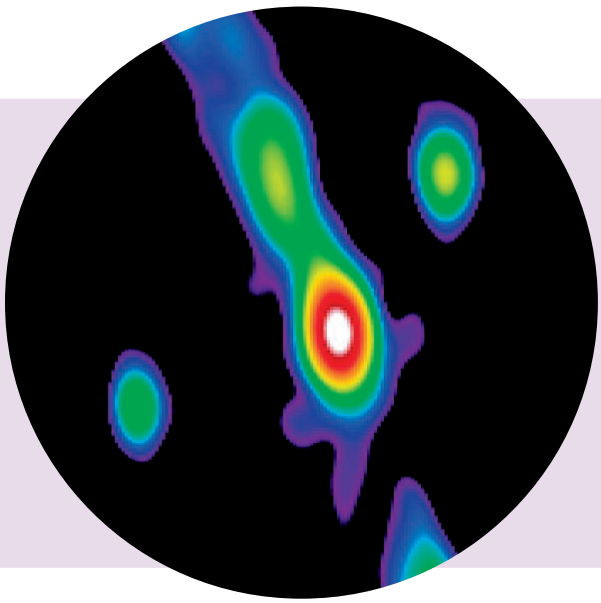
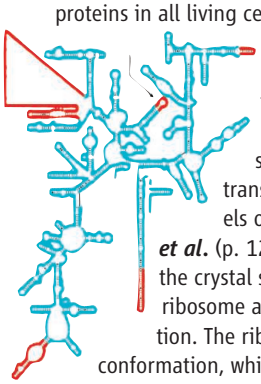
EDITED BY CAROLINE ASH AND MARIA CRUZ

Stellar Jets >>

Supersonic jets of energized charged particles are a common phenomenon in astrophysics, emanating from sources that range widely in mass: from brown dwarfs to super massive black holes in the centers of galaxies. **Carrasco-González *et al.*** (p. 1209; see the Perspective by **Ray**) present observations, of a jet emanating from a young stellar object, which show that the jet is magnetized and has characteristics that are similar to those of jets found in much larger and more massive systems. The results support the idea that all astrophysical jets are launched and collimated through the same basic mechanism, involving launching of material along magnetic field lines.



Macromolecular Message Translation



The ribosome is a macromolecular machine that translates the sequence of messenger RNA into proteins in all living cells. Structures of prokaryotic ribosomes have supplied insight into the conserved features of such protein synthesis; however, eukaryotic translation has additional levels of complexity. **Ben-Shem *et al.*** (p. 1203) have determined the crystal structure of the yeast 80S ribosome at 4.15 angstrom resolution. The ribosome is in a ratcheted conformation, which is a state that is an intermediate in the translocation of messenger RNA and transfer RNA. The crystal structure provides the molecular underpinning for existing biochemical and genetic data and will inform the design of functional experiments.

Dressing-Up Diamond Defects

The spin states of nitrogen vacancy defects in diamond are being explored as information carriers and memories in quantum information systems. Their long lifetimes, fast manipulation rates, and the ability to couple them to adjacent electronic and nuclear spins provide the necessary properties for implementation in solid-state quantum networks. To date, however, the readout of the spin state via photoluminescence, either directly or indirectly, results in the destruction of the spin state. **Buckley *et al.*** (p. 1212, published online 14 October; see the Perspective by **Milburn**) have formed a light-matter hybrid state in which the spin interacts with laser light to form a polariton state. This hybrid state can be optically probed to produce a nondestructive measurement and manipulation technique for the spin state of the nitrogen-vacancy center.

A Little Help from Hydrogen

Biomass may one day displace petroleum as the chemical industry's primary feedstock. Currently, though, the primary hurdle for incorporating plant-derived material into existing process feeds is the high proportion of oxygen in its molecular frameworks. Rapid heating of the biomass followed by high-temperature treatment with zeolite catalysts can yield tractable quantities of useful commodity compounds such as ethylene and benzene, but much of the carbon is wasted in the process—diverted either toward gaseous CO and CO_2, or solid coke. **Vispute *et al.*** (p. 1222) show that an intermediate step, in which hydrogen is catalytically incorporated into the heated material prior to zeolite treatment, can substantially raise the yield of useful products by reducing susceptibility to coking.

How Mammals Grew in Size

Mammals diversified greatly after the end-Cretaceous extinction, which eliminated the dominant land animals (dinosaurs). **Smith *et al.*** (p. 1216) examined how the maximum size of mammals increased during their radiation in each continent. Overall, mammal size increased rapidly, then leveled off after about 25 million years. This pattern holds true on most of the continents—even though data are sparse for South America—and implies that mammals grew to fill available niches before other environmental and biological limits took hold.

