

analysis strengthens the case for climate change as the key driver of megafaunal extinctions, with human impacts playing a secondary role. — AMS

*Science*, this issue p. 602

## HUMORAL IMMUNITY

### B cells have a need for speed

High-affinity antibodies provide long-lasting protective immunity against many infections. Generating such antibodies requires help, in the form of T cells, which interact with antibody-producing B cells. As B cells proliferate and mutate their antibody genes, T cells select the cells producing high-affinity antibodies. Gitlin *et al.* show in mice that B cells that receive T cell help transit through the cell cycle more quickly by increasing the speed at which replication forks progress. Such a rapid cell cycle transition gives high-affinity B cells a selective advantage.

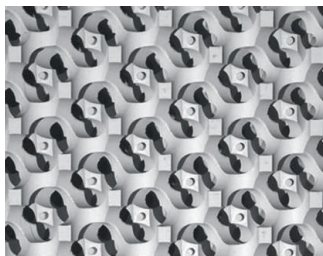
— KLM

*Science*, this issue p. 643

## TOPOLOGICAL MATTER

### Weyl physics emerges in the laboratory

Weyl fermions—massless particles with half-integer spin—were once mistakenly thought to describe neutrinos. Although not yet observed among elementary particles, Weyl fermions may exist as collective excitations in so-called Weyl semimetals. These materials have an unusual band structure in which the linearly dispersing valence and conduction bands meet at discrete “Weyl points.” Xu *et al.* used photoemission spectroscopy to identify TaAs as a Weyl



Surface of a 3D photonic crystal with four Weyl points in the band structure

semimetal capable of hosting Weyl fermions. In a complementary study, Lu *et al.* detected the characteristic Weyl points in a photonic crystal. The observation of Weyl physics may enable the discovery of exotic fundamental phenomena. — JS

*Science*, this issue p. 613 and 622

## STROKE TREATMENT

### Randomized clinical trials for mice

To ensure valid conclusions for formal drug approval, the design and analysis of clinical trials are very stringent. Llovera *et al.* applied the criteria of the gold-standard randomized controlled clinical trial to a preclinical investigation in mice. They tested an antibody to CD49d, which inhibits leukocyte migration into the brain, in two mouse models of stroke. Their six-center randomized controlled study showed that the antibody reduced both leukocyte invasion and infarct volume after a small cortical stroke, but had no effect on larger injuries. — KLK

*Sci. Transl. Med.* **7**, 299ra121 (2015).

## ENVIRONMENTAL SCIENCE

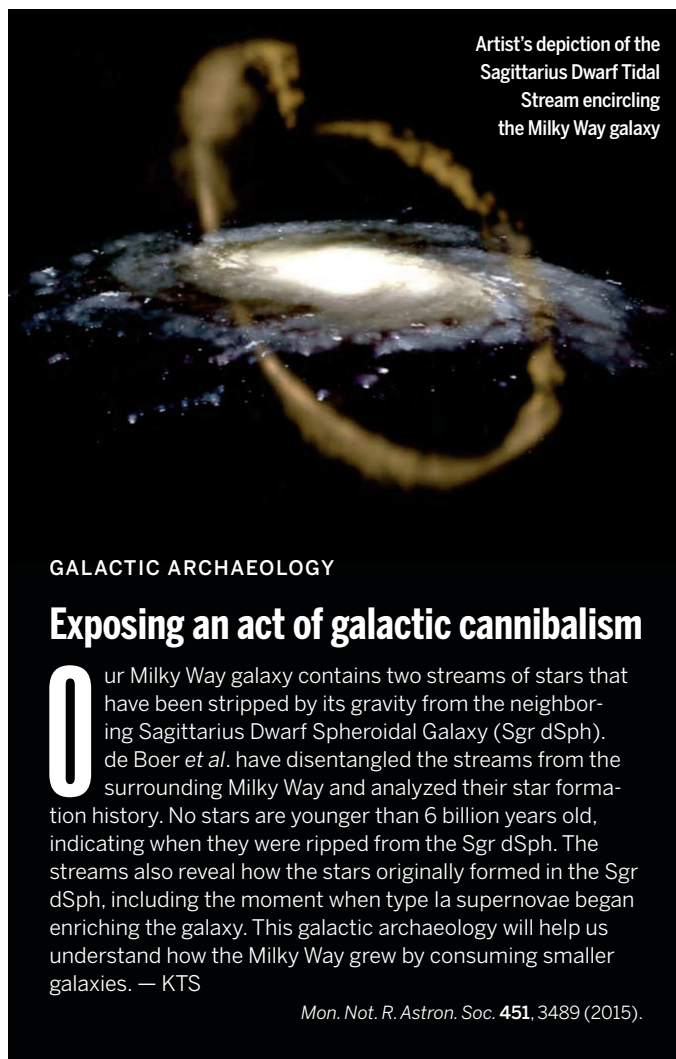
### Deltas are growing centers of risk

Population growth, urbanization, and rising sea levels are placing populations living in delta regions under increased risk. The future resiliency and potential for adaptation by these populations depend on a number of socioeconomic and geophysical factors. Tessler *et al.* examined 48 deltas from around the globe to assess changes in regional vulnerability (see the Perspective by Temmerman). Some deltas in countries with a high gross domestic product will be initially more resilient to these changes, because they can perform expensive maintenance on infrastructure. However, short-term policies will become unsustainable if unaccompanied by long-term investments in all delta regions. — NW

*Science*, this issue p. 638; see also p. 588

## IN OTHER JOURNALS

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



Artist's depiction of the Sagittarius Dwarf Tidal Stream encircling the Milky Way galaxy

## GALACTIC ARCHAEOLOGY

### Exposing an act of galactic cannibalism

Our Milky Way galaxy contains two streams of stars that have been stripped by its gravity from the neighboring Sagittarius Dwarf Spheroidal Galaxy (Sgr dSph). de Boer *et al.* have disentangled the streams from the surrounding Milky Way and analyzed their star formation history. No stars are younger than 6 billion years old, indicating when they were ripped from the Sgr dSph. The streams also reveal how the stars originally formed in the Sgr dSph, including the moment when type Ia supernovae began enriching the galaxy. This galactic archaeology will help us understand how the Milky Way grew by consuming smaller galaxies. — KTS

*Mon. Not. R. Astron. Soc.* **451**, 3489 (2015).

