DEVELOPMENT

A Need for Glia

The mammalian cerebral cortex, the seat of higher thought, develops from the inside out, as younger neurons born in the ventricular zone migrate past older neurons to form ever more superficial layers. Radial glial cells serve as guide wires along which the migrating neurons travel, and these same radial glial cells also serve to produce new neurons. As migrating neurons navigate through the glial cell scaffold, they move stepwise by means of transient adhesive contacts mediated by gap junction proteins. Integrins are αβ subunit receptors located in the plasma membrane and link the extracellular matrix to the intracellular cytoskeleton. Belvindrah *et al.* have taken a closer look at how β1 integrin contributes to the organization of these cortical cell migrations. They used an existing mouse line, in which both radial glia and migrating neurons were deficient in β1 integrin, and compared it with a mouse line they developed for this analysis, with β1 integrin knocked out only in the migrating neurons. When the radial glia lacked β1 integrin, they seemed disorganized in their anchor points, and the cortex developed abnormally, whereas when only the neurons lacked β1 integrin, migration proceeded normally. Tissue culture analysis showed that the normal formation of neurite extensions depended on the expression of β1 integrin in the glia, but not in the neurons. It seems that what matters for how β1 integrin affects the layering of the developing cortex is not its expression in neurons but rather its expression in glial cells. — PJH

J. Neurosci. **27**, 13854 (2007).

CREDITS (TOP TO BOTTOM): BELVINDRAH *ET AL.*, *J. NEUROSCI.* **27**, 13854 (2007); LEE AND KIM, *LANGMUIR* **24**, 142 (2008)

VIROLOGY

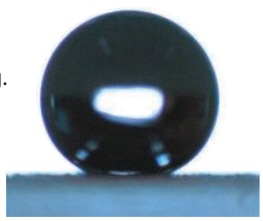
Aided by Amyloid

The role played by semen in the sexual transmission of HIV may be more than simply as an innocuous carrier. Münch *et al.* show that semen contains factors that can actually amplify the infectious potential of HIV by helping to promote the binding of the virus to target cells. Within semen, the enzyme prostatic acidic phosphatase can break down and form fragments that can, in turn, coalesce into amyloid-like fibrils. These fibrils can bind to HIV virions and enhance their binding to target cells—effectively amplifying the chance of successful viral infection by several orders of magnitude. Addition of the fibrils at physiological concentrations increased HIV infection in susceptible cell cultures, cultures of human tonsils, and in transgenic rats. It remains to be confirmed to what extent this mechanism is effective during human-to-human sexual transmission, but if it is an important factor, it may represent a valuable target in efforts to prevent transmission. — SMH

Cell **131,** 1059 (2007).

MATERIALS SCIENCE

How to Walk on Water



Water striders can skate and jump on water without drowning. The legs of these insects have a hierarchical structure of hydrophobic hairs; the resulting highly water-repellent surface is thought to help the insects move on water, because small hydrophobic objects can float, or sink with a delay, even when their density is higher than that of water. Floating is one thing though—jumping onto and off of a liquid water surface quite another. How do the impact conditions affect the response of the water surface? To investigate this question, Lee and Kim studied the impact behavior of small superhydrophobic spheres. They found that at low impact velocity, the spheres oscillate on the surface while afloat. As the impact velocity increases, they bounce off the water surface. At even higher velocity, the spheres penetrate the water surface and sink. Whether the spheres bounce off depends on the viscosity of the liquid and the hydrophobicity of the sphere. Thus, the superhydrophobic legs are crucial to the water striders' ability to jump on water and avoid drowning. Future robots may mimic such behavior. — JFU

Langmuir **24**, 142 (2008).

CHEMISTRY

Aromatic Surprise

Unsaturated hydrocarbon rings are constructively classed by their number of electrons available for pi-bonding: A multiple of four confers instability in a planar configuration (as in cyclobutadiene), whereas even nonmultiples of four (as in benzene and naphthalene) confer exceptional stability, termed aromaticity. Cyclic analogs in which the carbons are replaced by heavier atoms can be subject to greater degrees of spin-orbit coupling, and it is thus unclear how straightforwardly the aromaticity picture extrapolates.

Ugrinov *et al.* explored this question in analyzing an unusual compound they prepared and crystallographically characterized—a dianionic parallelogram with arsenic (As) and tellurium (TE) centers at opposite corners and charge-balancing potassium cations sequestered by crown ethers above and below the plane. A simplistic analysis would suggest that four lone pairs (one each per As and Te center) should sum to an anti-aromatic configuration. However, calculations using density functional theory suggest that the experimental geometry is consistent with a spin triplet ground state and that the net electronic configuration is in fact closer to an aromatic system. — JSY

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Aromatic Surprise

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