Prof. Łukasz Stępień

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Department of Pathogen Genetics and Plant Resistance

Team: Plant-Pathogen Interaction

Education:

- M.Sc. of Biotechnology, Department of Agriculture, Poznań University of Life Sciences, 1999.
- Ph.D. of Agricultural Sciences, Institute of Plant Genetics, Polish Academy of Sciences, Poznań, 2005.
- Professor of Agricultural Sciences, 2019.

Research profile: Research is focused on biochemical and molecular characteristics of the saprobiotic and pathogenic fungi (mainly from *Fusarium* genus). Analyses include species and chemotype identification of fungal strains, based on the sequence analysis of the marker genes as well as the molecular communication between the pathogen and the host plant. Part of the research activities is related to the bio-transformation of *Fusarium*-produced mycotoxins by the antagonistic *Trichoderma* and *Clonostachys* fungi.

National grants led:

1. National Centre of Science project OPUS13 project, NCN 2017/25/B/NZ9/01210: Functions of *Fusarium*-produced lytic enzymes and mycotoxins in pathogenesis and of metabolites responsible for plant defence response. Duration: 2018-2021, principal investigator.
2. National Centre of Science project OPUS9 project, NCN 2015/17/B/NZ9/03577: Plant bioactive molecules inducing stress response in pathogenic fungus *Fusarium proliferatum*. Duration: 2016-2019, principal investigator.
3. National Centre of Science project OPUS8 project, NCN 2014/15/B/NZ9/01544: Genetic basis of cyclic peptide biosynthesis by entomopathogenic and phytopathogenic *Hypocreales* fungi. Duration: 2015-2018, principal investigator.
4. National Centre of Science project OPUS1 NCN 2011/01/B/NZ8/00162: „Impact of the host plant extract on mycotoxin biosynthesis, transcriptional and metabolic activity of the pathogenic *Fusarium proliferatum* isolates”. Duration: 2011-2015, principal investigator.
5. Ministry of Science and Higher Education project NN310 732440: „*FUM* genes polymorphism in different *Fusarium* species and its relation to fumonisin biosynthesis”. Duration: 2011-2014, principal investigator.

International fellowships / trainings (year/institute/country)

1. 04-27.06.2003, Chair of Agronomy and Plant Breeding, Technical University Munich, Freising, Germany
2. 02-29.08.2004, Chair of Agronomy and Plant Breeding, Technical University Munich, Freising, Germany
3. 21.01-19.02.2005, Chair of Agronomy and Plant Breeding, Technical University Munich, Freising, Germany
4. 05-28.02.2006, Institute of Epidemiology and Resistance, Aschersleben, Germany
5. 03-16.12.2006, Institute of Sciences of Food Production ISPA, CNR, Bari, Italy
6. 29.06-26.07.2008, Institute of Sciences of Food Production ISPA, CNR, Bari, Italy
7. 14-26.09.2014, Technical University of Denmark, Department of Systems Biology, Lyngby, Denmark

Recent papers:

