



ECOLOGY

Unlucky in Love

Some anurans, members of an order of amphibians that includes frogs and toads, are explosive breeders—males aggregate to attract females and compete aggressively for mating opportunities. This results in multiple males attempting to mount a single female, which may cause the female's death from the excessive weight. From an evolutionary perspective, this seems counterproductive, but analysis of the frog *Rhinella proboscidea* by Izzo *et al.* suggests that this may not always be the case. Males of this species were able to extract the eggs from females that expired as a result of these intense competitions among males. Field observations confirmed that males could manipulate dead females to extract oocytes and that these oocytes could be fertilized to produce embryos. These findings suggest that in some male-biased systems, due to the scarcity of available females and the intense competition for access to reproduction among males, this behavior may allow for fitness gains in both the male and female participants. In fact, males may actually experience positive selection for functional necrophilia. — LMZ

J. Nat. Hist. 10.1080/00222933.2012.724720 (2012).

CHEMISTRY

Stretching the Polanyi Rules

Forty years ago, Polanyi laid out a framework to explain and predict the relative effectiveness of translational and vibrational energy in driving the reactions of atoms with diatomics. The current frontier in state-resolved molecular dynamics research encompasses the reactions of halogen atoms with methane and its various isotopologues—a six-atom system. Over the past several years, successive experimental and theoretical studies have sought to clarify the extent to which the Polanyi Rules apply (or fail to apply) to such systems. For the reaction of chlorine with CHD_3 , the Rules suggest that the product-like transition state ought to favor the efficacy of vibration over translation, although the results of recent studies have been ambiguous in this regard. Zhang *et al.* now report quantum dynamics simulations of this reaction and compare their results with those from previous experiments and quasiclassical trajectories. The simulations suggest that C–H stretch excitation does indeed promote the reaction, except at collision energies below 1 kcal/mol. — JSY

J. Phys. Chem. Lett. 10.1021/jz301649w (2012).

GEOLOGY

Recording the Doldrums

The winds in the “doldrums” region near the equator are rather calm, and marine settings there see barely any hurricanes. The relative stability of ocean currents and waves in this region minimizes disruption of seafloor sediments and benthic communities. This is likely to

have been true at other points in Earth history as well, such as the Late Ordovician, when there were also polar regions with permanent ice caps. To search for clues of a hurricane-free equator in the geologic record, Jin *et al.* examined a 6000-km cross section across the margins of what was then the continent of Laurentia—containing modern-day North America, Greenland, and



northern Europe. Massive carbonate deposits containing abundant *Thalassinoides* trace fossils and persistent brachiopod shell beds suggest environments in which shallow water with relatively few major hurricanes would host and/or preserve these fauna. The belt corresponds remarkably well to the equatorial region in paleomagnetism-based plate reconstruction models of the Late Ordovician, providing independent validation of such models. — NW

Geology 10.1130/G33688.1 (2012).

ASTRONOMY

Impulsive Activity

Comets and asteroids are normally distinguished on the basis of their composition, appearance, and orbits. Since 2006, however, nine bodies orbiting within the main asteroid belt have been found with physical characteristics similar to those of comets; i.e., comae and narrow dust tails. They have been named main-belt comets and are still enigmatic because they are difficult to find and characterize. Moreno *et al.* used the Gran Telescopio Canarias, a 10.4-m telescope located in the Canary Islands in Spain, to observe the main-belt comet P/2012 F5 (Gibbs), which was discovered in March 2012—the ninth main-belt comet found. The optical data, obtained on 18 May and 8 June 2012, together with a model to characterize the dust environment around the comet, imply that an impulsive event lasting less than a day, possibly less than a few hours, occurred on 1 July 2011, with an uncertainty of ± 10 days, producing the narrow dust trails observed in this comet. It is not possible to say what caused this event, but an outburst, a collision with another body, or a rotational disruption are some of the likely causes. Activity related to ice sublimation, which has been suggested for other main-belt comets, is unlikely, based on the properties of the dust. — MJC

Astrophys. J. 761, L12 (2012).

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CELL BIOLOGY

Endocytosis In-filtration

A healthy human kidney filters about 180 liters of plasma per day, a highly regulated process that ensures the removal of toxins but the retention of proteins and red blood cells. Critical to this filtration process is the slit diaphragm, a cell-cell junction formed by specialized cells called podocytes that wrap around kidney capillaries. The slit diaphragm loses its structural and functional integrity in nephrotic syndrome, a disease characterized by protein loss in the urine (proteinuria) that can lead to kidney failure.

Studying genetically engineered mice, Soda *et al.* identified a role for clathrin-mediated endocytosis, a process implicated in membrane protein recycling, in the formation and maintenance of the slit diaphragm. Podocyte-specific deletion of any of several proteins essential for endocytosis caused severe proteinuria in the mutant mice. These results suggest that the podocyte cell-cell junctions may be more dynamic than previously thought. Endocytosis could be a mechanism that allows the slit diaphragm to be rapidly remodeled in response to physiological changes such as fluctuations in blood pressure and blood volume. — PAK

J. Clin. Invest. 10.1172/JCI65289 (2012).

ECONOMICS

Cap and Innovate?

Climate policies, such as emissions caps or carbon taxes, aim in part to induce technological change: Make emissions more expensive and market incentives will drive companies to develop technologies that emit fewer, or no, greenhouse gases. Such innovations, it has been argued, will drive down the costs of the policies. Gans suggests that prior research in this area gives an incomplete and sometimes misleading picture. His economic model explores three

types of technological innovations: fossil fuel efficiency (e.g., improved automobile efficiency), alternative energy (e.g., wind power), and carbon offset (e.g., carbon sequestration). As emissions caps drive down emissions-intensive behaviors, they make fossil fuel efficiency innovations less valuable, limiting incentives to improve technology. Alternative energy innovations may also suffer, as profit incentives would depend on the overall size of the economy, which could contract under emissions caps. A higher carbon price could, however, spur innovation in carbon offset technologies, suggesting that carbon offset credits should be widely integrated into emissions trading schemes. Gans concludes that the market alone, driven by climate policies, will not be enough. Innovation policies must be pursued as well, including public investments in fossil fuel efficiency and alternative energy. — BW

Am. Econ. J. Econ. Policy 4, 1 (2012).

PSYCHOLOGY

One If by Hand, Two If by See

Language is a human universal, yet differs across cultures. Reading and writing are learned skills, and it seems improbable that the rather different orthographies observed in French and Chinese would be processed in the same way in the brain. Nakamura *et al.* showed that readers of French do indeed differ on behavioral measures from readers of Chinese when confronted with words that are either static or handwritten with a forward or backward trajectory, and with either normal or squeezed spacing. The effect of spatial distortion was greatest for the Chinese participants when viewing the forward direction of handwriting motion, whereas the largest effect on the French participants occurred with static words. The neuroimaging results provided a similar double dissociation, in which repetition suppression (due to priming) was observed specifically in Exner's

area—a portion of the premotor cortex known to be activated during the viewing of motion—for the Chinese and in the visual word form area for the French. The authors suggest that these areas, along with those that were activated, but not differentially so, constitute a large-scale network that facilitates reading in all cultures, with relative cortical contributions dependent on whether one is reading by eye or by hand. — GJC

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1217749109 (2012).

