Heterogeneous Expression of Autoinducer (AI)-Dependent and AI-Independent Genes in *Sinorhizobium fredii*

Bacterial quorum sensing is believed to be responsible for a population-wide response in gene expression. Grote et al. (p. 5572–5582) provide evidence that AI-dependent and AI-independent genes are heterogeneously expressed within isogenic populations of *Sinorhizobium fredii*. Their findings imply that the level of phenotypic heterogeneity on a single-cell level depends on the AI concentration. Furthermore, their data suggest that plant-released signaling molecules can override the single-cell heterogeneity and that homogeneous expression in the rhizosphere may be a key to successful rhizosphere colonization.

Predator-Prey Interactions in Soil Bacteria Regulated by Secondary Metabolites

Bacteria produce secondary metabolites (e.g., antimicrobials or signaling molecules) that affect the physiology and behavior of their neighbors. In complex environments, the rules governing these interactions remain largely unknown. Here, Müller et al. (p. 5603–5610) demonstrate that two common soil microbes, *Bacillus subtilis* and *Myxococcus xanthus*, engage in a predator-prey relationship that is regulated, in part, by a secondary metabolite known as bacillaene. The ultimate defense for *Bacillus* bacteria is to produce spores that *Myxococcus* cannot consume. *Bacillus* buys time for sporulation to occur by producing bacillaene to inhibit *Myxococcus* predation. This study sheds light on complex interspecies interactions governed by chemical cues in the environment.

Arctic Ground Squirrel Hibernation Physiology Impacts Gut Microbiota

The physiological extremes in body temperature and food intake expressed by obligate seasonal hibernators hold the potential to profoundly affect gut microbiota. Stevenson and colleagues (p. 5611–5622) show that compared to those in summer, hibernating arctic ground squirrels (*Urocitellus parryii*) have a gut microbial community that is significantly altered in diversity, activity, and density, converging to a core hibernation gut microbiota. These findings, combined with those observed for thirteen-lined ground squirrels, provide compelling evidence that similar changes may occur in the gut microbiota during hibernation among all obligate seasonal hibernators.

Constraints on the Spread of Symbiont-Mediated Protection

Invertebrate animals are often protected from natural enemies by infection with heritable bacteria. While protective benefits favor symbiont spread within host populations, many individuals remain symbiont free. Studies by Dykstra et al. (p. 5818–5827) investigate potential constraints to the spread of *Hamiltonella defensa*, which protects the aphid *Aphis craccivora* from attack by parasitic wasps. The authors identify imperfect maternal transfer and costs to infection in the absence of enemies as important constraints. They also report minimal *H. defensa* strain variation, which likely limits the responsiveness of the protective symbiosis to changing conditions. These results emphasize the conditional nature of many animal-microbe symbioses.

Immunogenic Outer Membrane Vesicles Decorated with Multiple Antigens

Outer membrane vesicles (OMVs) shed from Gram-negative bacteria are attractive as vaccines because they combine the best of two worlds: (i) they have intrinsic immunostimulatory properties, like their parental cells, but (ii) they are nonliving and, hence, safer to use. Employing their previously developed protein display platform, Daleke-Schermerhorn et al. (p. 5854–5865) efficiently decorated the surfaces of OMVs with multiple full-length foreign antigens simultaneously. *In vitro* delivery of engineered OMVs to dendritic cells demonstrated the potential of this approach for raising specific immune responses to (multiple) heterologous antigens in the context of an intrinsic adjuvant.