



PLANT SCIENCE

Breaking the Mold

Filamentous fungi are believed to grow exclusively by means of elongation at their tips. However, this mechanism has seemed incompatible with the transmission of *Neotyphodium* and *Epichloë* endophytic fungi through the embryos of seeds of their host grasses. By examining the vegetative growth of fungi within *Lolium* spp. grasses, Christensen *et al.* find evidence for hyphal expansion by physical expansion (intercalary growth); the fungi attach to their host cells (see hypha attached to a fescue leaf, above) and stretch within the space between cells, paralleling the leaf expansion growth mode of their host. Furthermore, the authors suggest that intercalary growth is an adaptation that maintains the integrity of hyphae within the leaves of its host. — LMZ

Fungal Genet. Biol. 10.1016/j.fgb.2007.07.013 (2007).

PSYCHOLOGY

Showing the Flag

Linking positions or policies to a country's flag by means of appeals to patriotism has become a potent weapon in the arsenal of political operatives of all stripes. Nuanced and multifaceted discussion can then be replaced by simplified yes/no choices, thus eliminating any middle ground and polarizing the voting public. Nevertheless, Hassin *et al.* show that in some situations, recourse to national symbols, such as the flag, can elicit the prosocial effect of drawing the citizenry from the extremes into the center. They found that presenting the Israeli flag subliminally—that is, too briefly for participants to become consciously aware that they had seen it—induced both right- and left-wing Israelis to adopt more moderate positions with respect to various aspects of the Israeli-Palestinian conflict. In addition, the consequences of this brief, undetected glimpse of the flag were reflected not only in the participants' declared voting intentions (in the elections of March 2006), but also in their actual voting behaviors. — GJC

Proc. Natl. Acad. Sci. U.S.A. 104, 10.1073/pnas.0704679104 (2007).

CLIMATE SCIENCE

Cooler in the Forest

Human activity affects climate in many, sometimes opposing, ways. For example, emissions leading to increased atmospheric greenhouse gas concentrations cause warming, whereas those that

raise the aerosol burden cause cooling. Moreover, our overall impact depends not only on what we send directly into the atmosphere but also on how we modify the land. Many analyses have concentrated solely on how land use change alters Earth's albedo, a measure of sunlight reflectivity at the surface, but changes in vegetation induce corresponding variations in moisture and heat fluxes that can have large impacts as well. In an effort to determine the effects on temperature of ecophysiological changes due to land use change in the southeastern United States, Juang *et al.* analyzed heat and radiation flux data collected via meteorological towers located in three distinct ecosystems: a grass-covered old field, a planted pine forest, and a hardwood forest. They found



that although the effect of albedo differences among the different ecosystems was large, with warming of nearly 1°C for the transition from old field to forest areas, the ecophysiological and aerodynamic effects of the same transitions could produce even greater cooling, of >2°C. Thus, con-

trary to some assertions, conversion of open fields to wooded fields will not necessarily make the world a hotter place. — HJS

Geophys. Res. Lett. 34, L21408 (2007).

ECOLOGY/EVOLUTION

A Loss of Bivalves

The potential for ecosystems to shift abruptly from one state to another is becoming increasingly recognized, especially in aquatic environments. Cloern *et al.* document an unusual and instructive example in one ecosystem, brought about by changes in another, neighboring system. In 1999, the San Francisco Bay—a large lagoon-like estuary on the west coast of the United States—began to experience massive algal blooms for the first time since monitoring had begun more than two decades earlier. Such blooms are normally associated with eutrophication: the enrichment of waters by runoff of excessive nutrients (especially N and P) from agricultural land. However, in this case the nutrient loading of the estuary had been decreasing before the bloom. It appears that the bloom was instead the result of a collapse in the population of the bivalve consumers of the algae. This collapse was brought about by an influx of flatfish and crustacean predators of the bivalves into the estuary from the coastal ocean, which itself had resulted from a physical oceanographic change in the California Current System. Increased coastal upwelling of cold, nutrient-laden waters led to increased oceanic primary production and a bonanza for consumers and their predators, which

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were recruited in substantial numbers into the neighboring estuary. Hence, the state change in the estuary was caused indirectly by hitherto-unsuspected connectivity with the ocean. — AMS
Proc. Natl. Acad. Sci. U.S.A. **104**, 18561 (2007).

