EDITED BY KRISTEN MUELLER AND JAKE YESTON

ECOLOGY

Different Dialects

Acoustical analysis has revealed the presence of complex communication signals across a variety of animal species. Information may also be conveyed by the arrangement of sounds, known as syntax. Syntax is thought to be rare outside of humans and birds, but the ability to transmit complex information vocally is likely to be beneficial across social species. Male rock hyraxes, a type of social small mammal, make a complex call that consists of wails, chucks, snorts, squeaks, and tweets and conveys detailed information about the caller's identity. Kershenbaum *et al*. applied methods borrowed from information theory and genetics to show the existence of distinct syntactical dialects in male hyraxes across regions within Israel. Specifically, populations near to one another were more similar than those farther apart, whereas at larger distances, differences varied without regard to proximity. The breakdown of the relationship between dialect and distance at larger scales suggests that dispersal distance is a limiting factor in the transmission of dialect learning. These results demonstrate that syntactical structure and vocal learning may occur in a more diverse group of species than has been previously recognized and that sociality may be a driving force for its development. — SNV

Proc. R. Soc. London Ser. B **279**, 10.1098/rspb.2012.0322 (2012).

PSYCHOLOGY

Evaluating Rituals

Rituals—protocols designed to make a problem go away or to bring about a favorable outcome—are widely used across cultures yet causally inexplicable within the mechanistic schema of the physical world. Legare and Souza collected judgments of ritual effectiveness from patrons of public health centers in Belo Horizonte, Brazil. They found, not surprisingly, that individuals who had themselves used rituals (referred to as simpatias) reported a stronger belief in their effectiveness. They also found, via experimental manipulation of scenario simpatias, that three characteristics contributed significantly to these judgments: (i) the number of steps in the protocol to be performed; (ii) the repetition of one or more steps in the ritual; and (iii) the inclusion of religious icons. Taken together, these findings are consistent with the proposal that rituals activate an intuitive system of causal belief. — GJC

Cognition **124**, 10.1016/j.cognition.2012.03.004 (2012).

CELL BIOLOGY

Who Hid the Cyclin D2?

During development of the cortex of the mammalian brain, radial glia divide asymmetrically to give rise to apical progenitor cells that continue to divide and cells that differentiate into neurons. Thus, the tissue supports the continued formation of neuronal structures while maintaining a pool of progenitors. Tsunekawa *et al*. report on a mechanism that influences

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the fate of the daughter cells. Radial glial cells have long thin apical and basal processes that extend from either end of the cell. mRNA encoding the cell cycle regulator cyclin D2 was preferentially localized and translated in the basal process because of a regulatory sequence in the 3′ untranslated region of the mRNA. The daughter cell that inherited the basal process thus got most of the cyclin D2 and continued to proliferate. The other daughter cell, perhaps because of a prolonged cell cycle, or effects of other sequestered factors, underwent neuronal differentiation. A causal role of cyclin D2 was supported by experiments depleting or overexpressing the protein, which caused the accumulation of proliferating progenitor cells or increased neurogenesis, respectively. — LBR

EMBO J. **31**, 1879 (2012).

DEVELOPMENT

Stressful for the Long Haul

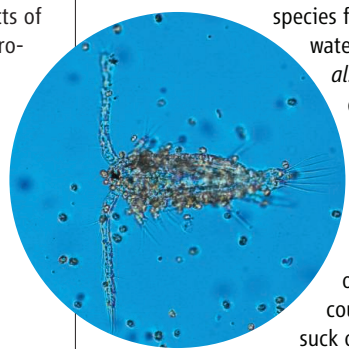
Cold, dehydration, variation in food supply—these are all potential environmental stressors that organisms must face. Often, organisms have mechanisms that can accommodate such challenges, at least to a degree; however, some challenges, particularly those that are rare, can have detrimental effects. Recent studies have reported that developmental changes resulting from such challenges are sometimes passed to subsequent generations through epigenetic mechanisms. Stern *et al*. sought to further examine this using the fruit fly, *Drosophila melanogaster*. *Drosophila* larvae were exposed to toxic stress through supplementation of their food with the drug G418. Stress was applied in a region-specific manner, however, because the flies were engineered to express a resistance gene under the regulation of an arbitrary spatiotemporally restricted developmental promoter. The developmental responses of the flies varied (for example, reduced fly size or deformed wings) as measured by survival rate, larval development, and morphology. Such variation was the result of the resistance genes being under the control of different promoters. The ability to tolerate the stressor was dependent on the down-regulation of Polycomb Group genes. Examination of progeny from toxin-exposed flies, who themselves were not exposed to the toxin, revealed that offspring from several subsequent generations retained the resistance gene before converting back to the normal fly phenotype. These results indicate that stressors may induce both heritable and nonheritable developmental effects. — BAP

Cell Rep. **1**, 10.1016/j.celrep.2012.03.012 (2012).