- Abdel-Razek A.G., Shehata M.G., Badr A., Gromadzka K., Stępień Ł. (2020). Effect of chemical composition of wild opticus *Ficus indica* byproducts on its nutritional, antioxidant and antifungal efficacy. *Egyptian Journal of Chemistry*, 62 (Special Issue Part 1): 47-61.
- Kasprzycka A., Lalak-Kańczugowska J., Walkiewicz A., Bulak P., Proc K., Stępień Ł. (2019). Biocatalytic conversion of methane – selected aspects. *Current Opinion in Chemical Engineering*, 26: 28-32.
- Perincherry L., Lalak-Kańczugowska J., Stępień Ł. 2019. *Fusarium*-produced mycotoxins in plant-pathogen interaction. *Toxins* 11(11): 664.
- Stępień Ł., Lalak-Kańczugowska J., Witaszak N., Urbaniak M. (2019). Secondary metabolism biosynthetic pathways in *Fusarium* Species: so close but so far away. In: Mérillon J.-M., Ramawat K.G. (eds.): *Co-Evolution of Secondary Metabolites*, Reference Series in Phytochemistry, Springer Nature Switzerland, 1-37. DOI: 10.1007/978-3-319-76887-8_28-1.
- Urbaniak M., Stępień Ł., Uhlig S. (2019). Evidence for naturally produced beauvericins containing N-methyl-tyrosine in *Hypocreales* fungi. *Toxins*, 11(3): 182.
- Czembor E., Waśkiewicz A., Piechota U., Puchta M., Czembor J.H., Stępień Ł. (2019). Differences in ear rot resistance and *Fusarium verticillioides*-produced fumonisin contamination between Polish currently and historically used maize inbred lines. *Frontiers in Microbiology* 10: 449.
- Stępień Ł., Gromadzka K., Chełkowski J., Basińska-Barczak A., Lalak-Kańczugowska J. (2019). Diversity and mycotoxin production by *Fusarium temperatum* and *Fusarium subglutinans* as causal agents of pre-harvest Fusarium maize ear rot in Poland. *Journal of Applied Genetics* 60: 113-121.
- Witaszak N., Stępień Ł., Bocianowski J., Waśkiewicz A. (2019). *Fusarium* species and mycotoxins contaminating veterinary diets for dogs and cats. *Microorganisms* 7: 26.
- Góral T., Wiśniewska H., Ochodźki P., Nielsen L.K., Walentyn-Góral D., Stępień Ł. (2019). Relationship between *Fusarium* head infection, kernel damage, concentration of *Fusarium* biomass and *Fusarium* metabolites in grain of winter wheat breeding lines inoculated with *Fusarium culmorum*. *Toxins* 11: 2.
- Gorczyca A., Oleksy A., Gala-Czekaj D., Urbaniak M., Laskowska M., Waśkiewicz A., Stępień Ł. (2018). *Fusarium* Head Blight incidence and mycotoxin accumulation in three durum wheat cultivars in relation to sowing date and density. *The Science of Nature*, 105: 2.
- Kozłowska E., Hoc N., Sycz J., Urbaniak M., Dymarska M., Grzeszczuk J., Kostrzewa-Susłó E., Stępień Ł., Płaskowska E., Janeczko T. (2018). Biotransformation of steroids by entomopathogenic strains of *Isaria farinosa*. *Microbial Cell Factories* 17(1): 71.
- Tomczyk Ł., Stępień Ł., Urbaniak M., Szablewski T., Cegielska-Radziejewska R., Stuper-Szablewska K. (2018). Characterisation of the mycobiota on the shell surface of table eggs acquired from different egg-laying hen breeding systems. *Toxins* 10(7): 293.
- Kozłowska E., Urbaniak M., Hoc N., Grzeszczuk J., Dymarska M., Stępień Ł., Płaskowska E., Kostrzewa-Susłó E., Janeczko T. (2018). Cascade biotransformation of dehydroepiandrosterone (DHEA) by *Beauveria* species. *Scientific Reports* 8: 13449.
- Urbaniak M., Przysaś W., Zabłocka-Godlewska E., Stępień Ł., Janusz G. (2018). Decolorization of azo and triphenylmethane dyes by MW113 *Beauveria bassiana* strain. *Desalination and Water Treatment*, 136: 422-432.
- Błaszczuk Ł., Basińska-Barczak A., Ćwiek-Kupczyńska H., Gromadzka K., Popiel D., Stępień Ł. (2017). Suppressive effect of *Trichoderma* on five toxigenic *Fusarium* species. *Polish Journal of Microbiology* 66: 85-100.
- Górna K., Perlikowski D., Kosmała A., Stępień Ł. (2017). Host extracts induce changes in the proteome of plant pathogen *Fusarium proliferatum*. *Fungal Biology* 121: 676-688.
- Gálvez L., Urbaniak M., Waśkiewicz A., Stępień Ł., Palmero D. (2017). *Fusarium proliferatum* - causal agent of garlic bulb rot in Spain: genetic variability and mycotoxin production. *Food Microbiology*, 67: 41-48.
- Kozłowska E., Urbaniak M., Kancelista A., Dymarska M., Kostrzewa-Susłó E., Stępień Ł., Janeczko T. (2017). Biotransformation of dehydroepiandrosterone (DHEA) by environmental strains of filamentous fungi. *RSC Advances*, 7: 31493.

