Neandertal growth patterns
The ontogeny of different parts of the Neandertal skeleton has been derived from isolated bones and fragments. Rosas et al. present a more complete skeleton of a Neandertal child, aged 7 to 8 years, from a 49,000-year-old site in northern Spain. The skeleton preserves dental, cranial, and postcranial material, allowing the assessment of dental and skeletal maturation with age. Most of the elements indicate an overall growth rate similar to that of modern human children. The main difference between Neandertals and modern humans is in the vertebral column. Also, several features indicate ongoing brain growth. The pattern of vertebral maturation and extended brain growth might reflect the broad Neandertal body form and physiology, rather than a fundamental difference in the overall pace of growth in Neandertals. —AMS

GEOCHEMISTRY
An early call for plate tectonics
The composition of continental crust far back in Earth’s history gives us insight into when plate tectonics ramped up and has influenced ocean chemistry. Greber et al. looked at titanium isotopes in shales, which form from eroded continental crustal sediments, to estimate the composition 3.5 billion years ago, closer to the origins of Earth. They found a silica-rich composition, which indicates that plate tectonics was happening deep in our distant past. Other changes in crustal composition might be linked to changing ocean chemistry and major events such as the oxygenation of our atmosphere. —BG

ECONOMICS
Helping people and their businesses grow
Many lower-income people in developing countries do not receive a wage but instead are self-employed in small firms of fewer than five workers. Helping entrepreneurs to grow small businesses by teaching them formal business skills has yielded mixed results. Campos et al. show that teaching entrepreneurial skills to the self-employed works much better in terms of increasing both sales and profits. The entrepreneurial training relies on psychological mechanisms that enhance personal initiative. —GJC

GENOME ENGINEERING
Taking the PERVs out of pigs
With the severe shortage of organs needed for transplants, xenotransplantation (transplantation of nonhuman organs to
BIOMIMETICS

How the sucker comes to grip

Remoras have an oval-shaped first dorsal fin with a pad that allows them to adhere to other sea creatures without causing them harm. Through a detailed study of the pad found on a shark remora, Wang et al. were able to fabricate an analog pad using components that had stiffness similar to those of natural fish spines, bones, and fibrous tissue. Carbon-fiber spines, providing the strength and stability, were patterned into a mix of rigid and soft printed acrylate polymers that could be manipulated using soft actuators. The engineered pad attached to different surfaces and generated pull-off force up to 340 times the weight of the pad. —MSL


ULTRAFAST OPTICS

Photoemission with a twist

Attosecond time-resolved spectroscopy provides the ability to probe the fastest electronic processes in atoms and solids. Yet the photoemission process from solids is not fully understood. Siek et al. studied photoemission from the layered van der Waals material WSe₂ and found that electron emission occurs as a sequence of events that are apparently time-ordered with respect to rising angular momentum of the involved initial states (see the Perspective by Yakovlev and Karpowicz). This result will help provide a more detailed picture of the photoemission process. —ISO

Science, this issue p. 1274; see also p. 1239

CANCER

Editing FAK to be more metastatic

Drugs that inhibit cell migration pathways, such as that mediated by the kinase FAK, may prevent metastasis in cancer patients. Amin et al. found that the RNA-editing enzyme ADAR underpins FAK activity. In lung adenocarcinoma cells, ADAR bound to and edited FAK mRNA, improving its stability, increasing FAK protein levels, and enhancing the migration of cells. High levels of ADAR expression correlate with poor prognosis in patients. Thus, inhibiting FAK may improve therapeutic outcomes for patients with ADAR-positive lung adenocarcinoma. —LKF


CLIMATE

Carbon capture from the industrial sector

Carbon capture aims to reduce the amount of carbon dioxide being emitted into the atmosphere. This carbon dioxide can then be either stored or used (for example, as a chemical feedstock). Most studies have focused on carbon dioxide emissions from power generation. Psarras et al. instead estimate the cost of carbon capture from the industrial sector, which contributes almost a quarter of carbon dioxide emissions. By accounting for separation, compression, and transport costs and linking industrial sources to locations for current and potential future carbon dioxide use, they find that the overall cost of reducing carbon emission is lower for industrial sources than for power generation; costs are lowest for steel and cement manufacturing. —JFU


