EDITED BY JESSE SMITH AND SACHA VIGNIERI

EVOLUTION

Skunky or Social

Though we often think of mammals in the order Carnivora as predators, many of these species are themselves subject to high rates of predation and, as such, have evolved a suite of antipredator defenses that tend to sort them into two quite different categories. Such small carnivore species generally tend to be either solitary, often aposematically colored and armed with noxious anal sprays, or social and highly vigilant. Stankowich *et al.* used natural history data, including range overlap with potential predators, body size, and activity patterns, in conjunction with comparative phylogenetic analyses on 181 species of mammals to identify patterns of predation risk that could have contributed to the evolution of these two defensive strategies. They found that species that have evolved noxious sprays as a defense, such as skunks, tend to be nocturnal and subject to predation by other mammals, whereas socially vigilant species, such as mongooses, tend to be diurnal and at risk of predation by birds of prey. These results show how similar ecological contexts can result in the repeated evolution of highly adaptive strategies across species and regions. — SNV

Evolution 10.1111/evo.12356 (2014).

CELL BIOLOGY

Growing Back Hearing?

Hair cells do not normally regenerate in the mammalian ear, and it has been thought that permanent damage to human hair cells in the cochlea inexorably resulted in hearing loss. However, Bramhall *et al.* have found that supporting cells in the cochlea taken from newborn mice can turn into hair cells. In a chemical model of damage, explant cultures were treated with gentamycin, and lineage tracing was done to track cell populations. New hair cells arose at a low level from a subpopulation of supporting cells that expressed the *Lgr5* (leucine-rich repeat–containing G protein–coupled receptor 5) marker, a protein in the *Wnt* signaling pathway. Previous studies had shown that inhibition of the *Notch* signaling pathway can help restore hearing in mice with noise-induced deafness. Here, Bramhall and colleagues found that *Notch* inhibition by a gamma secretase inhibitor increased the fraction of supporting cells that transdifferentiated into hair cells and that the effects of *Notch* were dependent on β–catenin. It is not yet known whether this process can be triggered in older animals. — BJ

Stem Cell Rep. **2**, 311 (2014).

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ENVIRONMENTAL SCIENCE

Root Down

Owing to their remarkable ability to uptake and translocate compounds using their roots, plants have long been considered a possible means of treating contaminated soils. However, this ability also provides an avenue by which organic contaminants such as pesticides and herbicides may be introduced into the food chain, an issue of great concern in the fields of public and ecosystem health. Collecting data in the field is a robust but slow way to assess exposure pathways, so a more efficient way to do that would be of great value. Limmer and Burken applied a predictive model, based originally on the uptake and translocation of pharmaceuticals and other compounds in human tissues, to plant roots and trace organic contaminants. As expected, hydrophocity and molecular mass of the organic compounds are two major predictive physiochemical domains of uptake, but a number of other factors, including hydrogen bonding and polar surface area, also are important. Because plant membranes behave in a fashion similar to human membranes such as the blood-brain barrier, plant roots may serve as the primary protective barrier from exposure to unwanted organic compounds. — NW

Environ. Sci. Technol. Lett. 10.1021/ez400214q (2014).

PHYSICS

Defect Control

Quantum information processing and nanoscale sensing applications rely on the ability to store and manipulate information encoded into quantum states of matter—quantum bits. Some solid-state implementations look to use the spin of electrons in quantum dots as the storage media. The quantum properties of natural or artificial defect centers (nitrogen vacancy or NV centers) in diamond can be optically addressed and manipulated and can be robust even up to room temperature. Likewise, silicon carbide (SiC) has also been found to have defects that exhibit similar properties to those of the diamond NV centers, including long coherence times that persist up to room temperatures, a high degree of optical polarization, and spin-dependent photoluminescence. Klimov *et al.* now demonstrate that the spin properties of defects in SiC can be coherently controlled electrically by applying series of voltage pulses to gates surrounding the defects. The compatibility with Si fabrication techniques makes SiC an ideal candidate for the development of integrated quantum technology platforms using scalable quantum control of electron spins in a dense array. — ISO

Phys. Rev. Lett. **112**, 10.1103/PhysRevLett.112.087601 (2014).

Science

Root Down

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