Letter to the Editor: Origins of SCAND3 and KRBA2, pp. 205–10

Here, Llorens et al. perform phylogenetic analysis on many sequences, 341 to be exact, of integrases and transposases. The group finds that two typical mammalian cellular-integrases, SCAND2 and KRBA2, appear to descend from a superfamily of transposons not found in vertebrates. The authors also suggest origins and evolutionary processes behind the two mammalian genes (Fig. 1).

Review: The Transfer of Integrons, pp. 211–23

Integrons are one of the many types of mobile genetic elements that are known to exist. They are able to integrate and exchange DNA with the host via gene cassettes. Overall, the mobility of integrons is lacking, however the finding that similar integron sequences appear throughout many bacterial species proves that they are able to get around. In this review, Domingues et al. look at different ways that the horizontal transfer of integrons takes place, specifically focusing on integrons involved in antibiotic resistance.

Commentaries: It’s Natural for V. cholerae to Pick Up DNA, pp. 224–7

Horizontal gene transfer (HGT) is a highly adaptive trait that allows bacteria to maintain the integrity of their genomes as well as evolve. Mobile genetic elements are responsible for many cases of HGT, however many species of bacterial are competent and are able to take up and integrate large pieces of DNA naturally. Melanie Blokesh looks at natural transformation in V. cholerae cells specifically studying how quorum sensing is able to flip a switch, guiding this bacterium to either incorporate or degrade new DNA. The author speculates on why the majority of V. cholerae strains in patient-derived cultures do not exhibit natural transformation.

Prokaryotic Immunity, pp. 228–32

How does a prokaryote avoid an ambush from foreign genetic elements? One way is by using a system known as CRISPR/Cas. The system is interesting as it is hereditary, adaptive and has a sequence specific mechanism. Maier et al. have characterized parts of this system, the protospacer adjacent motif (PAM), in Haloferax volcanii and discuss what implications they may have (Fig. 2).

Upregulating Transgenes by Removing Amino Acids, pp. 233–8

Serendipitous results guide this commentary by Palmisano et al. While following a previous lead that found upregulation of a pet protein after removal of an amino acid, the authors found that depriving cells of other amino acids also created...
upregulation of many other genes—but only exogenous genes, not endogenous. Unearthing a pathway involving class II histone deacetylase-4 (HDAC4), the authors look at how other transgenes fair in an amino acid deprived environment, focusing on HIV-1.

MGE’s Makes MRSA at Home in Hospital Settings, pp. 239–43

*S. aureus* is a common commensal of humans and animals that can often lead to treatable skin and soft tissue infections (SSTIs), especially in hospitals. The spread of methicillin-resistant *S. aureus* (MRSA), however, is a different matter. MRSA creates huge financial burdens as it causes SSTIs that are not only difficult to treat but also carry a high mortality rate. Antibiotic resistance is often encoded on mobile genetic elements (MGEs) within *S. aureus*. In this commentary, Lindsay et al. review their recent research using whole genome microarrays to profile MGEs. The group reveals how healthcare settings are enabling the success and spread of MRSA clones.

Limb Regeneration Controlled by Retroelements, pp. 244–7

As of recent, retroelements have been implicated in the role of development, specifically embryonic. Mashanov, Zueva and García-Arrarás have also found them to be involved in a different type of development—limb regeneration. The group recaps their results found on the salamander and sea cucumber, noting that retrotransposon activity can be controlled by the host organism itself to guide the regeneration process (Fig. 3).

The Birth of Large Viruses, pp. 247–52

How did viruses come to be? Did they appear before cellular life, or are they a trimmed down version of parasitic organism? Perhaps they are the result of genetic material that broke free from its host. In the case of large-to-medium-sized viruses, Nasir et al. explore a hypothesis for their origin by looking at genomic structure. They find that these larger viruses coevolved alongside cellular ancestors in a reductive manner. This model explains how diversity can be created by the evolution of viruses from existing cellular parasites (Fig. 4).

Transposable Element Type Depends on Endosymbiotic Bacteria, pp. 253–6

Does asexual or sexual reproduction minimize the spread of transposable elements (TEs)? Both have pros and cons. Asexuality leads to an accumulation of TEs whereas sexual behavior allows for the horizontal transfer of TEs to take place. Kraaijeveld and Bast recently quantified this conundrum in a parasitoid wasp. The group found that both asexual and sexual reproduction leads to many TEs, however the type of TE accumulated is different for each group. The authors speculate that the type of TE amassed is dependent on the endosymbiotic Wolbachia bacteria via Argonaute proteins and methylation patterns.