



ECOLOGY

## Frequency Matters

Aggressive conflict is dangerous. Thus many animals have evolved signals to advertise their ability to defend resources, such as antlers in elk or bird song. For many aquatic species, however, signaling one's prowess is not so straightforward. Murky environments hinder the ability of receivers to discern visual cues, making proactive signaling more difficult. Amazonian knifefish use an electric sense to navigate and forage in muddy tropical waters. Individuals produce distinct electric signals, which have been implicated in courtship and aggressive displays. Through a series of experiments conducted within a natural population of Amazonian knifefish (*Sternarchorhynchus* sp.) in Peru, Fugère *et al.* demonstrate that larger males produce higher-frequency signals and that fish that emit higher-frequency signals outcompete those with lower frequencies in direct competition. Furthermore, fish only respond aggressively towards an artificial electric signal played at a frequency lower than their own. Thus, the frequency of an animal's electric discharge accurately signals its resource-holding potential, and competitors heed the electrical warning. — SNV

*Biol. Lett.* 10.1098/rsbl.2010.0804 (2010).

SOCIOLOGY

## Political Leapfrogging

Although there have been many discussions of the polarized nature of American politics, do the views of elected officials match the preferences of their electorate? Bafumi and Herron sought to answer this question by comparing a national opinion survey of American voters (the Cooperative Congressional Election Study; CCES) with legislator voting records of the 109th (2005–2006) and 110th (2007–2008) Congresses. In many cases, the CCES questions were similar to (or the same as) actual congressional roll call votes, which allowed for better comparison. By developing a linear scale bounded by representatives (or CCES respondents) who had taken consistently liberal or conservative positions, the authors found that members of Congress were more extreme than the voters they represented. The median member of the 109th House of Representatives was more conservative than the median American voter, but the median



member of the 110th House of Representatives was more liberal. Thus, voting out one extremist usually led to replacement by someone equally extreme, but of the opposite party. The authors refer to this as “leapfrogging” because the moderate views of the median American voter are leapfrogged during the turnover. Although the turnover was similar in the Senate, overall it appeared to be more moderate. — BJ

*Amer. Polit. Sci. Rev.* 104, 519 (2010).

BIOTECHNOLOGY

## Expanding Archaeal Diet

Archaeal methanogens transform carbon dioxide into methane under an extraordinary range of conditions, unfazed by surrounding acids, bases, salts, or extremes of temperature. However, they are for the most part quite choosy about their substrate. Lessner *et al.* now show that by introducing an esterase enzyme (MekB) from an aerobic bacterium into the metabolic pathway of one such methanogen, they can extend the organism's diet to encompass methyl esters of acetate and propionate. On incorporation of a plasmid encoding MekB, *Methanosarcena acetivorans* proved capable of growing and emitting methane with either ester

acting as the sole carbon source. Methanol appeared to be the portion of the ester most readily reduced; acetate was transformed more slowly, whereas propionate simply accumulated as a by-product. The success of merging pathways from bacterial and archaeal domains, coupled with the effectiveness of the resulting engineered organisms in consuming common esters, bodes well for broader applications in processing biomass and organic waste products to form energy-dense natural gas. — JSY

*mBio* 1, e-00243-10 (2010).

BIOMEDICINE

## NKT Cells Fight Cancer

One way tumors evade the immune system is by fostering an immunosuppressive environment. Although immune cells such as macrophages are known to contribute to this immunosuppression, whether neutrophils, an immune cell typically associated with inflammation, do too has not been fully explored. De Santo *et al.* now find that melanoma patients have elevated frequencies of immunosuppressive neutrophils in their blood. This correlated with increased concentrations of the acute-phase response protein, serum amyloid A 1 (SAA-1), in both the plasma and in tumors. In vitro, SAA-1 induced neutrophils from healthy donors to become immunosup-

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pressive. As a way to modulate SAA-1–induced neutrophil differentiation, the authors exposed immunosuppressive neutrophils to natural killer T (NKT) cells, immune cells that can counteract immunosuppression. SAA-1 promoted the interaction of NKT cells with neutrophils, which resulted in neutrophils adopting a proinflammatory phenotype. These results suggest that adoptive NKT cell therapy may be one way to relieve tumor-induced immunosuppression. — KLM

*Nat. Immunol.* **11**, 1039 (2010).

