give themselves a mild electric shock rather than be deprived of external sensory stimuli. — GJC

Science, this issue p. 75

CANCER

Exosomes can help cancer cells hide out

Some locations in the body, such as the bone marrow, can actually help cancer cells to metastasize, or spread. Chemotherapy targets rapidly dividing cells, but cancer cells that hide out in the bone marrow proliferate slowly, which protects them from chemotherapy. Ono *et al.* found that stem cells in the bone marrow released vesicles called exosomes. Metastatic breast cancer cells took up these exosomes, which contained various factors that blocked the cancer cell proliferation. — LKF

Sci. Signal. **7**, ra63 (2014).

EXTRASOLAR PLANETS

Impolite planet ignores host's partner

Many known exoplanets (planets outside our own solar system) are hosted by binary systems that contain two stars. These planets normally circle around both of their stars. Using microlensing data taken with a worldwide network of telescopes, Gould *et al*. found a planet twice the mass of Earth that circles just one of a pair of stars. The same approach has the potential to uncover other similar star systems and help to illuminate some of the mysteries of planet formation. — MMM

Science, this issue p. 46

BILAYER GRAPHENE

Breaking down graphene degeneracy

Bilayer graphene has two layers of hexagonally arranged carbon atoms stacked on top of each other in a staggered configuration. This spatial arrangement results in degenerate electronic states: distinct states that have the same energy. Interactions between electrons can cause the states to separate in energy, and so can external fields (see the Perspective by LeRoy and Yankowitz). Kou *et al*., Lee *et al*., and Maher *et al*. used three distinct experimental setups that clarify different parameter regimes of bilayer graphene. — JS

Science, this issue p. 55, p. 58, p. 61; see also p. 31

CLIMATE CHANGE

Strong winds, upwelling, and teeming shores

Climate warming has produced stronger winds along some coasts, a result of growing differences in temperature and pressure between land and sea. These winds cause cold nutrient-rich seawater to rise to the surface, affecting climate and fueling marine productivity. Sydeman *et al*. examined data from the five major world regions where upwelling is occurring. Particularly in the California, Humboldt, and Benguela upwelling systems, winds have become stronger over the past 60 years. These regions represent up to a fifth of wild marine fish catches and are hot spots of biodiversity. — HJS

Science, this issue p. 77

CELL DEATH

Life and death and quality control

When cells are subjected to too much stress, they curl up their toes and die. Lu *et al.* describe a clever strategy cells use to stay alive as long as they are not stressed for too long. The cells' quality-control machinery will activate a so-called death receptor when defective proteins accumulate within the cell, a sign of stress—but they will wait until the proteins have built up for a good long time. If stress is relieved soon enough, levels of the death receptor decay back to normal, and the cells stay alive; otherwise, R.I.P. — SMH

Science, this issue p. 98

IN OTHER JOURNALS

Edited by **Kristen Mueller** *and* **Jesse Smith**

Migrating monarchs head south each fall

ZOOLOGY

Butterflies steer with magnetic compass

Each fall, eastern North American monarch butterflies migrate 4000 kilometers south to central Mexico. In daylight, the butterflies navigate by the Sun's position and their antennal circadian clocks. But under overcast skies, they rely instead on a magnetic compass, Guerra *et al.* found. The team put monarchs in a flight simulator surrounded by a magnetic coil, measuring responses to horizontal, vertical, and intensity changes in the magnetic field. Monarchs, they found, navigate north or south using the change in dip of Earth's magnetic field lines with latitude. And as in birds, the compass is light-sensitive; monarchs need ultraviolet-to-blue wavelengths to find their way. — CG

Nat. Comm. 10.1038/ncomms5164 (2014).

RISK PERCEPTION

How many words equal a number?

The probability that an event will occur can be expressed in words ("very unlikely") or in numbers ("<10%"). Budescu *et al.* show that to communicate clearly to a lay audience, it is better to use words and numbers together than words alone. They asked 10,000 adults across 25 countries to give their numerical interpretation of probability terms (*very unlikely*, *unlikely*, *likely,* or *very likely*) used in Intergovernmental Panel on Climate Change (IPCC) statements. With only words, people interpreted unlikely events to be more likely than the IPCC intended, and vice versa. When the experimenters used both words and numerical ranges, however, the respondents estimated probabilities more accurately. — GJC

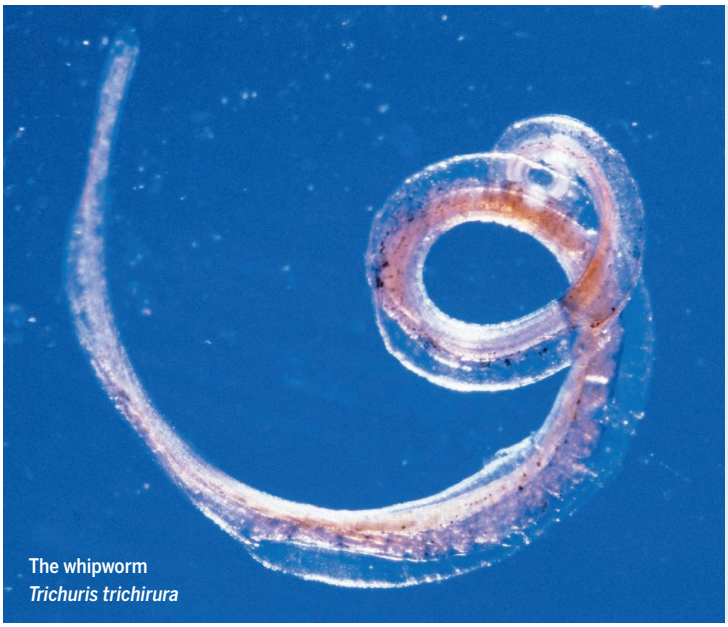
Nat. Clim. Change **4**, 508 (2014).

