as complex mathematical functions, manipulate them, and provide an output that is the integral of the functions. The results, demonstrated for microwaves, provide a route to develop chip-based analog optical computers and computing elements. —ISO

Science, this issue p. 1333

ATMOSPHERIC SCIENCE

Elucidating the sources of nightglow

Even in the absence of light from the Sun and the stars, Earth's atmosphere emits its own glow. The sources of these glows vary, but nightglow has proven particularly enigmatic. Kalogerakis identified a mechanism that causes such glow in the mesosphere and lower thermosphere about 100 kilometers above Earth's surface. During the day, solar radiation breaks up oxygen and ozone, but by night, multiquantum vibrational-to-electronic energy transfer facilitates a similar process. The resultant individual oxygen atoms electrically excite surrounding molecules, producing nightglow. —KJP

Sci. Adv. 10.1126/sciadv.aau9255 (2019).

ION CHANNELS

Targeting sodium channels

Voltage-gated sodium (Na_v) channels have been implicated in cardiac and neurological disorders. There are many subtypes of these channels, making it challenging to develop specific therapeutics. A core α subunit is sufficient for voltage sensing and ion conductance, but function is modulated by β subunits and by natural toxins that can either act as pore blockers or gating modifiers (see the Perspective by Chowdhury and Chanda). Shen *et al*. present the structures of $Na_v1.7$ in complex with both β1 and β2 subunits and with animal toxins. Pan *et al*. present the structure of $Na_v1.2$ bound to β2 and a toxic peptide, the μ-conotoxin KIIIA. The structure shows why KIIIA is specific for $Na_v1.2$. These and other recently determined Na_v structures provide a framework for targeted drug development. —VV

Science, this issue p. 1303, p. 1309; see also p. 1278

INDUSTRIAL CHEMISTRY

Methane oxidation on the plus side

Industrial conversion of methane to alcohol derivatives involves a circuitous route that starts with overoxidation to carbon monoxide. More direct approaches in highly acidic media have shown promise at small scale but are not cost-effective. Díaz-Urrutia and Ott describe a reaction at pilot-plant scale that combines methane and sulfur trioxide directly in sulfuric acid to form methanesulfonic acid with no by-products (see the Perspective by Schüth). The reaction appears to proceed via a cationic chain mechanism initiated by a low concentration of added sulfonyl peroxide and propagated by CH_3^+. —JSY

Science, this issue p. 1326; see also p. 1282

CANCER

A sweetener's not-so-sweet effects

Obesity increases an individual's risk of developing many types of cancer, including colorectal cancer. One of the factors driving the rise in obesity rates is thought to be the use of high-fructose corn syrup (HFCS) as a sweetener in soft drinks. Goncalves *et al*. found that ingestion of HFCS promotes the growth of intestinal cancer even in the absence of obesity in mouse tumor models. An enzyme in tumors (ketohexokinase) converts fructose to fructose-1-phosphate, which alters tumor cell metabolism and leads to enhanced cell growth. Whether a similar process occurs in humans remains to be seen. —PAK

Science, this issue p. 1345

IN OTHER JOURNALS

Edited by **Caroline Ash** *and* **Jesse Smith**

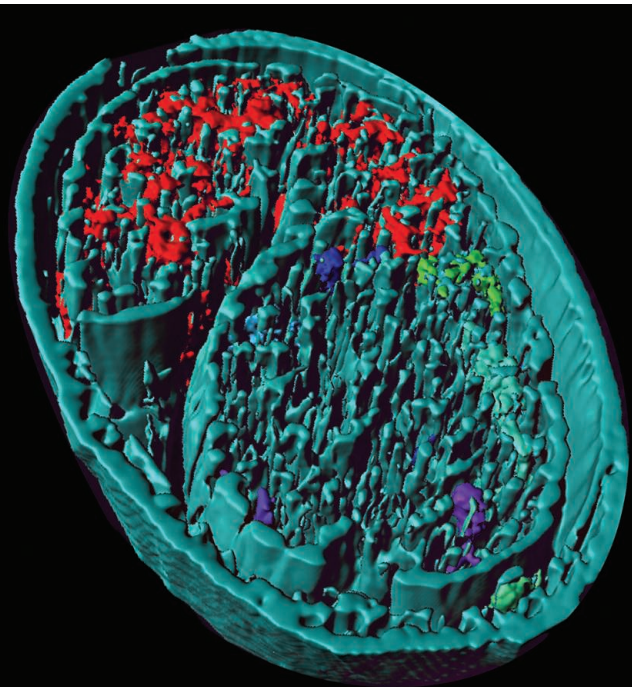

IMAGE: SANDEEP GOPAL/MONASH UNIVERSITY

NEURODEVELOPMENT

Leadership from behind

Morphogens of the Wnt family regulate development during embryogenesis in organisms ranging from hydra to humans. These peptides, secreted in globular form by the synthesizing cells, initiate signaling cascades that direct morphogenesis. Wnt protein stability in the extracellular environment depends on its multiple disulfide bonds. Torpe *et al*. identified the protein-folding chaperone in the small nematode *Caenorhabditis elegans* that is required for viability of a Wnt variant. By controlling folding of this Wnt variant, the protein disulfide isomerase (PDI) controls neuronal migration. Similarly, human cells tested with a pharmacological inhibitor of PDI confirm that Wnts can regulate human development, too. —PJH

Cell Reports 10.1016/j.celrep.2019.02.072 (2019).

