EDUCATION

From Journal to Classroom

Can cutting-edge science be taught in the classroom? Adapted primary literature (APL) retains the structure and results of original research papers while adjusting the content to fit high-school students. The use of APL in the classroom via conversation or group discussion introduces students to the idea that the written text serves both to construct arguments and to present them for evaluation by others.

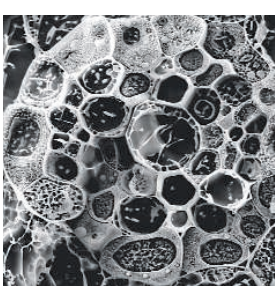
In a case study at a girls-only religious high school, Falk and Yarden observed the coordination practices—which integrate elements from theory, methods, data, and applications—of eight 12th-grade biology students during an APL-based lesson. In text-oriented practices, the student connects different sections of the text, whereas in research-oriented practices, the student connects the scientific methods used to the data that were generated. The findings reveal not only that coordination practices enhanced APL-based learning but also that students are able to engage with this type of curriculum—learning science by inquiry and learning about science as a means of inquiry. Furthermore, developers of APL-based curricula need not avoid the complexity of the primary scientific literature because coping with ambiguous data through coordination practices expands the students' appreciation of scientific authenticity. — MM*

Res. Sci. Educ. **39**, 349 (2009).

PLANT SCIENCE

Making Salt-Tolerant Plants

Crops grown in salty soils yield less. Soils may be too salty naturally, as expanding land use presses hectares of marginal quality into agricultural service, and reasonable-quality lands can become too salty because of the effects of long-term irrigation. Plants respond to an excess salt in various ways: Some transport salt from the roots to the aboveground shoots; some sequester excess salt into vacuoles; and some are able to exclude excess Na^+ from the shoot tissues. As the first point of contact between the plant and salty soils, how the roots balance Na^+ influx and efflux determines how much Na^+ the plant has to deal with.



Møller *et al.* have manipulated Na^+ transport in the whole plant or only in the roots (cross section at left) and assessed the outcome in *Arabidopsis*. When the Na^+ transporter is overexpressed constitutively, the plants are, if anything, more sensitive to salt. In contrast, when the transporter is overexpressed specifically in the root stele tissue, which includes the vascular system that feeds the shoots, the plants become more salt-tolerant. In this case, less Na^+ is transported to the shoots, even though the amount of Na^+ taken up from soil into root remains unchanged. — PJH

Plant Cell **21**, 10.1105/tpc.108.064568 (2009).

APPLIED PHYSICS

Strained Graphene

When graphene (an extended two-dimensional layer of graphitic carbon) is adsorbed on substrates such as silicon dioxide (SiO_2), it can develop strong surface corrugations, and this buckling can create regions of high and low strain. Teague *et al*. examined the effect of this strain on the conductance properties of graphene adsorbed on SiO_2 by first making topographic measurements with a scanning tunneling microscope. A fast Fourier transform of these data produced a strain map of the surface. In unstrained regions, the conductance curves show a sharp inflection at the minimum conductivity and, as in suspended graphene samples, evidence Dirac-like behavior. In the strained regions, however, the effects of out-of-plane phonons mediate the inelastic electron tunneling and help create a broader "U-shaped" conductance curve. The authors note that the effects are relatively small and that strain effects should not prove a barrier to creating graphene devices. — PDS

Nano Lett. **9**, 2542 (2009).

