International Symposium 1-3

Paul Wilmes, PhD

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Personal statement

Although, I have conducted research on the human microbiome for only the past two years, I have a strong background in molecular microbial ecology with a primary interest on unraveling fundamental ecological relationships through the application of high-resolution molecular methods to mixed microbial communities. At present, I head the Eco-Systems Biology Research Group based at the Luxembourg Centre for Systems Biomedicine (University of Luxembourg) which is supported by a Luxembourg National Research Fund ATTRACT grant. Within my research group, we are developing and applying novel methods for carrying out Systems Biology of natural microbial assemblages. Particular research foci include the study of microbiome-host molecular interactions through small molecules and RNA.

Positions

2005	Visiting Scientist, Department of Molecular Ecology, Max Planck Institute for Marine Microbiology, Bremen, Germany
2006	Research Associate, School of Biological Sciences, University of East Anglia, Norwich, UK
2006–2009	Postdoctoral Research Scholar, Department of Earth and Planetary Science, University of California, Berkeley, Berkeley, USA
2010–2011	ATTRACT Research Fellow and Project Leader in Microbial Ecology, Department of Environment and Agro-Biotechnologies, Centre de Recherche Public – Gabriel Lippmann, Belvaux, Luxembourg
2011–	ATTRACT Research Fellow and Head of the Eco-Systems Biology Research Group, Luxembourg Centre for Systems Biomedicine, University of Luxembourg, Belvaux, Luxembourg

Honors

2002–2003	United Kingdom Foreign and Commonwealth Office, British Chevening Scholarship
2002–2005	School of Environmental Sciences at the University of East Anglia, full doctoral scholarship
2005	Luxembourg Ministry of Culture, Higher Education and Research, research scholarship
2005	German Academic Exchange Service (DAAD), research scholarship
2008	United States National Science Foundation, International Graduate Training Course in Antarctic Biology
2009	Luxembourg National Research Fund ATTRACT Fellow

Eco-systems biology of microbe-host molecular interactions in the human gastrointestinal tract

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Molecular Eco-Systems Biology holds great promise to unravel host-microbe interdependences. We have recently developed the necessary wet- and dry-lab methodologies to carry out high-resolution integrated omics, including metagenomics, metatranscriptomics, metaproteomics and metabolomics, on human gastrointestinal microbiota. This integrated approach allows us to systematically investigate differences in microbiome-derived biomolecular spectra (for example small molecules, RNA, etc.) between healthy and diseased individuals. Observed differences are further investigated using a recently developed microfluidics-based human-microbial co-culture device (HuMiX), which allows high-throughput first-pass experiments aimed at proving cause-and-effect relationships prior to testing of hypotheses in animal models. In this context, I will discuss recent work on investigating the impact of certain microbiota on human cellular metabolism as well as the effect of bacterial extracellular small RNA on human cell physiology.