## PATERNAL CHROMATIN

### Biparental control in remodeling sperm

Maternally and paternally inherited animal genomes reorganize and replicate before entering the first zygotic mitosis. Maternally deposited proteins in the egg recondition the sperm DNA; however, Levine *et al.* show that paternal factors are also involved. The *Drosophila* testis-specific protein HPIE localizes to paternal chromosomes and controls sperm DNA reorganization to prime it for embryonic chromosome segregation. Elimination of HPIE in males results in male sterility. Hence, proteins from both parents

prime sperm DNA so it can be synchronized with the maternal genome for the first zygotic mitosis. — BAP

*eLife* 10.7554/eLife.07378 (2015).

## PSYCHOLOGY

### Believing you know is not the same as knowing

Impossibly large numbers of people believe that they are above average drivers; similarly, people often think that they understand how GPS works, but then cannot provide a persuasive explanation. Atir *et al.* add the phenomenon of overclaiming to this list of meta-cognitive judgments. They find that crowdsourced workers claim



Wild legumes, like this red clover, need mycorrhizal fungi to help their Nitrogen fixing symbionts during growth

## MICROBIOME

### Belowground-aboveground

**S**ymbiotic microorganisms, such as nitrogen-fixing bacteria and phosphorus-transferring fungi (mycorrhizae), are vital for plant growth in wild systems. The symbionts may scavenge rare nutrients for plants, but how do they interact? Van der Heijden *et al.* systematically simulated the plant-symbiont communities found in sand dunes in experimental microcosms kept free of contaminating organisms. For wild legume (peas, beans, and their relatives) seedlings, hosting nitrogen-fixing bacteria alone was not enough to guarantee growth; mycorrhizal fungi supplying phosphorous had to be present too. This synergism becomes apparent only when plants live on a nutritional edge. — CA

*ISME* 10.1038/ismej.2015.120 (2015).

to know or to be familiar with nonexistent financial (“fixed-rate deduction”) or biological (“metatoxins”) terms and that this occurs in proportion to their self-assessed knowledge about the topic. Moreover, telling people in advance that some terms did not exist had no effect on how many they claimed to know. — GJC

*Psychol. Sci.* **26**, 10.1177/0956797615588195 (2015).

## SOLAR CELLS

### Healing perovskite thin films

Inorganic-organic perovskite thin films function best in solar cells when they are free of defects and grain boundaries, but the as-synthesized films are often rough and highly polycrystalline. Zhou *et al.* now show

that methyl ammonium lead iodide ( $\text{CH}_3\text{NH}_3\text{PbI}_3$ ) rapidly reacts with gas-phase methylamine ( $\text{CH}_3\text{NH}_2$ ) to form a liquid, and then reforms a solid film after degassing. Processed films decreased in root mean

square roughness by about a factor of 25, and their overall power conversion efficiency in solar cells increased from 5.0 to 14.5% after treatment. — PDS

*Angew. Chem. Int. Ed.* 10.1002/anie.201504379 (2015).



In the spiny chromis damselfish, genes involved in metabolism, immunity, and development are up-regulated in cross-generational adaptation to warming

## CLIMATE ADAPTATION

### How to adapt to climate change

Climate change is imposing increases in temperature on a wide variety of species. Such warming conditions may be particularly challenging for aquatic animals, for which warming waters bring not only temperature increases but also associated oxygen limitations. Some species have displayed an ability to adapt to warming conditions across generations. Veilleux *et al.* looked at the transcriptome of parents and offspring in a Pacific damselfish, *Acanthochromis polyacanthus*, and found three suites of genes whose expression was altered during transgenerational exposure to increased temperatures. These included genes involved in metabolism, immune response, and tissue development. Notably, heat-shock gene expression did not change, suggesting that these markers of immediate response to increased temperatures may not be involved in longer-term adaptation. — SNV

*Nat. Clim. Change* 10.138/climate2724 (2015).

## CLIMATE CHANGE

### Whither carbon capture and storage?

Carbon capture and storage (CCS) is widely considered an essential aspect of efforts to limit global warming. Yet efforts to develop CCS technology are progressing slowly, and no full-scale power plant with CCS is in operation. Maddali *et al.* analyze the costs and risks associated with CCS and model the effects of its delayed implementation using a dynamic nonlinear simulation tool. Based on a number of emissions and mitigation scenarios, the authors conclude that CCS is not sufficiently mature and, in its current form, is too expensive to contribute significantly to global climate change mitigation. Other mitigation strategies must therefore be developed urgently. — JFU

*Environ. Sci. Technol.* 10.1021/acs.est.5b00839 (2015).

# Science

## Healing perovskite thin films

Phil Szuromi

*Science* **349** (6248), 599-600.  
DOI: 10.1126/science.349.6248.599-d

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