- Jeszka-Skowron M., Zgoła-Grześkowiak A., Waśkiewicz A., Stępień Ł., Stanisław E. (2017). Positive and negative aspects of green coffee consumption – antioxidant activity vs. mycotoxins. *Journal of the Science of Food and Agriculture*, 97: 4022–4028.
- Dymarska M., Grzeszczuk J., Urbaniak M., Janeczko T., Płaskowska E., Stępień Ł., Kostrzewa-Susłow E. (2017). Glycosylation of 6-methylflavone by the strain *Isaria fumosorosea* KCH J2. *PLoS ONE* 12: e.0184885.
- Stępień Ł., Waśkiewicz A., Urbaniak M. (2016). Wildly growing asparagus (*Asparagus officinalis* L.) hosts pathogenic *Fusarium* species and accumulates their mycotoxins. *Microbial Ecology* 71: 927-937.
- Górna K., Pawłowicz I., Waśkiewicz A., Stępień Ł. (2016). *Fusarium proliferatum* strains change fumonisin biosynthesis and accumulation when exposed to host plant extracts. *Fungal Biology* 120: 884-893.
- Czembor E., Stępień Ł., Waśkiewicz A. (2015). The impact of environmental factors on *Fusarium* species and associated mycotoxins in maize grain grown in Poland. *PLoS ONE* 10(7): e.0133644.
- Skóra J., Gutarowska B., Pielech-Przybylska K., Stępień Ł., Pietrowski P., Pietrzak K., Piotrowska M. (2015). Assessment of microbiological contamination at workplaces in museums, archives and libraries work environments. *Aerobiologia*. 31: 389-401.
- Stanisław E., Zgoła-Grześkowiak A., Waśkiewicz A., Stępień Ł., Beszterda M. (2015). Can ergosterol be an indicator of *Fusarium* fungi and mycotoxins in cereal products? *Journal of the Brazilian Chemical Society*. 26: 705-712.
- Skóra J., Otlewska A., Gutarowska B., Leszczyńska J., Majak I., Stępień Ł. (2015). Production of allergenic protein Alt a1 by *Alternaria* isolates from working environments. *International Journal of Environmental Research and Public Health* 12: 2164-2183.
- Gutarowska B., Skóra J., Stępień Ł., Szponar B., Otlewska A., Pielech-Przybylska K. (2015). Assessment of microbial contamination within working environments of different types of composting plants. *Journal of the Air & Waste Management Association* 65: 466-478.
- Stępień Ł., Waśkiewicz A., Wilman K. (2015). Host extract modulates metabolism and fumonisin biosynthesis by the plant-pathogenic fungus *Fusarium proliferatum*. *International Journal of Food Microbiology* 193: 74-81.
- Wilman K., Stępień Ł., Fabiańska I., Kachlicki P. (2014). Plant-pathogenic fungi present on seeds of different pea cultivars in Poland. *Archives of Industrial Hygiene and Toxicology* 65: 329-337.
- Gutarowska B., Skóra J., Stępień Ł., Twarużek M., Błajet-Kosicka A., Otlewska A., Grajewski J. (2014). Estimation of mould contamination and mycotoxin production at workplaces in composting plants, tanneries, archives and libraries. *World Mycotoxin Journal* 7: 345-355.
- Czembor E., Stępień Ł., Waśkiewicz A. (2014). *Fusarium temperatum* as a new species causing ear rot on maize in Poland. *Plant Disease* 98: 1001.
- Skóra J., Gutarowska B., Stępień Ł., Otlewska A., Pielech-Przybylska K. (2014). The evaluation of microbial contamination in the working environment of tanneries. *Medycyna Pracy* 65(1): 15-32.
- Wiśniewska H., Stępień Ł., Waśkiewicz A., Beszterda M., Góral T., Belter J. (2014). Toxigenic *Fusarium* species infecting wheat heads in Poland. *Central European Journal of Biology*, 9: 163-172.
- Stępień Ł. (2014). The use of *Fusarium* secondary metabolite biosynthetic genes in chemotypic and phylogenetic studies. *Critical Reviews in Microbiology* 40(2): 176-185.
- Stępień Ł., Jestoi M., Chełkowski J. (2013). Cyclic hexadepsipeptides in wheat field samples and *esn1* gene divergence among enniatin producing *Fusarium avenaceum* strains. *World Mycotoxin Journal* 6: 399-409.
- Stępień Ł., Waśkiewicz A. (2013). Sequence divergence of the enniatin synthase gene in relation to production of beauvericin and enniatins in *Fusarium* species. *Toxins* 5: 537-555.
- Stępień Ł., Koczyk G., Waśkiewicz A. (2013). Diversity of *Fusarium* species and mycotoxins contaminating pineapple. *Journal of Applied Genetics* 54, 367-380.
- Waśkiewicz A., Stępień Ł., Wilman K., Kachlicki P. (2013). Diversity of pea-associated *F. proliferatum* and *F. verticillioides* populations revealed by *FUM1* sequence analysis and

- fumonisin biosynthesis. *Toxins* 5: 488-503.
- Waśkiewicz A., Stępień Ł. (2012). Mycotoxins biosynthesized by plant-derived *Fusarium* isolates. *Archives of Industrial Hygiene and Toxicology* 63: 437-445.
- Chełkowski J., Gromadzka K., Stępień Ł., Lenc L., Kostecki M., Berthiller F. (2012). *Fusarium* species, zearalenone and deoxynivalenol content in preharvest scabby wheat heads from Poland. *World Mycotoxin Journal* 5: 133-141.
- Stępień Ł., Gromadzka K., Chełkowski J. (2012). Polymorphism of mycotoxin biosynthetic genes among *Fusarium equiseti* isolates from Italy and Poland. *Journal of Applied Genetics* 53: 227-236.
- Stępień Ł., Koczyk G., Waśkiewicz A. (2011). Genetic and phenotypic variation of *Fusarium proliferatum* isolates from different host species. *Journal of Applied Genetics* 52: 487-496.
- Stępień Ł., Koczyk G., Waśkiewicz A. (2011). *FUM* cluster divergence in fumonisins-producing *Fusarium* species. *Fungal Biology* 115: 112-123.
- Stępień Ł., Chełkowski J. (2010). *Fusarium* Head Blight of wheat – pathogenic species and their mycotoxins. *World Mycotoxin Journal* 3: 107-119.

Awards

- Foundation for Polish Science Scholarship for young researchers - 2005
- IPG Director's 1st class award for scientific publications - 2013
- Republic of Poland President's Bronze cross of merit for scientific achievements - 2014
- IPG Director's 1st class award for scientific publications - 2014
- IPG Director's 1st class award for scientific publications - 2015

Interests / Hobby

Nature photography, travelling