devices. Qin et al. found that doping a tin selenide thermoelectric material with lead and sodium improved the room temperature thermoelectric properties, an effect created by manipulation of the electronic bands. The authors showed that the material could be used not only for power generation but also cooling. If optimal contact materials are identified, then this approach may be attractive for future applications. —BG

Science, ab18668, this issue, p. 556

MATERIALS SCIENCE

Amalgamating intermetallic nanocrystals

Intermetallic nanocrystals are a large family of emerging materials with extensive applications in many fields, but a generalized method for synthesizing them is lacking. Clarysse et al. report the development of a colloidal synthesis method based on amalgamation of monometallic nanocrystal seeds with low-melting-point metals. The researchers successfully synthesized a wide range of crystalline and compositionally uniform intermetallic nanocrystals and demonstrated compositional and size tunability as well as size uniformity. This amalgamation-seeded growth method can be used to achieve numerous other intermetallic compounds of interest for many potential applications. —XWDL


BIOMEDICINE

Repairing the nuclear pore in ALS

Most cases of amyotrophic lateral sclerosis (ALS) are of unknown origin (sporadic ALS). The nuclear pore complex is known to be involved in familial ALS; however, whether and how it also plays a role in sporadic ALS remain to be elucidated. Coyne et al. used human tissue and induced pluripotent stem cell-derived motor neurons from patients with familial and sporadic ALS to show that the protein CHMP7, previously shown to be involved in nuclear pore complex homeostasis in yeast, was increased in both ALS subtypes. An antisense oligonucleotide targeting CHMP7 reduced cellular abnormalities and promoted neuronal survival, suggesting that CHMP7 is a potential target for treating both sporadic and familial ALS. —MM


ENTOMOLOGY

Protection from parasitism by a virus

Parasitoid wasps have developed myriad systems to overcome the defense mechanisms of their hosts as they lay their eggs in the bodies and eggs of targeted species. Gasmi et al. report how the host can fight back when infected by a virus that expresses a protein conferring resistance to the parasitoid. When members of the butterfly and moth family are targeted by wasps, a protein family has evolved that is horizontally carried by viruses—and sometimes is incorporated into the host genome—and impairs the ability of parasitoid offspring to fully develop and emerge. Characterizing the ability of this protein to protect hosts against specific parasites, the authors document an ongoing host-parasite evolutionary arms race. —LMZ

Science, abb6396, this issue, p. 535

MONEY AND REGULATION

Philanthropy, advocacy, and profit

For-profit corporations bolster their influence over government rulemaking by funding nonprofit entities that then submit ostensibly independent comments to agencies that reinforce the corporate position. Bertrand et al. analyzed public comments submitted to U.S. agencies on proposed regulations, and link to data on hard-to-trace corporate donations through charitable foundations to nonprofits. Donations increased the likelihood that a nonprofit would submit comments and increased the similarity between the nonprofit’s comments and the firm’s own comments. This donation-driven co-commenting increased the alignment between the firm’s comments and the agency’s ultimate discussion of the finalized rule. —BW


CHEMICAL BIOLOGY

Parasite or poisoner

Cordyceps fungi are bizarre and disturbing parasites that infect insects, sometimes compelling them to exhibit strange behaviors that help disperse fungal spores to new hosts. These fungi produce a number of small molecules that presumably help in this type of takeover and could have valuable applications in medicine. Klein et al. synthesized and characterized the cytotoxic cyclic peptide cordyheptapeptide A, along with a number of variants, to establish the structure–activity relationship and identify the cellular target(s). Cytological profiling suggested a mechanism of action similar to that of protein synthesis inhibitors. The authors confirmed that elongation factor 1A, which is crucial in ribosomal protein synthesis and is a common cytotoxic target, is also a target for this group of cyclic peptides. —MAF


NEUROSCIENCE

Virtual reality

Hippocampal theta oscillations in rodents profoundly affect neural activity, spatial coding, synaptic plasticity, and learning. What are the sensory mechanisms governing these slow oscillations? Safaryan and Mehta compared oscillations in the brains of rats trained to run a virtual reality–generated track with oscillations when the rats were running in real life. Theta oscillations were enhanced in the brains of the animals sensing virtual reality compared with when they ran in the real world. Further, a new 4-Hertz oscillation called eta was detected in the rats running in

Image credit: May Stock Photo
virtual reality. Eta rhythm was highest in the CA1 pyramidal cell layer, and it appears that putative CA1 interneurons, but not pyramidal neurons, showed stronger eta modulation in virtual reality. Multisensory experience can thus reveal unexpected brain rhythms and could have therapeutic value. —PRS


CANCER

FAKing a way to resistance

The number of cancer therapies available for clinical use is larger than ever before, but unfortunately, resistance arises for every type of therapy deployed. Many of these mechanisms are based on the acquisition of genetic alterations, but nongenetic resistance can also occur. Marin-Bejar et al. examined the patterns of treatment resistance in melanoma and identified recurrent resistance driven by the emergence of undifferentiated stem-like neural crest cells. These stem-like cells were characterized by activation of focal adhesion kinase (FAK) signaling, which in turn could be targeted by the pharmacological inhibition of FAK. —YN


INVASIVE SPECIES

Sea squirt invaders

Invasive marine species can be aggressive ecosystem engineers, dramatically altering new habitats by overgrowing preexisting species and threatening coastal ecology. Pyura praeputialis, an intertidal tunicate indigenous to the southeastern coast of Australia, invaded the coastline of Chile a few hundred years ago. The species is present, so far exclusively, along 70 kilometers of rocky coast inside the Bay of Antofagasta, where it has become ecologically dominant. Hudson et al. combined species distribution models and genomic data to understand the invasion history of this tunicate and what potential habitats might be available adjacent to its current introduced range. Although animals from a single region of eastern Australia contributed to the colonization of the Bay of Antofagasta, the population shows high genomic diversity and considerable adaptive potential. The authors identified more than 3500 kilometers of coast along the eastern Pacific at potential risk of invasion. Slight changes in currents and human-assisted contamination could help the spread of this damaging sea squirt. —DJ


GLACIOLOGY

A ray of sunshine

Probing the interior structure of ice sheets and tracking their subsurface evolution is essential for projecting ice sheet contributions to sea level rise. Existing techniques using traditional ice-penetrating radar as an active signal source are too resource intensive to do this across the range of scale needed. Peters et al. show that the sun can be used as a passive signal source, obviating the need for unwieldy equipment for actively generating radar signals. This approach could allow mapping to be done across Greenland and Antarctica with much greater coverage and resolution. —HJS


AGRICULTURE

Camel milk

Food insufficiency across Central Asia leaves too many children malnourished. Although many people in Kazakhstan are self-sufficient for meat, the same cannot be said about dairy, which brings valuable protein, fats, and micronutrients to the diet. Orazov et al. show that food insecurity has improved in recent years in Kazakhstan, but childhood malnutrition continues to manifest as obesity, growth stunting, and wasting. Camels represent a small but growing fraction of livestock animals in Kazakhstan and are a source of both meat and milk. The high nutritional value of camel’s milk indicates that an increased focus on camel breeding and production of their milk could reduce malnutrition among young children. —PJH