Articles of Significant Interest Selected from This Issue by the Editors

The First Metagenomic Analysis of the Air Virome

Airborne viruses are expected to be ubiquitous in the atmosphere and are regarded as major environmental risk factors in the pathogenesis of complex diseases. Whon et al. (p. 8221–8231) demonstrate that viral abundances in the near-surface atmosphere are inversely correlated with temperature and absolute humidity, which increased from autumn to winter and decreased toward spring. The first metagenomic analysis of air viromes revealed dominance of plant-associated single-stranded DNA (ssDNA) geminivirus-related viruses followed by animal-infecting circovirus-related viruses showing evolutionary relationships to previously known ssDNA viruses. These findings suggest that the near-surface atmosphere is a largely unexplored reservoir of novel plant- and animal-associated viruses with high diversity.

Structure of an Archaeal Viral Integrase Suggests DNA Cleavage in *trans*

The relationship of archaeal virus enzymes to those of other viruses is not clear. Eilers et al. (p. 8309–8313) found that the structure of the catalytic domain of Int^{SSV}, an archaeal viral integrase, displays a minimal fold similar to bacterial HP1 and contains structural elements conserved across the three domains of life. However, similarities in the C-terminal tail to a eukaryotic enzyme, and superposition on a bacterial Holliday junction complex, suggest that the catalytic tyrosine is delivered to neighboring subunits in *trans*. Mechanistically, this archaeal enzyme appears more similar to its eukaryotic counterparts.

Chloroplastic tRNA Ligase Circularizes *Avsunviroidae*

Viroids belonging to the family *Avsunviroidae*, such as eggplant latent viroid, replicate in the chloroplasts of infected plants through an RNA-to-RNA rolling-circle mechanism in which viroid oligomeric RNAs self-cleave to linear monomers by their embedded hammerhead ribozymes. Nohales et al. (p. 8269–8276) report a combination of *in vitro* and *in vivo* experiments suggesting that the plant chloroplastic tRNA ligase, more specifically the isoform with a transit peptide targeting it to the chloroplast, is the enzyme involved in the circularization of the monomeric linear plus (+) and minus (−) replication intermediates of the *Avsunviroidae*. These findings shed light on mechanisms of viroid replication.

Poly(A)-Binding Protein Enhances Viral Cap- and Poly(A)-Independent Translation

Plant RNA viruses often lack both a 5′ cap and a 3′ poly(A) tail in their genomic RNAs. Instead, cap-independent translation enhancer elements (CITEs) located in the 3′ untranslated region (3′ UTR) mediate their translation. Iwakawa et al. (p. 7836–7849) show that interactions between poly(A)-binding protein (PABP) and the viral 3′ UTR enhances 3′ CITE-mediated translation at the initiation step by promoting recruitment of translational initiation factors to the 3′ UTR. These findings provide the first evidence that PABP enhances translation of the uncapped and nonpolyadenylated viral RNAs.

A New Bat Herpesvirus Encodes Unique Immune-Related Genes

Bats, which carry many highly lethal viruses in the absence of detectable clinical disease, are important reservoirs of zoonotic viruses. Zhang et al. (p. 8014–8030) report the isolation, cell tropism, and complete genome sequence of a novel betaherpesvirus from the bat *Miniopterus schreibersii* (MsHV). This new virus expresses different classes of host immune modulators and represents the only virus known to encode major histocompatibility complex class II (MHC II) homologues. This study provides a foundation for an improved understanding of the symbiotic relationship between bats and viruses, potentially aiding in the development of new virus control strategies.

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