Scientists call for new tools to explore the world's microbiomes

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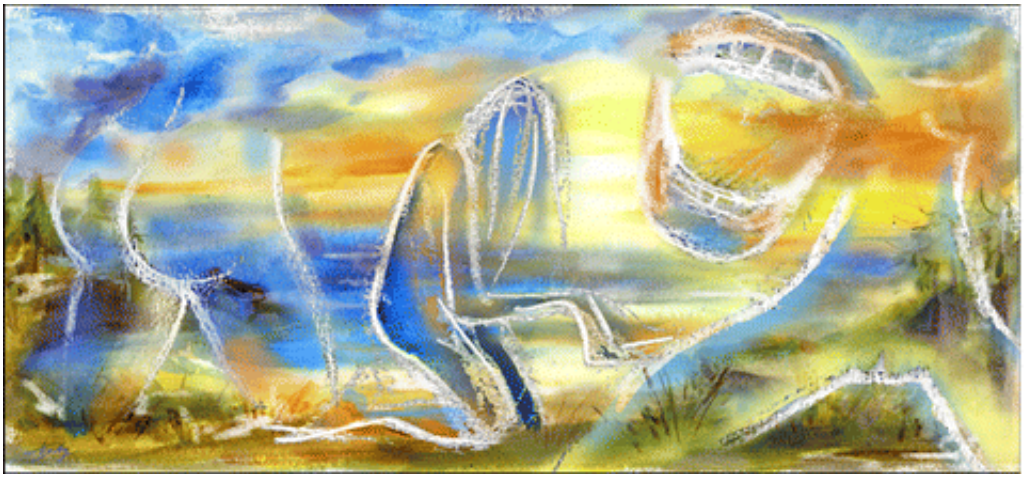

Artwork credit: Andrea Selby

In October, an interdisciplinary group of scientists proposed forming a Unified Microbiome Initiative (UMI) to explore the world of microorganisms that are central to life on Earth and yet largely remain a mystery. An article in the journal *ACS Nano* describes the tools scientists will need to understand how microbes interact with each other and with us.

Microbes live just about everywhere: in the oceans, in the soil, in the atmosphere, in forests and in and on our bodies. Research has demonstrated that their influence ranges widely and profoundly, from affecting human health to the climate. But scientists don't have the

necessary tools to characterize communities of microbes, called microbiomes, and how they function. Rob Knight, Jeff F. Miller, Paul S. Weiss and colleagues detail what these technological needs are.

The researchers are seeking the development of advanced tools in bioinformatics, high-resolution imaging, and the sequencing of microbial macromolecules and metabolites. They say that such technology would enable scientists to gain a deeper understanding of microbiomes. Armed with new knowledge, they could then tackle related medical and other challenges with greater agility than what is possible today.

More information: Julie S. Biteen et al. Tools for the Microbiome: Nano and Beyond, *ACS Nano* (2015). DOI: 10.1021/acsnano.5b07826

Abstract
The microbiome presents great opportunities for understanding and improving the world around us and elucidating the interactions that compose it. The microbiome also poses tremendous challenges for mapping and manipulating the entangled networks of interactions among myriad diverse organisms. Here, we describe the opportunities, technical needs, and potential approaches to address these challenges, based on recent and upcoming advances in measurement and control at the nanoscale and beyond. These technical needs will provide the basis for advancing the largely descriptive studies of the microbiome to the theoretical and mechanistic understandings that will underpin the discipline of microbiome engineering. We anticipate that the new tools and methods developed will also be more broadly useful in environmental monitoring, medicine, forensics, and other areas.

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