



Articles of Significant Interest in This Issue

Investigating Structural Contributors to Endoglucanase Thermostability

Thermostable enzymes are essential for integration of biotechnology with industrial processes, particularly for biomass conversion. To isolate specific interactions responsible for thermostability in GH5 family endoglucanases, Zheng et al. (e02079-18) created 10 hybrid enzymes by combining two endoglucanases, mesophilic *SoCel5* and thermophilic *TeEgl5A*, to study the roles of different structural motifs shared within the GH5 family. Two hybrids exhibited significant increases in the temperature optima and thermostability relative to the mesophilic parent, with the interactions responsible for the improvement identified through simulation. These structural insights inform future engineering to improve enzyme thermostability and catalytic efficiency.

Wolbachia Has Important Impacts on Its Insect Host

Wolbachia is a common endosymbiotic bacterium commonly found in insect species in which it has important phenotypic impacts. The coexistence of multiple strains in an insect species is poorly understood but may be influenced by diverse phenotypic effects including reproductive manipulation and protection against pathogens. As *Wolbachia* is increasingly being developed as a tool to control disease transmission and suppress pest populations, it is important to understand the ways in which multiple *Wolbachia* strains persist in natural populations and how these might then be manipulated. This study by Asselin and colleagues (e02290-18) investigates viral protection and the molecular basis of cytoplasmic incompatibility in two coexisting *Wolbachia* strains with contrasting effects on host reproduction.

Chemolithotrophic Hot Spots in Karst Aquifers

Since karst aquifers supply up to 25% of the world's population with fresh drinking water, understanding of their ecosystem functioning is of primary concern. Here, Wegner et al. (e02346-18) applied a multiomics approach to near-surface groundwater microbiomes flowing through different karstic hydrogeochemical settings. They identified chemolithoautotrophic hot spots and could show that functional and taxonomic profiles of the groundwater microbiome surpass hydrochemistry in discriminating individual groundwater sites. In addition, the work revealed an unexpected constant expression of carbohydrate-active enzymes along the flow path complementing lithotrophy-driven carbon fixation for microbial carbon assimilation.

Survival of *Escherichia coli* in Manure-Amended Soils in the Mid-Atlantic United States

Untreated manure provides nutrients to soils but can introduce enteric pathogens like enterohemorrhagic *Escherichia coli* to fruits and vegetables. Over twelve separate field trials conducted in the Mid-Atlantic United States, Sharma et al. (e02392-18) showed that spatiotemporal factors (site, year, and season) affect survival durations of *E. coli* in manure-amended soils more than agricultural factors (manure type, organic or conventional management of soils, and depth of application) or weather effects. Poultry litter frequently supported longer survival durations compared to other manure types, and lower initial soil moisture values were associated with longer survival durations of *E. coli* in manure-amended soils.

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A Novel Endolysin Harboring a Spore Binding Domain

Endolysins of bacteriophages infecting Gram-positive bacteria generally have two distinct domains, an enzymatically active domain (EAD) and a cell wall binding domain (CBD). In their study, Kong et al. ([e02462-18](#)) report that LysPBC2, an endolysin of *Bacillus cereus* phage PBC2, has an additional spore binding domain (SBD) which specifically binds to *B. cereus* spores. The SBD partially overlaps with the EAD, and a single point mutation in the SBD can greatly increase the lytic activity of LysPBC2 at the expense of spore binding activity. This work provides an insight for the rational design of efficient antimicrobials or diagnostic tools for controlling pathogenic bacteria using endolysins.