RESEARCH HIGHLIGHTS

Selections from the scientific literature

METEOROLOGY

Air particles boost rain extremes

As the climate warms, tiny particles suspended in the atmosphere may have a greater effect than greenhouse gases on increasing the frequency of extreme rain and snowfall.

Greenhouse gases and atmospheric aerosols both drive extreme precipitation, which is expected to increase with climate change. To tease apart the climate effects, Zhili Wang of the Chinese Academy of Meteorological Sciences in Beijing and his colleagues used a global climate model to simulate scenarios with different levels of greenhouse-gas emissions.

They predict that, by the end of the century, aerosols will be two to four times more important than greenhouse gases in boosting precipitation extremes worldwide. Reducing aerosol emissions could help people to alter future climate-change impacts.

Geophys. Res. Lett. **http://doi.org/bqdf (2016)**

EVOLUTION

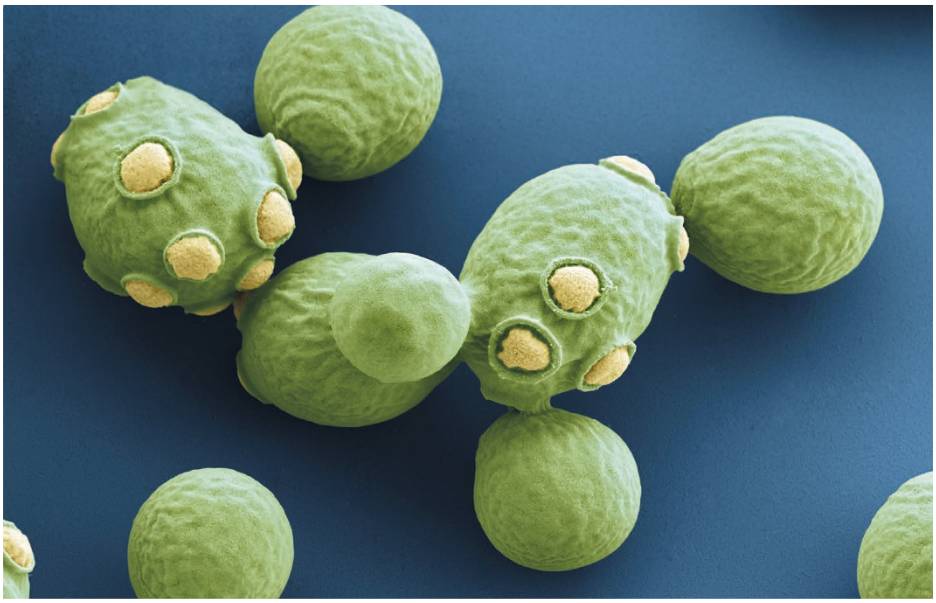
Why some groups have more species

Plants have diversified at almost twice the rate of animals, and animals and plants have accumulated new species some ten times faster than prokaryotes such as bacteria.

Across the tree of life, some groups have many more species than others. To find out why, Joshua Scholl and John Wiens at the University of Arizona in Tucson collated published data on the number of species and their phylogenetic relationships in each group of living organisms. Contrary to some hypotheses, older groups did not have more species than young groups. Instead, the authors found that the balance of speciation and extinction over time, known as the diversification rate, determined most differences in species number between groups.

Ecological and evolutionary differences between the kingdoms of life could explain differences in diversification rates, the researchers say.

Proc. R. Soc. B 283, **20161334 (2016)**



EYE OF SCIENCE/SPL

GENOMICS

History of brewer's yeast revealed

People began to domesticate beer yeasts in the late sixteenth or early seventeenth century, when beer-making in Europe moved from homes to pubs and monasteries.

Kevin Verstrepen at the University of Leuven and Steven Maere at the University of Ghent, both in Belgium, and their colleagues sequenced the genomes of more than 150 strains of *Saccharomyces cerevisiae* (pictured) used to make bread, beer and other drinks. An evolutionary tree of the strains revealed distinct families of yeast, such as one used to make wine and another sake, as well as two distantly related groups of ale yeast. The beer yeasts showed the strongest signatures of human influence. Beer-making strains carried variations and duplications of genes that break down maltose and maltotriose, the main sugars in beer.

The team used the genomic information to make a hybrid strain that has a high tolerance to alcohol and does not produce 4-vinyl guaiacol, which imbues unpopular clove and smoke flavours.

Cell 166, **1397–1410 (2016)**

MICROBIOLOGY

Nanoparticles kill resistant bacteria

A synthetic polymer clears infections in mice caused by a multiple-drug-resistant bacterium.

Gram-negative bacteria are particularly hard to kill once they become drug resistant. To target them, Eric Reynolds, Greg Qiao and their colleagues at the University of Melbourne in Australia designed star-shaped antimicrobial nanoparticles made of amino acids. The molecules killed several common Gram-negative pathogens in culture, and cleared infections in mice caused by *Acinetobacter baumannii*, which is resistant to several antibiotics. When cultured with sublethal concentrations of the nanoparticles for 24 days, *A. baumannii* did not grow resistant over 600 generations.

The nanoparticles hit multiple targets — disrupting