IN OTHER JOURNALS

Edited by **Sacha Vignieri** *and* **Jesse Smith**

NEUROSCIENCE

Thirst-quenching neural mechanisms

To maintain homeostasis, physiological imbalances produce motivational drives. Thirst is one of the strongest drives. Allen *et al*. identified a distinct population of neurons in a brain region called the median preoptic nucleus that are activated during thirst (see the Perspective by Gizowski and Bourque). The activity of these neurons integrates the recent history of water intake and adaptively regulates goal-directed behavior. When thirsty, animals consume water, which in turn reduces the aversive activity of the neurons. This action is repeated until the level of aversion falls below the threshold necessary to evoke this behavior. —PRS

Science, this issue p. 1149; see also p. 1092

HUMAN GENETICS

Genetic history of Papua New Guinea peoples

Papua New Guinea was likely a stepping stone for human migration from Asia to Australia. Bergström *et al*. analyzed genome-wide autosomal data from several peoples in Papua New Guinea and determined population structure, divergence, and temporal size changes on the island. A sharp genetic divide is evident between the highlands and lowlands that appears to have occurred 10,000 to 20,000 years ago, concurrent with the spread of crop cultivation and the trans–New Guinea language family. —LMZ

Science, this issue p. 1160

SPACE SCIENCES

Surface water on the Moon

Recent research has fueled debate regarding the abundance of water in the Moon's interior and its implications for lunar evolution, but surface water is known to occur in the lunar regolith. Using data from NASA's Moon Mineralogy Mapper—an imaging spectrometer that was included on India's first mission to the Moon, Chandrayaan-1—Li and Milliken present a globally comprehensive map of these deposits. The upper meter of the lunar regolith is estimated to contain roughly 0.1 petagrams of water. Higher latitudes have more water ice than lower latitudes. Most of the ice was implanted by solar wind, with some local input from the lunar interior. —KVH

Sci. Adv. 10.1126/sciadv.1701471 (2017).

CANCER

Unintentional immunotherapy inhibition

Metastatic spread depends on lymphangiogenesis, and mediators of this pathway are targeted clinically for cancer treatment. Fankhauser *et al*. used mouse models of melanoma to show that blocking lymphangiogenesis disrupted recruitment of naïve T cells and subsequent antitumor immunity. Data from patients enrolled in clinical trials confirmed that indicators of lymphangiogenesis were associated with robust T cell responses. These findings have important implications for using and predicting responses to immunotherapy. —LP

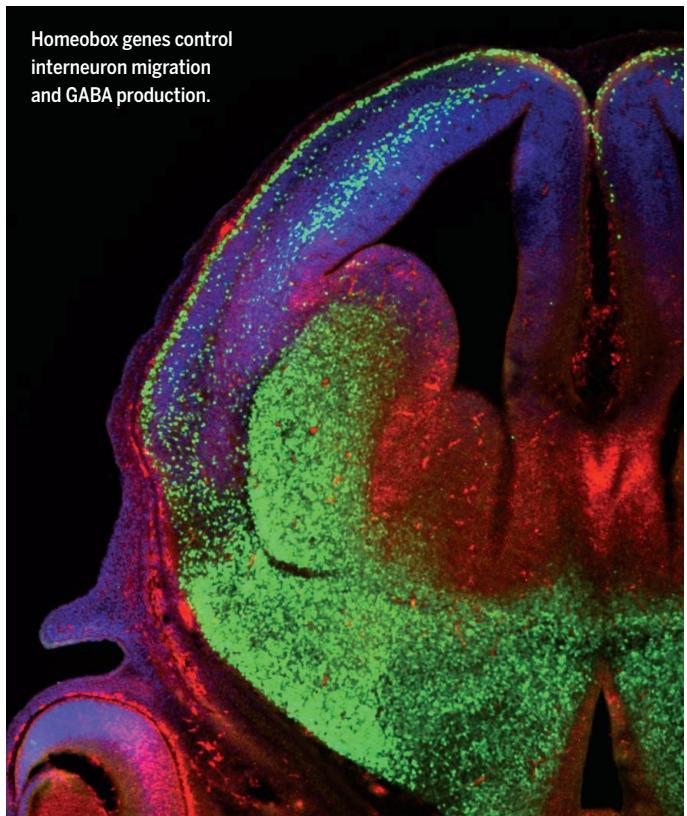
Sci. Transl. Med. **9**, eaal4712 (2017).

