IN BRIEF

GENOME EVOLUTION

Complex fitness effects of ploidy states

To assess the fitness effects of ploidy changes, Zörgö *et al.* tested the growth properties of 51 strains of *Saccharomyces cerevisiae* and *Saccharomyces paradoxus*, each in haploid and diploid forms, under 33 distinct environmental conditions. For each condition, there was strong conservation among strains for whether haploidy or diploidy was advantageous. However, the fitness effects of ploidy varied in an unexpectedly complex manner across the specific environmental conditions. In particular, the expected patterns of haploid advantages in nutrient-poor conditions (owing to bioenergetic efficiency) and diploid advantages in mutagenic environments (owing to mutation buffering) were not observed.

ORIGINAL RESEARCH PAPER Zörgö, E. *et al.* Ancient evolutionary trade-offs between yeast ploidy states. *PLoS Genet.* **9**, e1003388 (2013)

DNA DAMAGE

A damaging neuronal activity

Suberbielle *et al.* analysed DNA double-strand breaks (DSBs) in mouse brains to examine potential genotoxic effects of the Alzheimer's disease-associated amyloid-β protein. Surprisingly, they found that in both wild-type and amyloid-β-expressing mice, neuronal activation — caused by the mice exploring a novel environment or by experimental stimulation — led to a substantial increase in DSBs specifically in the activated neurons. Furthermore, relative to wild-type mice, amyloid-β expression led to more DSBs prior to stimulation and a more sustained presence of DSBs after stimulation. It remains to be discovered whether such DSBs are a side effect of neuronal activation or whether they have an important role in normal cognitive functions or Alzheimer's disease pathology.

ORIGINAL RESEARCH PAPER Suberbielle, E. *et al.* Physiologic brain activity causes DNA double-strand breaks in neurons, with exacerbation by amyloid-β. *Nature Neurosci.* 24 Mar 2013 (doi:10.1038/nn.3356)

GENE REGULATION

Circadian control in chloroplasts

Although circadian rhythms are known to influence processes such as photosynthesis in chloroplasts, it is not known how circadian time keeping is transmitted from the nucleus to these organelles. This study in *Arabidopsis thaliana* showed that nucleus-encoded sigma factors, which can be regulated by the circadian system, are crucial for conveying circadian information to the chloroplasts. Sigma factors are required to confer promoter specificity to plastid-encoded RNA polymerases. This work also sheds light on the evolution of coordination among organelles.

ORIGINAL RESEARCH PAPER Noordally, Z. B. *et al.* Circadian control of chloroplast transcription by a nuclear-encoded timing signal. *Science* **339**, 1316–1319 (2013)

TECHNOLOGY

High-throughput protein interactions

The authors present a new method for efficient characterization of interactions between proteins and their binding partners. In this approach, which is termed PLATO, a library of human open reading frames (ORFs) was used in which the mRNAs lack stop codons and so remain tethered to the proteins that they encode. The panel of proteins expressed in this way can then be screened for binding to an immobilized bait (such as a small molecule), and the bound proteins can be identified through deep sequencing their ORFs.

ORIGINAL RESEARCH PAPER Zhu, J. *et al.* Protein interaction discovery using parallel analysis of translated ORFs (PLATO). *Nature Biotech.* 17 Mar 2013 (doi:10.1038/nbt.2539)