Cross-sectional reconstruction of a *C. elegans* embryo (teal) showing higher (red) and lower (blue, green, and purple) morphogen concentrations

BIOMATERIALS

Naked droplets for culturing cells

Cellular behavior and interactions are best modeled in vitro using 3D constructs because they closely mimic in vivo environments. Both scaffold and nonscaffold techniques have been developed, but these methods can be time consuming, expensive, or hard to do reproducibly. Chen *et al*. show that low-volume droplets, placed inside superhydrophobic coated plates, create a medium in which cells can float freely and rapidly grow into spheroids. The reproducibility of the droplets' size and shape, and the scope for easy addition

Reptiles, and particularly chelonians such as this Galápagos giant tortoise (*Geochelone elephantopus*), are among the most endangered vertebrate species.

EXTINCTION

Turtles and tortoises in decline

It is now generally accepted that a sixth mass extinction is under way, but its impact varies across taxa. Reptiles and amphibians gain generally less attention than birds and mammals, but they are no less threatened. Rhodin *et al.* looked at the conservation status of all 360 species of turtles and tortoises and found that the order Chelonia is among the most endangered of all vertebrate orders. The epicenter of the threat is Asia, where trade in turtles for meat and traditional medicine has driven large declines across species. Further harm to this group is inflicted by habitat loss and degradation, disease, invasive species, and climate change. This overview calls attention to decline in an understudied, yet ecologically important, group with the hope that a more thorough understanding will improve its conservation. —SNV

Chelonian Conserv. Biol. **17**, 135 (2018).

of reagents, facilitates cell coculture and high-throughput screening assays. —MSL

ACS Appl. Mater. Interfaces **11**, 9814 (2019).

NANOMATERIALS

A core-shell silver cluster

Well-defined clusters containing noble metal atoms are often stabilized with organic capping ligands on their surface. Zhang *et al*. report the synthesis of clusters containing 48 silver atoms in which 5 chromate anions stabilize a cylindrical core of 23 silver atoms. These inorganic anions bridge the core to a surrounding shell of 25 silver atoms and help stabilize that structure, along with 20 ^{t}BuC≡C^{-} anions (where ^{t}Bu is *tert*-butyl) that act as capping ligands. This 14-electron superatom cluster is nonemissive as a solid, but luminescent in methylene chloride solution with an emission peak at 420 nanometers. —PDS

J. Am. Chem. Soc. **141**, 4460 (2019).

EDUCATION

Careers in STEM start early

The relationship between early experiences, STEM identity, and STEM career intention is not well understood. Dou *et al*. took a retrospective look at early, informal STEM learning experiences that may be associated with STEM identity. "Outreach Programs and Science Career Intentions," a national survey administered to freshman college students, was used to collect data on STEM identity, STEM career intention, and early STEM-related experiences. Results showed that for every 1 point higher on the STEM identity scale, participants' odds of choosing a STEM career in college increased by 85%. Additionally, talking with friends and family about science and consuming science media were found to be predictive of STEM identity in college. —MMc

Sci. Educ. 10.1002/sce.21499 (2019).

CELL BIOLOGY

Lysosome repositioning

Endoplasmic reticulum (ER) stress is strongly linked to development and disease. For example, neurodegenerative diseases often involve protein misfolding and aggregation. Bae *et al*. examined why ER stress leads to relocalization of the cell's degradative organelles, the lysosomes, which cluster around the microtubule organizing center. Repositioning allows cells to degrade protein aggregates more effectively, leading to better survival rates for cells under stress. During ER stress, lysosomal repositioning relies on degradation of a particular messenger RNA called *Blos1*. Preventing *Blos1* degradation prevents lysosome relocalization and sensitizes cells to stress, which culminates in cytotoxic ubiquitinated aggregates, causing cell death. —SMH

J. Cell Biol. 10.1083/jcb.201809027 (2019).

GENOMICS

Reproducible instability

The cervical cancer cell line called HeLa is regularly used in laboratories across the world. But how do we know that HeLa cells used in one laboratory are the same as those used in another? Genetically unstable cell lines, like HeLa, might contribute to irreproducibility between experiments. Liu *et al*. analyzed stock HeLa cells from 13 laboratories and recorded variation in gene copy numbers, gene expression, protein expression, and protein turnover, which were reflected in cell phenotypes. Other genetically unstable cancer cells are similarly variable, emphasizing the importance of careful monitoring, maintenance, and culture of cell lines to maintain reproducibility between labs. —GKA

Nat. Biotech. **37**, 314 (2019).

Careers in STEM start early

Melissa McCartney

Science **363** (6433), 1297-1298.
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