ATTOSECOND PHYSICS

A quick glimpse of the x-ray aftermath

X-rays pass through your skin to reveal the inner workings below. At the atomic scale, x-rays skip past valence electrons to grab hold of the core electrons closer to the nucleus. Moulet *et al*. used two successive, extremely short laser pulses (lasting less than a quadrillionth of a second) to initiate and then track this process in a sample of silica. This study uncovered the angular momentum character and relaxation dynamics of the excitons, or electron-hole pairs, ensuing from the x-ray absorption. —JSY

Science, this issue p. 1134



Homeobox genes control interneuron migration and GABA production.

NEURODEVELOPMENT

Migration bound to neurotransmitter

Interneurons in the brain that use GABA (γ-aminobutyric acid) as a neurotransmitter are essential for functional circuits. During development, these interneurons migrate tangentially from their birthplace in embryonic ganglionic eminences to their functional homes in the neocortex. In mice lacking the distal-less homeobox genes (*Dlx1* and *-2*), this migration is disrupted. Studying mouse brain development, Le *et al.* now show that *Dlx1* and *-2* regulate not only interneuron migration but also production of GABA. These genes bind to and regulate promotors of genes encoding GAD (glutamic acid decarboxylase), which converts the excitatory neurotransmitter glutamate into the inhibitory neurotransmitter GABA. —PJH

J. Neurosci. 10.1523/JNEUROSCI.2125-16.2017 (2017).

MICROBIOME

Inflammasomes and gut flora

A large proportion of our immune system resides in the gut. Inflammasomes are host molecular complexes that sense danger and activate immune responses to food-related signals and foreign pathogens. Studies in mice have suggested that Nlrp6-ASC inflammasomes influence gut flora composition and susceptibility to obesity, colon inflammation, and fatty liver disease. Mamantopoulos *et al.* analyzed the microbiome of Nlrp6- or ASC-deficient mice and littermate siblings

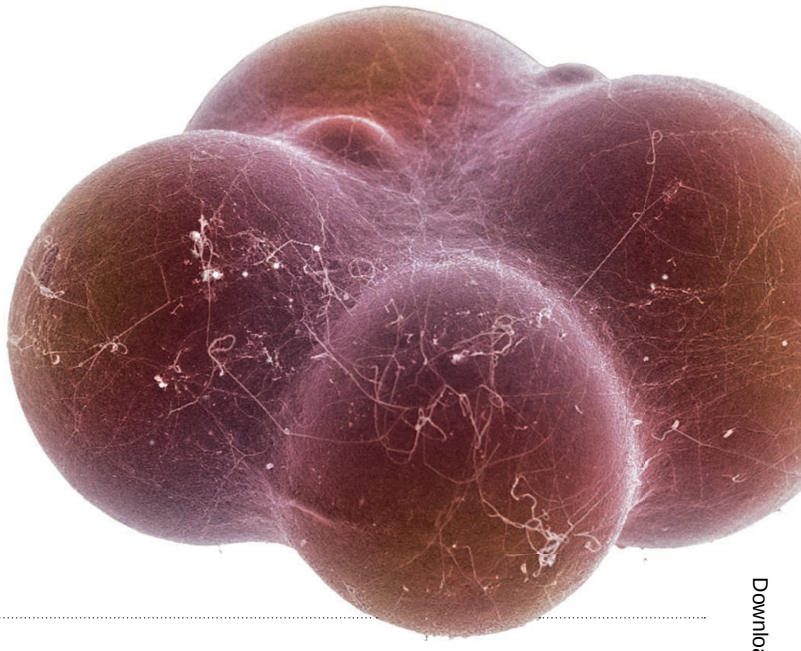
CREDIT: PHILIP GARDNER

METABOLISM

Staying warm requires communication

Mammals cope with falling temperatures by undergoing a series of metabolic changes, some of them poorly understood. In mice, Simcox *et al.* identified a previously unappreciated intertissue communication system that mobilizes energy for heat production. The molecular linchpins of this system are liver-derived serum lipids called acylcarnitines. Liver production of acylcarnitines increases at low temperatures because factors critical to their synthesis, free fatty acids, are released from white adipocytes upon cold exposure. Circulating acylcarnitines are then taken up by brown adipose tissue, which uses them as a fuel source for heat generation. Aging in mice is associated with increased cold sensitivity, and, interestingly, administration of molecules that enhance acylcarnitine synthesis reversed this sensitivity. —PAK

Cell Metab. 10.1016/j.cmet.2017.08.006 (2017).



