EDITED BY KRISTEN MUELLER AND JAKE YESTON

EDUCATION

Less Is More

Although educators agree that moving away from "cookbook" laboratory units allows for a better emulation of authentic scientific practice, our understanding of how laboratory materials influence student learning with respect to problem-solving remains limited. Jordan *et al.* investigated whether the removal of laboratory materials during initial discussions resulted in increased student planning and creativity. Junior and senior undergraduates were divided into two groups, one that was given materials to work with and one that was not, and were asked to design two experiments to determine plant transpiration rate using stem cuttings. Students were asked to record time to completion, describe each experiment, provide drawings of the experimental setup, and to describe in a written report what additional information they needed. Students who were given materials listed two "standard" solutions, whereas students without materials listed an additional five novel solutions, had a shorter time to completion, reported more discussion beyond the instructions, and more often mentioned the natural environment. These results suggest that novice students, given a typical laboratory-based experimental task, focus on available materials, supporting the notion that removal of the laboratory materials can result in greater and more collaborative planning that leads to more creative solutions. — MM

J. Res. Sci. Teach. **48**, 1010 (2011).

CELL SIGNALING

Opioid Receptors Up to Scratch

Itching and pain are two distinct sensations, and it's probably not advantageous to mix the two, given that they cause very different responses —scratching in response to the former and withdrawal in response to a painful stimulus. Nevertheless, there seems to be some overlap of the two sensations. For example, a common side effect of injection of opioids into the spinal cord for pain management is opioid-induced itch. Liu *et al.* report that this effect of the opioid morphine is brought about by heterodimeric receptors composed of the μ-opioid receptor (MOR1D), which binds morphine, and the gastrin-releasing peptide receptor (GRPR), which binds GRP. This hybrid receptor only allows signaling of itch sensation as binding of morphine activates GRPR, but binding of GRP doesn't activate MOR1D. Specifically targeting this heterodimeric receptor holds promise as a strategy to prevent opioid-induced itch while retaining the analgesic effects of opioids. — LBR

Cell **147**, 447 (2011).

PHYSICS

Metamaterials to See in THz

Certain bands of the electromagnetic spectrum are useful for specific sensing applications, whether chemical detection or thermal imaging. Terahertz frequencies, for instance, can readily penetrate clothing and paper and so are finding use at airports in the form of full-body scanners. These systems are relatively big though; shrinking both the radiation source and detector size would make them potentially more mobile. Tao *et al.* have combined a micromechanical cantilever system with a metamaterial-engineered split-ring resonator. The cantilever array is made from a bilayer of two metals, the different thermal properties of which cause a cantilever to move when it absorbs heat. That heat can also be provided in form of absorbed photons. As the split-ring metamaterial can be tuned by design to operate at any desired wavelength, the authors chose its geometry to confer sensitivity to absorption in the microwave and terahertz frequency range. Moreover, they incorporated a reflector on each cantilever across the array to facilitate simple optical readout of any deflection of the cantilevers. The approach offers a relatively cheap and flexible route to designer sensor imaging arrays. — ISO

Smaller sensors on the way?

Opt. Express **19**, 21620 (2011).

ASTRONOMY

Bigger than Earth, but No Giant

The microlensing method of detecting planets takes advantage of the fact that the light of a background star gets deflected by the gravitational field of a foreground star with which it is spatially aligned. If the foreground star hosts a planet, light will be deflected in a way that furthermore depends on the planet's mass and distance from its host star. Using this method to analyze observations from 13 different telescopes around the world and one in space, Muraki *et al.* detected a planet 10.4 times more massive than Earth. The planet orbits a star 0.56 times as massive as the Sun, at a distance comparable to Jupiter's distance from the Sun. This puts the planet's orbit beyond the snow line—the distance from a star beyond which ice can condensate—and thus in the sort of environs where giant planets such as Jupiter and Saturn form. However, the new planet looks more like a failed giant planet; one, in other words, that accreted enough solid material to form the core of a giant planet but never acquired a gaseous envelope because the protoplanetary disk lost its gas before the solid core was massive enough to efficiently attract hydrogen and helium. — MJC

Astrophys. J. **741**, 22 (2011).

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