Microbes and their hosts -- exploring the complexity of symbiosis in DNA and cell biology

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The unique association between microorganisms and their hosts, whether insects, plants, or mammals, provides a fascinating view into how microbial symbionts adapt to changing biological environments. Insights into the diversity and complexity of symbiotic relationships are the focus of the current special issue of *DNA and Cell Biology*.

"Symbiosis is one of the most rapidly growing fields in biology.... After decades of focusing on bacteria in pure culture, it is evident that to manage them for our benefit, we need to understand bacteria in association with the complex biological environments with which they contend in the natural world," write Jo Handelsman, PhD, Editor-in-Chief of *DNA and* Cell Biology, Professor at the University of Wisconsin-Madison, and President of the Rosalind Franklin Society, and Guest Editor Margaret J. McFall-Ngai, Professor at the University of Wisconsin-Madison, in their Editorial.

The issue contains articles representative of the broad range of scientific topics and disciplines related to microbial symbiosis. These include "The Oral Microbial Consortium's Interaction with the Periodontal Innate Defense System," which describes a process called "local chemokine paralysis," in which the membership and characteristics of the bacterial community that populates the gingival crevice in the human mouth affect the ability of the natural immune defenses in the mouth to detect the presence of harmful bacteria and orchestrate their destruction.

Author Richard Darveau, PhD, from the University of Washington in Seattle, describes this phenomenon as "another mechanism by which the action of a single bacterial member of the oral consortium can affect the host responses to a wide variety of different bacteria."

The term "symbiont plasticity" describes the mechanisms by which symbiotic microbes adapt to changes in host development, immune responses, and the changing external environment. Jennifer Wernegreen, PhD, from the Marine Biological Laboratory at Woods Hole, MA, and Diana Wheeler, PhD, from the University of Arizona, in Tucson, use the example of mutualism between Blochmannia and their ant hosts to illustrate how the bacteria rely on genetic, ecological, and physiological means to maintain the functional flexibility that allows them to meet the needs of an ant colony rather than the individual ants that make up the colony. Their thought-provoking review of the impact of symbiotic lifestyle on genetic variation and microbial adaptation is entitled, "Remaining Flexible in Old Alliances: Functional Plasticity in Constrained Mutualisms."

Adam Silver and Joerg Graf from the University of Connecticut, in Storrs, explore the role of virulence factors and specific toxins produced by members of the Aeromonas veronii bacterial group in the article "Prevalence of Genes Encoding the Type Three Secretion System and the Effectors AexT and AexU in the Aeromonas veronii Group." These bacteria can cause a range of infections, from diarrhea and wound infections to life-threatening septicemia and meningitis. The authors demonstrate the presence of the type-3 secretion factors AexT and AexU in a variety of Aeromonas veronii strains and propose different functions for these two toxins.

More information: The issue is available free online at www.liebertpub.com/dna

Source: Mary Ann Liebert