ARTERIAL INNERVATION

Netrin-1 helps to get the blood flowing

In moments of crisis, you might remind yourself to breathe, but generally this and other functions controlled by the autonomic sympathetic nervous system, such as swallowing or maintaining blood flow to

PHOTO: ADAM SKOWRONSK/FLICKR



The whipworm *Trichuris trichirura*

MICROBIAL GENETICS

Worming into host immune responses

Among the variety of parasitic worms that can infest human beings, whipworms, or trichurids, are distinct. They partially burrow into the gastrointestinal wall and immediately influence host immune responses. The worms need to persist in the gut to reproduce, which means they have to dampen their hosts' immune responses. To find the substances the worms use to modulate their hosts, Foth *et al*. sequenced the genomes of mouse- and human-infecting trichurid species and analyzed how mouse tissues responded to low-level persistent infections. The worms produced a suite of serine protease enzymes, which split intestinal glycoproteins apart, helping the worms invade the intestine. Mice responded with a muted immune response, creating an inviting environment for the worms. — CA

Nat. Genet. 10.1038/ng.3010 (2014).

the heart and central nervous system, proceed without thought. To function properly, the autonomic sympathetic nervous system requires nerves and blood vessels to coordinate with each other as they grow. Using genetic and pharmacological approaches, Brunet *et al*. find that the protein netrin-1, produced by arteries, directs sympathetic neurons to develop normally around arteries. This parallels netrin-1's role in guiding neuronal axons toward their correct targets. — BAP

J. Clin. Invest. 10.1172/JCI75181 (2014).

CANCER IMMUNOLOGY

Blocking IL-22 to stop cancer spread

Cancer metastasis, when tumors spread from their primary location, is almost always deadly, so patients need anti-metastatic therapies. Cancer stem cells (cells within the tumors that can renew themselves) may drive metastasis. Kryczek *et al*. now report that $CD4^+$ T cells within human colorectal cancer tissues produce the protein interleukin-22 (IL-22), which helps to maintain colorectal cancer stem cells. IL-22 blockade slowed down colon cancer in mice, whereas IL-22 made the cancer grow. And IL-22 helped tumor cells express stem-cell genes through epigenetic changes to these genes. Colon-cancer patients with these epigenetic modifications also had worse prognoses, which suggests that blocking IL-22 may provide therapeutic benefit. — KLM

Immunity **40**, 772 (2014).

ECOLOGY

Casting new shade onto ecosystem threshholds

As environmental conditions change, ecosystems can suddenly enter a different and potentially unfavorable state. Researchers have captured such threshold crossings in whole-lake experiments, but it's much harder to study them experimentally in the dynamic open ocean. Thrush *et al.* cast shade on marine sandflats in New Zealand and looked at what happened to two species of bivalves. They found changes in how the bivalves interacted, in the primary producers that they feed on, and in their physical and chemical environment. Shading causes a loss of positive feedbacks; within about 100 days, the interaction network had shifted to a new configuration. The comparatively simple experimental system helps to identify the risks of threshold crossings. — JFU

Ecology **95**, 1451 (2014).

Bivalves on marine sandflats in New Zealand

EDUCATION

A research paper in seven moves or less

Genre analysis and argumentation theory, mainstays of literature classes, rarely appear in science classrooms. To teach students how to read primary research papers efficiently, Lacum *et al.* showed students which rhetorical moves occur in research articles and how to identify them. The authors created a scientific argumentation model (SAM), which provided a detailed description of seven possible rhetorical moves scientific authors use to argue: motive, objective, main conclusion, implication, support, counterargument, and refutation. They then showed students how to identify these moves in a research article. A pre- and post-test that evaluated the teaching method showed a significant increase in how well students could identify these moves. — MM

CBE Life Sci. Educ. **13**, 253 (2014).

ASTRONOMY

Nova seems shell-shocked after outburst

With a generous companion star, even a runty white dwarf can quickly reach explosive stature. That's probably what happened to the unusual recurring nova T Pyx, which had its sixth recorded outburst in 2011. Chomiuk *et al.* used the Swift and Suzaku satellites to observe the x-ray brightness of this system over the first few hundred days after its discovery. The high- and low-energy x-ray behavior suggest that the white dwarf ejected two shells of material in successive thermonuclear events. In the team's model, the second shell expanded 50% faster than the first, and its inevitable catch-up produced a shock responsible for the x-ray emission. The reason for this stalled secondary explosion is still unclear. — MMM

Astrophys. J. 10.1088/0004-637X/788/2/130 (2014).