APPLIED PHYSICS

Pick a Color

The ability to detect single photons makes it possible to investigate the quantum properties of light and to implement strategies for quantum cryptography and quantum communications with



Tunable single photon detector.

single photons as the information carriers. To date, photon detectors have come in two guises: They can be designed either for sensitivity at a single energy or over a broad range of energies, but neither option has

offered on-chip tunability of the detected wavelength. Gustavsson *et al.* now describe a frequency-tunable single-photon detector for the microwave regime using a double quantum dot structure. They are able to shift the discrete energy levels of one dot with respect to the other by application of appropriate gate voltages. Using time-resolved charge detection techniques, they can then directly relate the detection of a tunneling electron to the absorption of

a single photon, the energy of which corresponds to the tuned energy-level separation between the two dots. — ISO

Phys. Rev. Lett. **99**, 206804 (2007).

CHEMISTRY

Gains in Contact

Self-assembled monolayers (SAMs) of alkanethiolates on gold or silver substrates have broad applications in surface patterning, but their flexible and thermally sensitive nature complicates efforts to probe properties such as conductivity. Mercury has been applied to SAM surfaces to form contact electrodes, but beyond its toxicity, its tendency to spread through flow can lead to short-circuiting and lack of measurement precision. Chiechi *et al.* show that a fluid eutectic composed of three parts gallium and one part indium by weight (dubbed "EGaln") is a practical alternative. The primary advantage of this material is its capacity to retain its shape below the comparatively high applied surface stress of 0.5 N/m. The authors extruded droplets from a syringe onto a silver surface and then drew back the needle until a sharp micron-scale conical tip formed, the size of which could be tuned by varying the pulling rate. They could then apply these conducting tips to SAM surfaces for robust measurements of current densities as a function of applied voltage. Additional advantages of EGaln include its stability in air and low toxicity. — JSY

Angew. Chem. Int. Ed. **46**, 10.1002/anie.200703642 (2007).



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<< Food for Thought

Parkinson's disease is characterized by the loss of dopaminergic neurons in the substantia nigra pars compacta (SNc) of the brain. The reduced production and function of neurotrophins (proteins that promote neuronal survival) in patients' brains as compared to those of unaffected individuals may be a contributing factor in Parkinson's disease. Leptin is a hormone that functions in the hypothalamus to reduce appetite. Leptin receptors are also abundant in dopaminergic neurons in the SNc, leading Weng *et al.* to investigate whether leptin might play a role in neuronal survival. Immunohistochemical analyses showed that degeneration of mouse dopaminergic neurons in the SNc caused by injection into the brain of the neurotoxin 6-OHDA (a mouse model of Parkinson's disease) was less severe if the mice were pre-injected with leptin. Leptin was also protective against 6-OHDA-induced toxicity in mouse MN9D cells, a dopaminergic cell line. Western blotting assays and treatments with pharmacological inhibitors and short hairpin RNAs showed that the ability of leptin to block 6-OHDA-induced apoptosis was dependent on leptin receptor-mediated activation of Janus kinase 2, mitogen-activated or extracellular signal-regulated protein kinase kinase, extracellular signal-regulated kinase 1 and 2, and the transcription factor cAMP-response element binding protein (CREB), a known neuronal survival factor. Leptin also stimulated the phosphorylation and nuclear localization of CREB in dopaminergic SNc neurons and increased the abundance of brain-derived neurotrophic factor (BDNF) in the brain as compared to that in untreated animals. Together, these data suggest that treatment with leptin may be useful in therapies to combat Parkinson's disease. — JFF

J. Biol. Chem. **282**, 34479 (2007).

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Science

Showing the Flag

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