Lap Cats

We all know that domestic cats lap milk, but perhaps fewer of us have thought about how they do this. **Reis *et al.*** (p. 1231, published online 11 November; see the cover) have discovered that cats curl their tongues so that the top surface touches the water. Then, by lifting their tongues rapidly, a column of liquid grows by inertia until gravity induces its breakage and the cats close their jaws to capture the liquid. Lapping frequency is tuned to maximize the volume ingested, depending on the animal's mass; a relationship that holds as true for tabby cats as it does for lions.

Writing to Close Gaps

Some have questioned whether findings in the laboratory obtained under controlled conditions and limited contexts bear any relevance to behavior in real-world environments in which ordinary people cope with real-life challenges. Recent studies have shown a replicable and long-term effect of a brief writing exercise on the academic performance of African-American seventh graders in an inner-city public school. **Miyake *et al.*** (p. 1234) extended this approach to show that a similar kind of writing exercise can help to reduce the gender gap observed in the performance of female students in an undergraduate physics class, where performance is measured not only via course grades and exam scores, but also on a standardized test.

CREDITS (TOP TO BOTTOM): CARLOS CARRASCO-GONZÁLEZ, LUIS F. RODRIGUEZ, GUILLEM ANGLADA, JOSEPH MARTI, JOSE M. TORRELLES, MAYRA OSORIO; BEN-SHEM *ET AL.*

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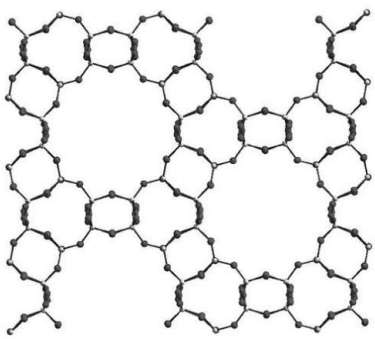
Lynx Vision

Early in development, correct visual experiences during the so-called "critical period" build the foundations for visual function in adulthood. Hence, when one eye is not working together with the other, an adult may be left with imperfect vision. The plasticity characteristic of the critical period does not persist into adulthood, and later readjustments to visual function may not be fully successful. **Morishita *et al.*** (p. 1238, published online 11 November; see the Perspective by **Higley and Strittmatter**) have identified a gene in mice called *Lynx1*, which shows increased expression after the critical period. The Lynx1 protein binds to and reduces the sensitivity of acetylcholine receptors, but if mice were treated to enhanced cholinergic signaling, their adult visual plasticity was improved and if mice lacked the *Lynx1* gene altogether, they were able to recover visual function even in adulthood.

Routes to Rare Zeolites



Zeolites are microporous crystalline solids with well-defined structures. Although many naturally occurring ones have been obtained in laboratory synthesis, some have remained elusive. One of these, boggsite, is of interest for catalytic reactions because it has large channels defined by rings of 10 or 12 atoms that intersect within its crystalline lattice. **Simancas *et al.*** (p. 1219) report the synthesis of boggsite by using phosphazenes as the organic groups that directed the formation of rings during synthesis. These reagents can be readily modified—a feature that should allow greater flexibility in synthesis routes.

By a Whisker

Every student learns that the sensory cortex is used for processing sensation and the motor cortex is used for perceiving movement. However, in the real world, this may not always be so neatly arranged. **Matyas *et al.*** (p. 1240) have found that sensory and motor fields are specialized for different types of movement, such that in mice the motor cortex controlled the forward movement (protraction) of their whiskers and the sensory cortex controlled backwards movements (retraction) of whiskers. So if a whisker hits an object, then a reasonable first reaction might be a motor command for retraction. Similarly, the motor cortex stimulates protraction for more active exploration. Hence, the sensory cortex is also motor and the motor cortex is also sensory. In an ecological context, these combined reactions offer a repertoire useful for a mouse seeking food and shelter in a complex environment.

Promoting Apoptosis

During acute disease, the promyelocytic leukemia (PML) protein becomes fused to another protein as a result of a chromosomal translocation. This protein appears to have multiple and varied functions, including the ability to form distinctive complexes in the nucleus that suppress tumorigenesis and promote apoptotic cell death. **Giorgi *et al.*** (p. 1247, published online 28 October; see the Perspective by **Culjkovic-Kraljacic and Borden**) have proposed a mechanism by which PML influences the cellular signals that promote apoptosis. The protein was localized at sites of contact between the endoplasmic reticulum and mitochondria, where it associated with a calcium channel, a protein kinase, and a protein phosphatase, to regulate calcium mobilization into the mitochondrion, which then triggers the cell death program.

Cellular Devices

Cellular control mechanisms might offer opportunities to build genetic devices capable of sensing aberrant cells and activate a regulatory signal that directs the cell to alter its biological state. **Culler *et al.*** (p. 1251; see the Perspective by **Liu and Arkin**) present a proof of principle for a synthetic gene network in which cells were engineered to make an RNA-based device that detected molecules associated with disease states such as inflammation and cancer. Detection then triggered expression of a gene that made the cells more sensitive to a drug causing cell death.

CREDIT: SIMANCAS *ET AL.*