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CHEMISTRY

8 Legs or 8 Faces?

Octopi are so named because these intriguing sea creatures have eight legs. Lu *et al.* have prepared an "octapi" supramolecular complex, so named because it assembles through the stacking interactions of eight faces—more specifically, the faces of aromatic rings bearing delocalized pi-bonded electrons. The authors mixed palladium ions in solution with phenyl-substituted phosphine ligands and pyridine-substituted pyrazole ligands. When the latter ligands were properly sized (with a two-carbon bridge linking a pair of pyridylpyrazoles), crystals formed in which, at the molecular scale, two tightly interlocked macrocycles were held together by a 2.5-nm-long column of stacking interactions involving eight phenyl and pyridyl faces, supplementing phosphorus and pyridyl-nitrogen coordination to the metal centers. Extending the pyrazole bridge length by one carbon disrupted the geometric balance, leading to separated (rather than linked) macrocycles in the resultant crystal lattice. — JSY

J. Am. Chem. Soc. **131**, 10.1021/ja9041912 (2009).

CREDITS (TOP TO BOTTOM): ISTOCK PHOTO; MØLLER *ET AL.*, *PLANT CELL* **21**, 10.1105/TPC.108.064568 (2009)

BEHAVIOR

The Power of the Printed Word

A common belief in the United States is that the media exhibit a liberal bias, which generally aligns them with Democratic programs and politicians, in their reporting of the news and in their selection of what news to report on. In fact, one study estimates the effect of Fox News Channel, which was launched about a decade ago and is generally more conservative than other television outlets, as having increased the Republican share of the vote by half a percentage point.

One month before the November 2005 gubernatorial election in Virginia, Gerber *et al.* carried out a randomized field study in which several thousand households that did not already receive a daily newspaper were given trial subscriptions to either the *Washington Post* (liberal) or the *Washington Times* (conservative). Post-election telephone interviews established that receiving either newspaper had little impact on factual knowledge (such as Harriet Miers being a Supreme Court nominee) or political attitudes (such as President Bush's approval rating). What was affected was voter turnout (as measured by administrative records) and, surprisingly, actual voter choice, with both sets of newspaper-receiving households favoring the Democratic candidate by about seven percentage points. — GJC

The Washington Post

The Washington Times

Am. Econ. J. Appl. Econ. **1**, 35 (2009).

CELL BIOLOGY

Perfect Timing

For cell division to occur, DNA must be completely replicated during the S phase of the cell cycle. Replication is tightly controlled, and the timing of replication of different regions of the genome is linked to localization in the nucleus and gene expression; replication timing of some genetic loci changes during development.

Using a nuclear microinjection system, Lande-Diner *et al.* changed the timing and analyzed histone proteins, which package DNA into nucleosomes to form chromatin. Histones undergo extensive post-translational modifications, which correlate with gene activity. Chromatin replicating late in S phase is generally inactive and packaged with deacetylated histones. They found that when the replication timing of a reporter gene was switched from late to early during S phase, it was repackaged with acetylated histones, which are a marker of active chromatin, and that the opposite occurred when replication was switched from early to late. The switch is due to cell cycle regulation of the acetylation state of histones and indicates how alterations in replication timing, such as that occurring during development, affect chromatin organization and gene activity. — HP

Mol. Cell **34**, 767 (2009).

CHEMISTRY

The Breaking Point

A chemical reaction fundamentally involves the cleavage and formation of bonds between atoms. In general, the electrons and nuclei don't move at precisely the same time; more often than not, a rapid electronic rearrangement precedes a slower nuclear rearrangement, after which the electron distribution may adapt once again. In this context, the question arises of when exactly a bond can be considered broken. Should the criterion be electronic arrangement? Nuclear separation? Some combination of the two?

Wernet *et al.* explore this question in a study of the photoinduced dissociation of gaseous diatomic bromine. Specifically, they excite the molecule to a state that leads rapidly to dissociation and then use ultrafast laser pulses to track changes in the electronic distribution along the way. The probe pulses eject electrons from the valence shell of the dissociating molecule, and the measured kinetic energy variations of these photoelectrons reflect the evolving bonding framework. By shortening the probe pulses below their duration in prior studies of this system, the authors successfully map out the transition from a molecular (Br_2) electronic arrangement to an atomic (2 Br) arrangement, defining the bond-breaking point (~85 fs after excitation) based on the appearance of the atomic signature. — JSY

Phys. Rev. Lett. **103**, 13001 (2009).

CREDITS (TOP TO BOTTOM): *THE WASHINGTON POST; THE WASHINGTON TIMES*