

oriented toward the center of the mitotic spindle. — SMH

*Science*, this issue p. 799

## GALAXY EVOLUTION

### In a cluster of protogalaxies far, far away

Astronomers constantly scour the sky for astronomical objects that can provide insight and constrain their models and simulations of galaxy evolution. Hennawi *et al.* surveyed the ancient sky at an epoch when the universe was half its age for nebulae: large clouds of ionized hydrogen. They stumbled across a system containing four active galactic nuclei, or quasars; objects that are thought to be the progenitors of galaxies. Finding a nebula with a rare quadruple quasar system embedded within it allows detailed spectroscopic and motional studies that may help to refine current models of galaxy and galaxy cluster formation. — ISO

*Science*, this issue p. 779

## ARCHAEOLOGY

### Cultural prehistory in southern Europe

The Protoaurignacian culture appeared in the southern European archeological record around 42,000 years ago and was characterized by artefacts including personal ornaments and bladelets. Archaeologists have debated whether it was ancestral *Homo sapiens* or Neandertals who made these tools and ornaments. Benazzi *et al.* analyzed dental remains from

two Protoaurignacian sites in Italy and confirm that they were *H. sapiens*. The arrival of this culture may have led to the demise of Neandertals in these areas (see the Perspective by Conard *et al.*). — AMS

*Science*, this issue p. 793; see also p. 754

## CANCER IMMUNOTHERAPY

### Giving antitumor T cells a boost

Mutations allow tumors to divide, escape death, and resist treatment. But mutations can also cause tumors to express mutant proteins, which could potentially be exploited to drive antitumor T cell responses. Carreno *et al.* report the results of a small phase I trial seeking to do just this (see the Perspective by Delamarre *et al.*). They vaccinated three patients with advanced melanoma with personalized dendritic cell-based vaccines designed to activate T cells specific for mutations in the patients' cancer. T cells specific for mutant peptides did indeed expand. A next step will be to determine whether this promising strategy improves patient outcomes. — KLM

*Science*, this issue p. 803; see also p. 760

## NEURODEGENERATION

### Making aggregation less aggravating

The accumulation of  $\alpha$ -synuclein aggregates occurs in certain neurodegenerative disorders, including Parkinson's disease. Daniele *et al.* found that  $\alpha$ -synuclein aggregates activated the receptor complex TLR1/2 on primary mouse microglia, leading to the production of proinflammatory cytokines. TLR1/2 antagonists, including a drug approved for treating hypertension, prevented the activation of microglia and cytokine secretion in response to aggregated  $\alpha$ -synuclein. Thus, repurposing of drugs that also inhibit TLR1/2 may be beneficial for patients with synucleinopathies. — LKF

*Sci. Signal.* **8**, ra45 (2015).

## IN OTHER JOURNALS

Edited by **Sacha Vignieri** and **Jesse Smith**



Larger birds, such as this white-plumaged honeyeater, decline in Australian woodlands surrounded by maturing pine plantations

## CONSERVATION BIOLOGY

### Shaped by your surroundings

**H**umans are fragmenting natural habitats into relatively pristine patches surrounded by a larger altered landscape patchwork, or matrix. The nature of this matrix can influence which species in the remaining intact habitat will persist. Mortelliti and Lindenmayer report on a large, long-term experiment that measured the impact of landscape change on 64 species of birds found within fragmented native *Eucalyptus* woodlands in Australia. They found that though overall species richness did not change, emerging pine plantations altered communities, favoring smaller birds that move easily through dense vegetation but reducing the presence of larger species. These results suggest that matrix vegetation types can shape selection in such a way that species and communities within native landscape patches are permanently changed. — SNV

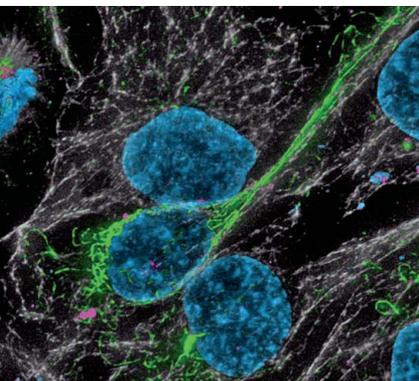
*Conserv. Biol.* 10.1111/cobi.12523 (2015).

