

COMMENTARY – Professional Development

Spotlight on... Janet K. Jansson

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Biographical summary



Janet Jansson is Chief Scientist for Biology in the Earth and Biological Sciences Directorate at the Pacific Northwest National Laboratory (PNNL) and President of the International Society for Microbiology (ISME). She obtained her Ph.D. in 1988 at Michigan State University and then established a successful research career in Sweden.

From 2000-2006, she was Professor of Environmental Microbiology at the Swedish University of Agricultural Sciences and Vice Dean of the Natural Sciences Faculty. From 2007-2013, she was a senior staff scientist at Lawrence Berkeley National Laboratory, and from 2012-2014 an Adjunct Professor at UC Berkeley and the University of Copenhagen.

Q: What is your current research addressing and what impact may this research have on the wider field?

My current research aims to gain a predictive understanding of the roles that microorganisms play in many areas of importance for human health and ecosystem sustainability. For example, we are using a variety of molecular 'omics' approaches to understand how microorganisms in the gut (the gut microbiome) influence human health. Similarly for the environment, we are using omics to understand the impact of climate change on soil microorganisms that play a key role in cycling of carbon and other nutrients.

Q: What made you decide on a career in Microbiology?

When I went to college I started in chemical engineering, but all of my electives were in biology and agricultural science. I found

my career passion when I took a course in soil microbiology and learned about the important roles that soil microorganisms played in the environment, including supporting plant growth and degradation of pollutant chemicals. Eventually, I ended up working in a soil microbiology laboratory as an undergraduate student and I realized how much I loved working in the laboratory and studying the hidden world of soil microbes.

Q: Who or what had the most positive influence on your career? Who is your microbiology hero/heroine (living or dead) and why?

My soil microbiology professor at New Mexico State University, William Lindemann, played a key role in my early career by giving me the opportunity to work in his laboratory and introducing me to the wonder of soil microbiology. This started me on a research trajectory that I continued through my Masters and Ph.D. degrees. My microbiology hero is James (Jim) Tiedje at Michigan State University. He was my Ph.D. supervisor and is considered by many to be the founder of the field of molecular microbial ecology. Jim Tiedje is a visionary scientific thinker and mentor. Most of the current microbial ecology professors in the United States and many in other countries have at one time studied with Jim Tiedje or collaborated in some way. He has helped to shape the field of microbial ecology into a mature research area with its own scientific society and journal.

Q: What do you consider to be the most important skills for a microbiologist?

I think that the most important skill for a microbiologist is to be curious and excited about the science. There are so many aspects of the microbiology world that are unknown. Most

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microbes on Earth have never been cultivated and their properties are unknown. Fortunately, we live in an era where there are continuous developments in molecular techniques, imaging and bioinformatics that better enable exploration of microorganisms in the environment and in association with our own bodies. Technical skills that are important for today's microbiologists are quite broad and include laboratory cultivation, molecular biology and computation.

Q: What advice would you offer to early-career researchers in microbiology to help further in their career? What is the best advice you can give for maintaining the work-life balance?

I would advise early-career researchers in microbiology to keep up to date with the current developments in omics technologies and bioinformatics. At the same time there is a need for more traditional microbiologists that can cultivate microorganisms from a range of diverse environments and understand their physiologies.

As far as maintaining the work-life balance... as a mother of three children that are 18 months apart (of course this includes twins) I can state that it is possible to balance a research career with raising children. In my case, the children were born and raised in Sweden—a country that has a generous parental leave and encourages fathers to share in the raising of the children. Other countries should adopt this practice to enable women to be with their children, but to share the responsibility with their partner so that both parents are able to continue to advance their research careers.

Q: What would you say is the greatest challenge facing microbiologists today?

One of the greatest challenges facing microbiologists today is gaining an understanding of the complex interactions that occur

between microorganisms that grow in communities in nature. Currently, it is possible to obtain enormous amounts of data, such as DNA sequence data, from basically any sample type. However, the interpretation of the data is a current bottleneck.

Overall experience as a microbiologist

My overall experience as a microbiologist has been very rewarding because I have been privileged to be at the forefront of the molecular biology revolution as it has been applied to understanding of the hidden world of microorganisms in complex environments, including soil, sediments and in the human gut. During my career the molecular tools have been constantly evolving. For example, my Ph.D. research focused on tracking soil microorganisms based on their DNA sequences. This was a new concept at the time because prior to this soil microorganisms could only be examined by microscopy (and most soil organisms look very similar) or by growing them in culture media. We now know that we have only cultivated a minority of the microbes in nature (<10%) by comparison of findings from DNA sequence technologies to traditional cultivation approaches. I was one of the first to apply these new molecular techniques that were developed for soil microbiology to also gain a better understanding of the microbes living in the human gut. As a result, we gained new knowledge about the types of microorganisms that resided in our own bodies and the role of many of these microbes in human health and disease. More recently, we have been expanding our repertoire of molecular techniques 'omics' to study what genes are expressed and translated into proteins. This combined 'multi-omics' approach provides a better picture of the complex interactions and functions that microorganisms in nature carry out.

