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In This Issue

CELL BIOLOGY

Cytochrome *c* targets brain cancer cells for apoptosis

One route to apoptosis, or cell death, begins as death-inducing signals prompt the mitochondria to release cytochrome *c*. Cytosolic cytochrome *c* then binds Apaf-1, which triggers a cascade of molecular interactions that leads to the cell's death. However, brain tumors are often resistant to chemotherapeutic agents, which trigger cell death at a step upstream of cytochrome *c* release. Carrie Johnson *et al*. show that directly activating the apoptosis pathway with cytochrome *c* causes apoptosis in murine astrocytomas and medulloblastomas but does not harm normal brain tissue. The authors show that primary neurons within the cerebellum and cortex are resistant to cytosolic cytochrome *c*-induced cell death. They report that this differential sensitivity is due to high Apaf-1 levels in tumor tissue versus low Apaf-1 levels in surrounding brain tissue. Johnson *et al*. suggest that this finding could be exploited to selectively kill brain cancer cells. — B.T.

"Differential Apaf-1 levels allow cytochrome c *to induce apoptosis in brain tumors but not in normal neural tissues" by Carrie E. Johnson, Yolanda Y. Huang, Amanda B. Parrish, Michelle I. Smith, Allyson E. Vaughn, Qian Zhang, Kevin M. Wright, Terry Van Dyke, Robert J. Wechsler-Reya, Sally Kornbluth, and Mohanish Deshmukh* (see pages 20820–20825)

ECOLOGY

Invasive Argentine ants thrive on modified diets

Invasive species, nonnative organisms that successfully colonize new environments, threaten biological diversity and drain economic resources. Research has focused on the immediate consequences of these invaders, although longitudinal studies may better inform ecological theory and management strategies. Chadwick Tillberg *et al*. conducted an 8-year study of *Linepithema humile*, the Argentine ant, as it advanced across the Rice Canyon area of southern California. Native to South America, Argentine ants have colonized parts of the United States and now live as far away as Australia, Japan, and South Africa. They aggressively displace and prey upon native, aboveground foraging ants and protect plant pests like aphids in return for honeydew, a sap-derived, sugar-rich secretion produced by insects of the order Hemiptera. The authors found that introduced Argentine ants, unlike those in their native Argentina, adapted their diet to the foreign environment over time and increasingly rely on Hemiptera honeydew for sustenance, rather than on prey from higher trophic levels. This dietary flexibility may contribute to the ants' ability to thrive in new and often harsh climates like the relatively less-productive scrub of southern California. — F.A.

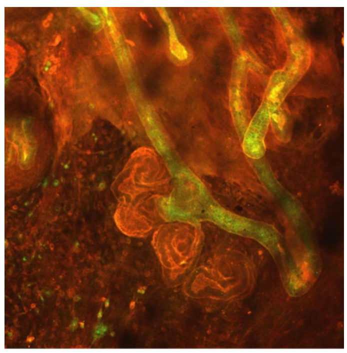
Argentine ants tending scale insects.

"Trophic ecology of invasive Argentine ants in their native and introduced ranges" by Chadwick V. Tillberg, David A. Holway, Edward G. LeBrun, and Andrew V. Suarez (see pages 20856–20861)

MEDICAL SCIENCES

Kidney baby steps

The kidney is a prime candidate for organ generation. However, engineering specialized tissue introduces a host of challenges beyond confluent cell culture. Eran Rosines *et al.* broke the process into a number of substeps, each with the potential for optimization and development. To coax the cells into the complex three-dimensional structure of a naturally functioning kidney, the authors employed growth factors and extracellular matrix components in a series of culture stages. First, ureteric buds (UBs) were grown from Wolffian duct (WD) microdis-



Uretic bud tissue (green) fusing with metanephric mesenchyme (red).

sected from embryonic rat. *In vivo*, a kidney develops from a single UB, but the authors induced multiple buds to develop from a single duct. In the next step, the authors detached one UB and coaxed it to grow into a branched tubular network. The authors then induced the UB to fuse with metanephric mesenchyme, as occurs *in vivo*, into a structure resembling the late embryonic kidney, including apparent filtration units. The gene expression in the engineered tissue was similar, but not identical, to that in a natural kidney. The tissue survived implantation in inbred adult rats and seemed to develop a simple blood network, but whether it functions like normal kidney tissue remains to be determined. — K.M.