## EDUCATION

### A stopgap laboratory experience

As science education moves toward lab-based courses, what happens to students without access to a lab? One option is peer-led team learning (PLTL), a cooperative-learning strategy that encourages students to

actively engage in learning. Snyder *et al.* hypothesized that a PLTL model would lead to increased achievement for students not enrolled in an optional lab course. Non-lab course PLTL students participated in active problem-solving, resulting in this group averaging a letter-grade higher than their nonlab peers without PLTL. This difference



## PALEOBIOGEOGRAPHY

## Dating the history of a biotic connection

The closure of the Panama isthmus enabled the dispersal of terrestrial organisms between South and Central America and prevented the dispersal of marine creatures between the Caribbean and Pacific oceans. This Great American Biotic Interchange is generally held to have begun about 3.5 million years ago. Bacon *et al.* analyze fossil and molecular sequencing data that indicate some significant and much earlier dispersal events for terrestrial organisms and separation events for marine organisms, at 6 to 7 and 23 to 24 million years ago. Together with recent geological evidence for earlier land emergence, these results suggest a more complex history for the biogeographic events shaping the biota of the Americas. — AMS

*Proc. Natl Acad. Sci. U.S.A.* 10.1073/pnas.1423853112 (2015).



The land bridge connecting South and Central America may have formed millions of years earlier than thought

was statistically significant, suggesting that PLTL workshops almost entirely closed the achievement gap for students without access to a lab. Although successful, the authors caution against using PLTL workshops as a replacement for laboratory experience. — MM

*CBE Life Sci. Educ.* 14:ar2 (2015).

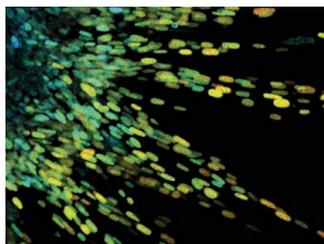
## CANCER BIOLOGY

## Creating a safe haven for tumor cells

Melanomas with certain mutations often respond dramatically to drugs inhibiting a protein kinase called BRAF. This is because BRAF is part of a signaling pathway that, when mutationally activated, drives melanoma growth. Unfortunately, the response is often short-lived because tumor cells develop resistance to the drugs. Hirata *et al.* make

the surprising observation that melanoma cells do not acquire resistance to BRAF inhibition on their own but rather receive help from neighboring fibroblasts. BRAF inhibitors cause fibroblasts to remodel the extracellular matrix. Signals from the remodeled matrix then reactivate the growth signaling pathway in the melanoma cells. Thus, the tumor microenvironment can provide a safe haven for tumor cells that allows them to tolerate certain drugs. — PAK

*Cancer Cell* 27, 574 (2015).



Neighboring fibroblasts help cancer cells tolerate certain drugs

## CHEMISTRY

## Water helpful but not needed to fold DNA

DNA has found a range of applications in chemistry and materials science, from acting as a link that connects other materials to forming complex structures. DNA structures are formed in water and cannot be transferred to organic solvents without a loss of order or change in helical structure. Gállego *et al.* show that a deep eutectic solvent composed of a 4:1 mixture of glycerol and choline chloride enables DNA assembly under room-temperature conditions. When water was added to the mix to lower the viscosity, the assembly time was reduced from 6 days to 20 min, thus providing a method for kinetic control of the assembled structures. — MSL

*Angew. Chem. Int. Ed.* 10.1002/anie.201412354 (2015).

## SYSTEMS BIOLOGY

## Signaling at the heart of blood pressure regulation

Genetic variants, detected in large genome-wide association studies (GWASs) of blood pressure regulation in humans, account for only about 1% of the variability observed between individuals. Thus, better understanding of complex regulatory networks is necessary to find causal events and potential therapeutic targets. Huan *et al.* used integrative analysis that included transcriptional profiling and coexpression network analysis, GWASs, and molecular network modeling to tease out “key driver” genes that are central to regulatory modules that control blood pressure. One of these was SH2B3, a cell signaling adaptor protein previously detected in GWAS studies. The analysis further suggested that SH2B3 may function by altering inflammatory responses and T cell functions. — LBR

*Mol. Syst. Biol.* 10.15252/msb.20145399 (2015).

## MEMBRANE SCIENCE

## Probing antifouling by graphene oxide

Graphene oxide (GO) surfaces have antibacterial properties, but they are not due to any known specific physical interactions with cells. Because GO is toxic to bacteria, it has been proposed as an antifouling material for membranes during water purification. To test the hypothesis that GO physically disrupts or binds to cells, Romero-Vargas Castrillón *et al.* measured the physical interactions between GO-coated atomic force microscope probes and *Escherichia coli* cells. Other than occasional lipopolysaccharide binding events, the forces of interaction are mostly repulsive. Other modes of action, such as oxidative stress, therefore are likely to be responsible for GO toxicity. — NW

*Environ. Sci. Technol. Lett.* 10.1021/acs.estlett.5b00066 (2015).