EDITED BY KRISTEN MUELLER AND JAKE YESTON

CHEMISTRY

The Ends of the Story

The rich self-assembly behavior observed in block copolymer blends comes from joining two dissimilar polymers together and so forcing them to live next to each other. If the component blocks A and B are hydrophobic and hydrophilic, then placing the polymer in water can give rise to micelles, vesicles, or other morphologies, depending on the ratio of A to B. This behavior would not be expected of a homopolymer, with only one component. However, Du *et al.* observed the spontaneous formation of micelles when they put a number of homopolymers, synthesized using the reversible addition fragmentation chain transfer polymerization (RAFT) method, into acidic water. This polymerization technique uses chain transfer agents (CTAs) that make it possible to tune and tailor the end groups of the polymer chains, either during or after the synthesis. Aggregates formed only when hydrophobic groups were present on both ends of the polymers, though these constituted less than 2% of the weight, much less than what is usually needed for a block copolymer. One might expect this odd behavior to be limited to polyelectrolytes, where there is a strong interaction between the hydrophilic part of the polymer and the acidic water, and thus an additional driving force for the formation of aggregates, yet the authors also observed the formation of small micelles when a neutral polymer was used. — MSL

small **7**, 10.1002/smll.201100382 (2011).

PHYSICS

The Universe in the Mirror

The concept of symmetry plays a prominent role in modern physics, and of all symmetries, C(harge)P(arity)T(ime Reversal) is the one believed to hold for every physical law: if the universe were replaced with its mirror image, particles' direction of motion reversed, and matter replaced by antimatter, an observer would not be able to tell the difference. The many tests designed to look for violations of CPT symmetry have not yet found any; one of the simplest would be to compare the basic properties of a particle and its antiparticle, which CPT symmetry implies should be the same (modulo a sign). Ulmer *et al.* have now made an important step in that direction: They observed spin flips of single protons (stored in a so-called Penning trap) induced by an rf magnetic field. The faint signal associated with the spin flips was detected through the coupling of the proton's spin and motional degrees of freedom. The technique could lead to precision measurements of the magnetic moments of both protons and antiprotons, enabling a new test of the CPT symmetry. — JS

Phys. Rev. Lett. **106**, 253001 (2011).

CREDIT: YU-YUN CHEN

ECOLOGY

Why Trees Skip a Year

The lowland tropical forests of Southeast Asia are dominated in many regions by trees of the family Dipterocarpaceae. Dipterocarps are mast-seeders—that is, they reproduce synchronously at intervals of several years. Masting, in these tree species and others, has been shown to be an effective strategy for satiating predators and thus ensuring the survival of a proportion of seedlings from each reproductive event. Whether this strategy has fitness advantages for the plants over annual reproduction, however, has not been established.

Visser *et al*. used a 25-year data set for the forest dipterocarp *Shorea leprosula* in a Malaysian forest, coupled with demographic modeling and simulations spanning the entire life cycle, to quantify the balance of demographic costs and benefits of mast fruiting. They find that there are clear fitness benefits to masting, as compared to annual reproduction, when seed predation pressure is strong. Nevertheless, masting is less likely to evolve if the majority of the forest community reproduces annually or if seeds are specialized for dispersal by animals. — AMS

J. Ecol. **99**, 1033 (2011).

SOCIOLOGY

Not All Equal to Politicians

In considering how much progress the United States has made toward racial equality, one aspect that has been hard to study has been the political system itself. Do legislators give preferential treatment to certain constituents? To answer this question, Butler and Broockman conducted a field experiment. They sent 4859 U.S. state legislators an e-mail asking about how to register to vote. The e-mail letter was signed by one of two aliases: Jake Mueller or DeShawn Jackson. Previous studies had indicated that these aliases were strongly associated with individuals identifying themselves as white or black, respectively. Alternate forms of the letter indicated no party affiliation or Democrat or Republican, resulting in six experimental situations. The DeShawn alias received significantly fewer responses than the Jake alias when a Republican affiliation or no party affiliation was

