A Specific Insect Gut Region Controlling Its Gut Symbiont

In insect-microbe symbiosis, maintaining a proper level of the symbiont population is critical for the host insect. While several mechanisms for host control of the intracellular symbiont population have been addressed, mechanisms for controlling extracellular gut symbionts have been poorly understood. Kim et al. (p. 7229–7233) have proposed that a specific midgut region in Riptortus pedestris may play a role in controlling the Burkholderia symbiont population. They have demonstrated that a midgut region has a potent antimicrobial activity against the Burkholderia symbionts and that this antimicrobial activity is induced by symbiont infection of the host. These findings highlight the specific aspect of host-symbiont interactions.

Daphnia magna Accumulates and Inactivates Avian Influenza Virus

In laboratory experiments, avian influenza virus can remain viable for an extended period of time in water; however, little is known regarding the influence of the biotic community (specifically, aquatic invertebrates) on virus persistence and infectivity in aquatic environments. In a series of laboratory experiments, Meixell and colleagues (p. 7249–7255) demonstrated that the filter-feeding invertebrate Daphnia magna can accumulate avian influenza virus and effectively remove virus particles from water but that daphnids can also inactivate the virus and functionally reduce infectivity. This research highlights aquatic invertebrates as potential factors influencing the persistence and transmission of avian influenza virus in the wild.

Cold Adaptation Leads to Acid and Redox Resistance in Salmonella enterica Serovar Typhimurium

Salmonella persists in the food supply in spite of increasing control measures, contributing to recurring outbreaks from increasingly diverse foodstuffs. Studies by Shah et al. (p. 7281–7289) revealed that exposure to cold temperatures rescues the organism from the inhibitory effects of hydrogen peroxide, acids used in processing, and stomach acid. Gene expression profiles indicated that these changes were related to redox stress, increased central metabolism, and reduced protein metabolism. These observations highlight important aspects of microbial metabolism, the stress response, environmental conditions, and the adaptability of Salmonella survival mechanisms to cause disease.

Tropical Soil Bacteria Are Severely Affected by Forest Clearance for Oil Palm but Not by Logging

Soil bacteria play key functional roles in tropical forests, but these forests are being rapidly logged and cleared for agriculture. Lee-Cruz et al. (p. 7290–7297) studied soil bacterial communities in primary and logged forests and in oil palm plantations in Borneo and found that neither logging nor clearance for oil palm changed the bacterial diversity at local spatial scales. At larger scales, however, soil bacterial communities were very different; total diversity was higher in oil palm than in primary and logged forest soils. This suggests that whereas tropical forest soil bacteria are resilient to logging, they are severely affected by conversion to oil palm agriculture.

Listeria monocytogenes Persisters Survive Bactericidal Antibiotics

The food-borne pathogen Listeria monocytogenes can cause listeriosis, a severe infection that is treatable with antibiotics. Knudsen and colleagues (p. 7390–7397) demonstrate that a portion of the bacterial population can survive bactericidal antibiotics by forming a persister subpopulation. Bacterial physiology affected the persister level, as larger numbers of persisters were found in older stationary-phase cultures than in younger cultures. However, the persister population could be killed by treatment with growth-independent antibiotics rather than growth-dependent antibiotics. The ability to form persister subpopulations could be a survival strategy for L. monocytogenes in food production environments and in the host and should be kept in mind when developing eradication strategies.