"Staged in vitro *reconstitution and implantation of engineered rat kidney tissue" by E. Rosines, R. V. Sampogna, K. Johkura, D. A. Vaughn, Y. Choi, H. Sakurai, M. M. Shah, and S. K. Nigam* (see pages 20938–20943)

PHARMACOLOGY

COX2 pathway components resolve inflammation

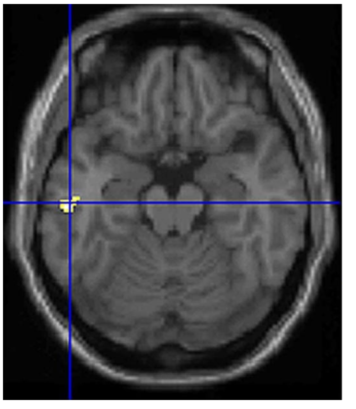
The cyclopentenone 15-deoxyΔ^{12-14} PGJ_2 (15d-PGJ_2) is generated in the cyclooxygenase 2 (COX2) pathway that is important in the control of inflammation. Researchers debate, however, whether the level of 15d-PGJ_2 is physiologically relevant. Ravindra Rajakariar *et al.* confirm the presence of 15d-PGJ_2 in a mouse model and find that, together with its precursor PGD_2, it regulates both the onset and resolution of inflammation. The authors used liquid chromatography–tandem mass spectrometry to detect 15d-PGJ_2 at nanogram-per-milliliter levels in mice that had peritonitis. Knockout mice lacking the enzyme that synthesizes PGD_2 experienced aggressive and prolonged inflammation. Rescue could be induced by injecting the mice with a selective agonist of the receptor DP1, on which PGD_2 acts. Stimulation of the related DP2 receptor, however, produced no relief. In knockout mice, macrophages and lymphocytes accumulated in the peritoneum at levels three to four times higher than in wild-type mice. Rajakariar *et al.* conclude that 15d-PGJ_2 plays an important role in resolving inflammation and suggest that the receptor DP1 may prove a useful target for antiinflammatory drugs. — K.M.

"Hematopoietic prostaglandin D_2 synthase controls the onset and resolution of acute inflammation through PGD_2 and 15-deoxyΔ^{12-14} PGJ_2" by Ravindra Rajakariar, Mark Hilliard, Toby Lawrence, Seema Trivedi, Paul Colville-Nash, Geoff Bellingan, Desmond Fitzgerald, Muhammad M. Yaqoob, and Derek W. Gilroy (see pages 20979–20984)

PSYCHOLOGY

For topological tasks, left hemisphere of brain superior

Researchers have long been uncertain about which brain region is most critical in analyzing the form properties of an object. Bo Wang *et al.* describe a series of experiments with right-handed individuals, including functional MRI studies, which show that the left hemisphere of the brain is more involved than the right hemisphere in perceiving the topological properties of an object. The authors asked right-handed volunteers to examine a range of topological structures, including inside/outside relationships, holes presented in differing shapes such as triangles, circles, and squares, and compare them to other geometric properties. Left-handed subjects were also tested, and the authors found that the reverse (right) hemisphere was better at topological perception, but by a smaller degree than in right-handed subjects. fMRI studies showed that the left hemisphere is reliably and consistently superior to the right for perceiving these differences. — B.T.



fMRI results showing activation in left temporal gyrus.

"Global topological dominance in the left hemisphere" by Bo Wang, Tian Gang Zhou, Yan Zhuo, and Lin Chen (see pages 21014–21019)