## MATERIALS SCIENCE

## 1...2...3...I Love to Count

Scanning transmission electron microscopy (STEM) methods are highly sensitive to atom type and arrangement and thus can be used for precise analysis of the structure of materials at the nanometer scale. However, current applications have been limited by the need for calibration standards that exhibit complex relationships between the image intensity and sample thickness, orientation, and crystallinity, or depend on comparisons of relative contrast. LeBeau *et al.* have developed a method to perform a column-by-column count of the atoms in an arbitrarily shaped sample without prior knowledge of the shape or thickness, by making direct comparisons with simulated images. Position-averaged convergent beam electron diffraction patterns were used to measure the local thickness and ensure accurate tilting of a gold foil sample. The raw data were filtered to obtain the location of each atom column, and comparisons between experimental and simulated column intensities were used to determine the number of atoms within each column to within  $\pm 1$  atom. By varying the value used in the simulations for the finite effective source of the microscope, a parameter that is difficult to measure in non–aberration-corrected STEM, it was also possible to determine when the simulated and observed intensities did not agree, and thus to obtain limits for this parameter. In conjunction with other atomic-level microscopy techniques, it should be possible to count the atoms in more complex samples without the need for calibration standards. — MSL

*Nano Lett.* **10**, 4405 (2010).

on this motif in which they expanded the layer spacing of a potassium lithium titanate sample by inserting alkane thiols and then reductively assembling gold nanoparticles between them. They deduced by electron microscopy that the solid contained intercalated gold disks less than 1 nm thick and about 3.5 nm wide. They then monitored the capacity of the assembled material to selectively oxidize benzene to phenol in water upon visible irradiation (at wavelengths exceeding 420 nm) at room temperature. Although the catalysts adsorbed benzene, they initially showed little selective activity. However, when phenol was added at the outset, the product enhanced its own formation pathway: Photoactivity increased substantially to a net phenol yield of 62% at a selectivity of 96%. — PDS

*J. Am. Chem. Soc.* **132**, 10.1021/ja1083514 (2010).

## BOTANY

## One in the Same, Almost

Although many flowering plants reproduce by sexual reproduction, some plants evade the complexities of chromosome reduction, dispersion of gametes, and fertilization by undergoing a type of asexual reproduction called apomixis. Such plants produce a seed, but that seed carries the same diploid genome as its one parent and can generate a new plant. Apomixis has

been suggested to be a de-regulated form of sexual reproduction. Garcia-Aguilar *et al.* have now analyzed the molecular mechanisms that distinguish the sexual reproduction pathway found in maize from the apomictic pathway found

in a wild relative of maize. The results implicate an alteration in DNA methylation pathways, which normally impose repressive marks on the chromatin. When certain methyltransferases expressed during sexual reproduction function poorly, or are deleted, the chromatin takes on a state that is more permissive of transcription, and a developmental program resembling apomixis is seen. Thus, chromatin modifications and their subsequent effects on gene transcription are involved in determining whether a plant reproduces sexually or by apomixis. — PJH

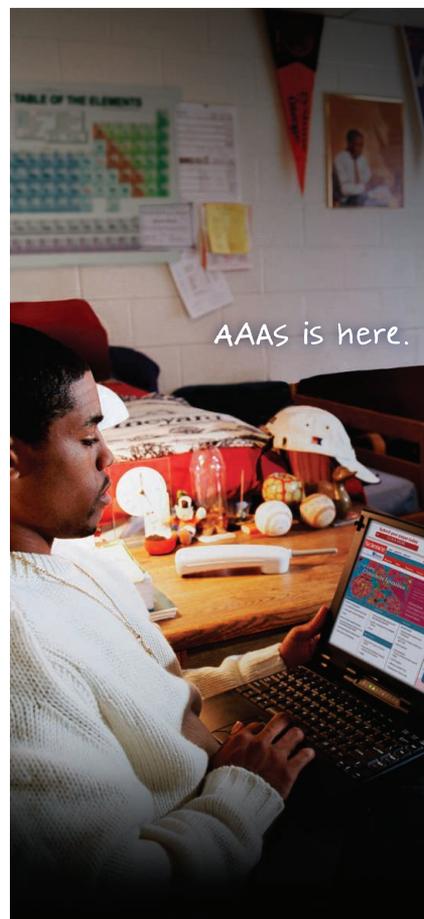
*Plant Cell* 10.1105/tpc.109.072181 (2010).



## CHEMISTRY

## Visible Product Assistance

Adsorption of gold nanoparticles to titania surfaces has proven a promising approach to extending the photocatalytic properties of a semiconductor from the ultraviolet into the visible regime. Ide *et al.* explored a variation



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