

## IN BRIEF

**HOST RESPONSE****TFR1 and virus battle it out**

Transferrin receptor (TFR1) is a cell surface receptor that functions in iron binding and uptake, but is also hijacked by numerous viruses to gain entry into the cell. In this study, the authors reveal the details of an evolutionary arms race between TFR1 and two rodent virus families (arenaviruses and mouse mammary tumour virus) that has shaped the evolution of the host protein and of at least one of the viral proteins involved. They observed that, although most of the TFR1 protein sequence is highly conserved, the two areas that show signs of rapid evolution correspond to the two distinct virus-binding surfaces, indicating that evolution of this protein is shaped by two concurrent selective pressures. Consistent with an arms race, the TFR1-contacting residues of arenavirus glycoprotein were also found to be under selective pressure. Importantly, mutations in the rapidly evolving residues of TFR1 blocked viral binding and entry without affecting iron uptake.

**ORIGINAL RESEARCH PAPER** Demogines, A. *et al.* Dual host-virus arms races shape an essential housekeeping protein. *PLoS Biol.* **11**, e1001571 (2013)

**FUNGAL BIOLOGY****Ras1 as a switch for *Candida albicans***

The small GTPase Ras1 regulates several processes in *Candida albicans*, including the switch from the yeast to the filamentous, hyphal form. This transition is thought to be triggered by a spike in cyclic AMP levels that is generated following interaction of the adenylate cyclase Cyr1 with the active (GTP-bound), plasma membrane-associated form of Ras1. Here, the authors identify a proteolysis-dependent mechanism that controls Ras1 signalling and, thus, filamentation in *C. albicans*. Plasma membrane-associated Ras1 was found to be cleaved at the carboxy-terminal hypervariable region, inhibiting the interaction of Ras1 with Cyr1 and downregulating Ras1-dependent cAMP signalling and, consequently, hyphal growth. Notably, Ras1 cleavage was regulated by cAMP signalling, as the levels of cleaved Ras1 decreased in response to high levels of cAMP but increased in the presence of the quorum sensing molecule farnesol (which inhibits Cyr1 function).

**ORIGINAL RESEARCH PAPER** Piispanen, A. *et al.* Regulated proteolysis of *Candida albicans* Ras1 is involved in morphogenesis and quorum sensing regulation. *Mol. Microbiol.* **21** May 2013 (doi:10.1111/mmi.12268)

**BACTERIAL GENOMICS****Learning about rare bacteria**

A key limitation in our understanding of microbial ecology and evolution is the fact that a large proportion of microorganisms remains unculturable. One method used to bypass this bottleneck is metagenomics — shotgun sequencing of DNA directly extracted from environmental samples — followed by genome assembly. However, even this technique is not fully effective for genome sequencing of rare species owing to the difficulties in binning (classification of reads into taxons) and in the assembly of individual genomes from complex metagenomes. The authors of this study developed a new differential coverage binning approach for the assembly of high-quality genomes from rare species. By testing it on DNA from an activated sludge bioreactor, they were able to assemble 12 complete or near-complete genomes, four of which belonged to the candidate phylum TM7, which the authors rename Saccharibacteria.

**ORIGINAL RESEARCH PAPER** Albertsen, M. *et al.* Genome sequences of rare, uncultured bacteria obtained by differential coverage binning of multiple metagenomes. *Nature Biotech.* **26** May 2013 (doi:10.1038/nbt.2579)