NEUROSCIENCE

Impulsivity and procrastination

Impulsivity and procrastination are highly correlated. Both have been attributed to a lack of self-control resulting in difficulties in achieving long-term goals. Liu and Feng have discovered that these behaviors are both linked to an overlapping region of the brain called the left dorsolateral prefrontal cortex. During brain scanning, measures of impulsivity and procrastination were negatively correlated with gray matter volume in this region. The identification of this region confirms the close association between impulsivity and procrastination; however, a causal relationship has yet to be found. —ECM


MOLECULAR MATERIALS

Electrochemically driven box-weaving

Woven textures within a molecular material can potentially affect strength and toughness. Champsaur et al.
**PARKINSON’S DISEASE**

Human-derived neurons provide the answers

Pathways involved in energy metabolism and removal of cellular debris by lysosomes play an important role in protecting our brain from degeneration in Parkinson’s disease. Burbulla et al. identified a toxic cascade of mitochondrial and lysosomal dysfunction in human neurons derived from patients with Parkinson’s. The dysfunction was mediated by accumulation of oxidized dopamine and α-synuclein, but it was not found in Parkinson’s mouse models, owing to species-specific differences in dopamine metabolism. Inherent species-specific differences between human and mouse neurons emphasize the value of studying human neurons to identify relevant targets for treatment of Parkinson’s disease and related synucleinopathies. —SMH

**SEISMOLOGY**

Universal scaling for big quakes

The amount of energy released as a large fault ruptures provides some clues about the overall size of an earthquake. Meier et al. looked at this energy release for more than 100 large earthquakes. Although the overall size of an earthquake cannot be predicted from the rate of energy release, a minimum size can be estimated. Estimating this minimum size could add valuable seconds to early earthquake warning algorithms, helping to avoid damage and save people from injury or death. —BG

**TRANSCRIPTION**

Multitalented enhancers

Productive transcription from DNA demands initiation, elongation, and termination. Enhancers are DNA sequences that loop with promoters to initiate transcription. Chen et al. show that enhancers also regulate gene expression by modulating transcription elongation. PAF1, a RNA polymerase II–associated factor, sits on enhancers. This prevents the full activation of the enhancer required for the release of paused polymerase at promoters to achieve successful transcription elongation. —SYM

**RNA LOCALIZATION**

Location, location, location

The distribution of RNA in cells is important for efficient translation into proteins. Asymmetric RNA localization is known in several cell types but is poorly understood in gut epithelial cells. Moor et al. found that transcripts in intestinal enterocytes tend to distribute to the cells’ apical or basolateral sides (see the Perspective by Gáspár and Ephrussi). mRNA localization does not generally overlap protein localization; instead, ribosomes are apically biased, which allows more efficient translation. On refeeding of fasted mice, gut cell mRNAs encoding ribosomal proteins exhibit a basal-to-apical shift in localization and a boost in translation. Thus, dynamic polarization of mRNA and polarized translation modulate translational efficiency in the intestinal epithelium. —SMH

**NEUROBIOLOGY**

Cutting out circular RNAs

Circular RNAs are widespread, but their functions have been controversial. Piwecka et al. used CRISPR-Cas9 technology to remove the locus encoding the circular RNA Cdr1as from the mouse genome. Single-cell electrophysiological measurements in excitatory neurons revealed an increase in spontaneous vesicle release from the knockout mice and depression in the synaptic response with two consecutive stimuli, indicating that Cdr1as deficiency leads to dysfunction of excitatory synaptic transmission. Small RNA sequencing of several major regions of the brain showed that expression of two microRNAs, miR-7 and miR-671, that bind to Cdr1as decreased and increased, respectively. These results, along with expression analyses, suggest that neuronal Cdr1as stabilizes or transports miR-7, which in turn represses genes that are early responders to different stimuli. —BJ