Communicating lipids are released from adipocytes during cold exposure.

containing functional copies of the encoding genes. The study compared mouse cohorts housed in two separate animal facilities in different countries. The authors found that, in contrast to previous reports, Nlrp6- and ASC-mediated inflammasome signaling may not affect immunity or shape gut flora. —PNK

Immunity 10.1016/j.immuni.2017.07.011 (2017).

BIOMATERIALS

Ways to patch a broken heart

Minimizing how invasive a surgical procedure is can benefit the patient, and the same could be true for the delivery of transient patches to help repair damaged tissues. Montgomery *et al.* designed optimal scaffolds from biodegradable poly[octamethylene maleate (anhydride) citrate] that were confined in bioreactors in their extended shape while seeded with cells. Patches as large as a square centimeter could then be compressed and delivered through an orifice a millimeter wide to repair rat hearts, where the residual stress from the injection process causes the scaffold to return to its original shape, but without damaging the cells. Further tests showed the successful delivery of patches to porcine epicardium, aorta, and liver. —MSL

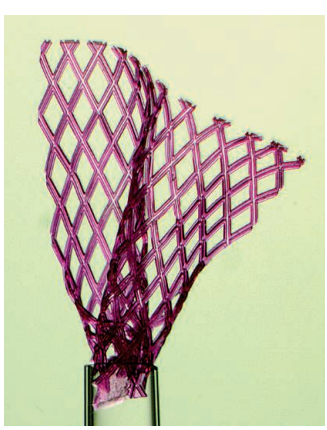
Nat. Mat. 10.1038/nmat4956 (2017).

STELLAR ASTROPHYSICS

An yttrium dating method for giant stars

The elements yttrium and magnesium are produced by different types of supernovae, so their abundance ratio can be used to date the formation of solar-type dwarf stars. Slumstrup *et al.* investigated whether the method also works for more evolved giant stars. They obtained spectra of giant stars in four open clusters, whose ages are known by other means, to calibrate the relation. They found that the giant stars follow the same trend of Y/Mg versus age as the dwarf stars—at least when the abundance of iron is moderately high. Because giant stars are much brighter than dwarfs, this technique may be used to date individual stars that are further away from Earth. —KTS

Astron. Astrophys. **604**, L8 (2017).



A biodegradable scaffold emerging from a 1-mm capillary glass pipette

EDUCATION

The math behind quantitative success

Better integration of math and biology is a long-standing goal of STEM (science, technology, engineering, and mathematics) education. A parallel long-standing challenge has been overcoming students' negative attitudes toward math. How can educators better align their curricula to student math-biology values? Andrews *et al.* developed the Math–Biology Values Instrument (MBVI), an 11-item college-level self-report tool based on expectancy-value theory, to measure students' interest in using math to understand biology. Life science educators can use MBVI at the beginning of a course to gauge their students' attitudes toward math, allowing for appropriate integration of quantitative skills into the curriculum. The MBVI can also be used by researchers assessing the success of quantitative biology reforms as a way to measure increased positive attitudes toward math. —MMc

CBE Life Sci. Educ. 10.1187/cbe.17-03-0043 (2017).

SYNTHETIC BIOLOGY

Synthetic ecosystems

Natural ecosystems can be difficult to study because of the many interactions among organisms. In the laboratory, experimental systems often can only examine a small subset of organisms, which may not represent the true nature of the larger community. To get around these limitations, Amor *et al.* engineered microbes that are required to exchange amino acids and used them to create synthetic ecosystems representing multiple states of cooperation and parasitism. With these tools, they were able to model and support hypotheses of how stable mutualisms can arise and identify when populations are vulnerable to parasitism. Although the field of synthetic ecosystems is relatively new, the authors suggest that future work can be used to identify and bioengineer environments, such as agricultural soil microbiomes. —LMZ

PLOS Comput. Biol. 10.1371/journal.pcbi.1005689 (2017).

Migration bound to neurotransmitter

Pamela J. Hines

Science **357** (6356), 1109.
DOI: 10.1126/science.357.6356.1109-a