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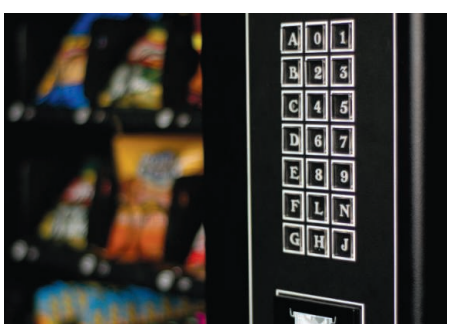
given. Legislators (or at least their offices) from both political parties were more responsive when they thought the letter writer was from their own party. Minority legislators replied more frequently to the DeShawn alias than to the Jake alias. The authors conclude that racial discrimination is still present in U.S. politics. — BJ

Am. J. Polit. Sci. **55**, 463 (2011).

PHYSIOLOGY

Managing the Munchies

Unfortunately for modern humans, we are adapted to pounce all over high-fat foods, presumably because the essential nutrients they provide were often scarce for our ancestors. In modern society, such preference for fatty foods in the face of their ample availability is a recipe for a major societal health problem. DiPatrizio *et al.* explored the mechanism by which the presence of fatty foods in the mouth stimulates the appetite of rats for more by surgically shunting ingested food from the stomach so that the rest of the digestive system was not affected. Surprisingly, the presence of fat in the mouth increased the synthesis of endocannabinoids (neurotransmitters related to



the active substance in marijuana) in the small intestine. Severing the vagus nerve blocked the effect, showing that the signal must travel from the mouth to the brain and then to the intestine. Endocannabinoid blockade in the gut diminished the feed-forward (so to speak) effect of oral fat on further fat ingestion. The authors suggest that a strategy that diminishes endocannabinoid signaling in the gut could help reduce an excessive drive for fat intake without side effects on the brain, where endocannabinoids also function in reward pathways. — LBR

Proc. Natl. Acad. Sci. U.S.A. **108**, 10.1073/pnas.1104675108.

ASTROPHYSICS

Galactic Ins and Outs

The study of stellar populations in present-day galaxies provides clues to the formation history of those galaxies. NGC 3115, also known as the Spindle, is a nearby disk galaxy without a spiral structure (i.e., a lenticular galaxy), for which Arnold *et al*. obtained high-quality images and detailed spectra with the Subaru, Keck, and Magellan telescopes. The data provide global information on the velocities and chemical abundances of the stars in that galaxy and show that its inner part spins faster than its outer part. Comparison of the results with those expected from theoretical models of galaxy formation suggests that NGC 3115 may not have formed in one go: Its inner part is likely the result of the violent merging of two large galaxies, whereas its outer part may have formed little by little as smaller galaxies joined in at later times. The fact that the stars in the outer part are also less chemically enriched than those in the inner part supports this hypothesis. The inner part of the galaxy would have hosted its own star formation, enriching the interstellar medium with newly synthesized elements, whereas the accreted stars in the outer part of the galaxy would have formed in much smaller galaxies, with much less chemically enriched interstellar media. — MJC

Astrophys. J. **736,** L26 (2011).

BIOCHEMISTRY

Tagged for Destruction

Promising new drug targets have come from deep sequencing, microarray studies, and genome-wide RNA interference screens; however, validation of these potential targets by specific in vivo inhibition remains a challenge. Neklesa *et al.* describe a new technology to address this problem that takes advantage of the fact that exposure of hydrophobic regions induces cellular stress and targets proteins for destruction by the proteasome. The strategy makes use of an existing technology: the introduction of a single fusion domain, the HaloTag protein (a bacterial dehalogenase), to the target protein. The HaloTag includes a reactive linker, which, when bound to a hydrophobic compound, induces protein degradation. The authors designed and synthesized hydrophobic small molecules to bind the HaloTag protein. On the basis of initial testing, the authors chose an adamantyl compound, HyT13, which was potent and nontoxic. In other destabilization-domain–based systems, a ligand has to be provided to prevent destabilization. The HaloTag-HyT13 system has the advantage that compound administration induces degradation. Proof-of-principle experiments showed degradation of a protein expressed in zebrafish embryos and of an oncogenic protein in cell culture and in mice. — VV

Nat. Chem. Biol. **7**, 10.1038/nchembio.597 (2011).

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