**COGNITIVE DEVELOPMENT**

If at first you don’t succeed, try again

Does grit—the combination of perseverance and passion popularized in the media—differ from conscientiousness? Personality traits are embedded early in life and remain relatively stable, whereas grit (at least the passion component) may come and go and thus be malleable. Leonard et al. show that infants can learn from adults to persist through failure at arduous tasks (see the Perspective by Butler). Infants who had observed adults struggle for half a minute before activating a toy persisted when given their own complicated toy to play with, in contrast to the lesser grit displayed by infants who had seen only rapid and effortless adult successes. —GJC

**COSMIC RAYS**

High-energy particles are extragalactic

Cosmic rays are high-energy particles arriving from space; some have energies far beyond those that human-made particle accelerators can achieve. The sources of higher-energy cosmic rays remain under debate, although we know that lower-energy cosmic rays come from the solar wind. The Pierre Auger Collaboration reports the observation of thousands of cosmic rays with ultrahigh energies of several eva–electron volts (about a Joule per particle), arriving in a slightly dipolar distribution (see the Perspective by Gallagher and Halzen). The direction of the rays indicates that the particles originated in other galaxies and not from nearby sources within our own Milky Way Galaxy. —KTS

**CELLULAR BIOPHYSICS**

Phase separation and cellular organization

Cells are compartmentalized to allow distinct processes to occur in membrane-delimited organelles. But similar spatial restriction of cellular components in membrane-less intracellular assemblies or condensates also appears to occur—much like oil droplets in water. These compartments contribute to multiple biological processes and regulatory mechanisms. Shin and Brangwynne review the protein–protein and protein–RNA interactions that result in formation of these structures. They explain known and potential functions of such structures in a range of examples, from signaling and local control of biochemical reactants to spatial segregation. In disease, such aggregation may go awry and contribute to neurodegenerative syndromes associated with inappropriate protein aggregation. —LBR

**SCIENCE**

Supported by Science Service, this issue p. 1255; see also p. 1235
ENVIRONMENT
A better system for pesticide regulation
Hundreds of different pesticides are used in industrial agriculture. In a Perspective, Milner and Boyd argue that far too little information is available to understand the environmental impacts of these substances. Drawing parallels to the regulation of pharmaceuticals, they propose that a system of “pesticidovigilance” should be introduced for routine monitoring of environmental effects of pesticides after market approval has been granted. Such a system would place responsibility for monitoring the use and effects of pesticides on manufacturers and growers and permit systematic assessment of their risks and benefits. —JFU
Science, this issue p. 1232

TRANPLANTATION
Tackling T cells in GVHD
Graft-versus-host disease (GVHD), which can follow stem cell transplantation, is mediated by effector T cells derived from donor stem cells. GVHD can be abrogated by donor-derived regulatory T cells. Hence, treatment ideally should allow regulatory T cell responses while inhibiting effector T cells. Tkachev et al. found promising results in a nonhuman primate model that indicate that such therapy is possible. Inhibition of mTOR, a regulator of cell growth, in combination with blockade of OX40L, which regulates T cell differentiation, reduced damaging T cells but preserved regulatory T cell activity. The combination therapy resulted in better survival of the monkeys. —LP

NATURAL KILLER CELLS
Killing viral helicases
Recognition of evolutionarily conserved pathogen-associated molecules drives innate immune responses. Naiyer et al. report that a killer immunoglobulin receptor (KIR) called KIR2DS2 promotes activation of natural killer (NK) cells. KIR2DS2 recognizes conserved peptides from flaviviral RNA helicases when they are presented by a particular human leukocyte antigen (HLA) allele called HLA-C*0102. Two distinct peptide motifs are sensed by KIR2DS2: LNPSVAATL and MCHAT. The former is conserved across hepatitis C virus isolates; the latter is conserved in several flaviviruses, including dengue, Zika, and yellow fever. Hence, a single KIR receptor has evolved to activate NK cells in response to multiple pathogenic viruses. —AB