MICROBIOLOGY

Attack of the Killer Algae

In the oceans, free-living dinoflagellates are one of the most diverse groups of simple eukaryotes: Some are photosynthetic, some are grazers and predators, some are both, and some become temporarily photosynthetic simply by virtue of the cells they eat. This relaxed approach to nutrition is common in the harmful algal bloom species found in coastal waters. But Berge *et al.* have found that dinoflagellate species, which possess permanent chloroplasts and were normally thought to rely on photosynthesis, could attach to and suck out nutriment from crustacean copepod larvae. More usually it is the copepods that are the predators on algae, and their grazing reduces algal biomass and regulates bloom formation, but in this case the dinoflagellate *Karlodinium armiger* displays pronounced swarming behavior and forms feeding aggregates that allow the ingestion of prey much larger than itself. — CA



ISME J. **6**, 10.1038/ismej.2012.29 (2012).

PHYSICS

Watching Excitons Condense

A fascinating property of the quantum world is that particles come equipped with a dual, wave-like nature, which becomes apparent at low temperatures and high densities. For a certain type of particle, bosons, this results in the formation of a giant wave, a Bose-Einstein condensate (BEC). BECs have been realized in laser-trapped ultracold gases of alkali elements, but bosons that exist elsewhere in nature are also expected to condense. An exciton is a composite boson consisting of an electron and a hole (a missing electron) in a semiconductor. High *et al.* take a page out of the atomic physicists' book and demonstrate the condensation of excitons in a trap. A spatially varying electric field traps the excitons' dipole moments, which are nonzero because of the spatial separation of electrons and holes in a GaAs/AlGaAs coupled quantum well (such so-called indirect excitons also have the advantage of a long lifetime necessary for cooling). When the temperature is lowered below ~2 K, the excitons collect at the trap center,

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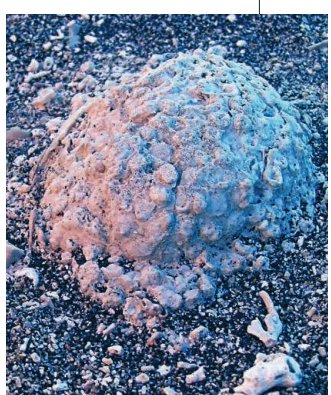
and the entire trap volume becomes coherent, signifying the onset of a BEC. The realization of a BEC in a trapped semiconductor system is expected to enable explorations complementary to those possible with ultracold atomic gases. — JS

Nano Lett. **12**, 10.1021/nl300983n (2012).

OCEAN SCIENCE

Where Carbonate Comes From

Rhodoliths—a type of marine red algae that resemble corals—constitute one of the world's most voluminous shallow-water benthic communities. Though they can be found in many tropical locations worldwide, they may be most extensive on the Abrolhos Shelf off the coast of Brazil. Amado-Filho *et al.* conducted a detailed survey of those beds, in order to determine rhodolith distribution, extent, composition, and structure. They found that the beds cover an area of about 20,900 km^2, comparable to that of the Great Barrier Reef, Australia. They estimated that the mean rate of $CaCO_3$ production by these organisms is about 0.025 Gt/year, in line with the world's largest biogenic $CaCO_3$ deposits, and that the rhodolith beds of the Abrolhos Shelf alone contain approximately 5% of the $CaCO_3$ inventory of all the world's carbonate banks. Sedimentation from land-based sources and large-scale dredging and mining are the largest immediate threats to these communities, and ocean acidification presents another, longer-term danger. Rhodoliths accumulate rapidly on a geological time scale, but very slowly on a human time scale, and should thus be considered a nonrenewable resource that needs to be protected. — HJS



PLoS ONE **7**, e35171 (2012).

CHEMISTRY

Tuning the Mix

Metal organic framework materials hook together metal ions or clusters, using organic linkers to make crystalline compounds with two- or three-dimensional porosity. The zeolitic imidazolate framework (ZIF) subset of this class of materials has imidazole molecules as linkers and forms structures analogous to the aluminosilicate lattices of zeolites. In addition to molecular sieving properties, ZIFs can manifest a gating phenomenon whereby interaction with adsorbates leads to an increase in guest uptake. This gating is caused by a rotation of the linker molecules. Thompson *et al.* explored the effects of making ZIFs with a mixture of linking molecules, based on ZIF-8, ZIF-90, and ZIF-7 parent materials, which use 2-methylimidazole, carboxaldehyde-2-imidazole, and benzimidazole linkers, respectively. In particular, ZIF-8 can selectively remove carbon dioxide from a complex mixture of gases, so finding ways to enhance its properties without reducing its stability is of practical importance. Changes in the gate-opening phenomenon emerged for varying specific compositions. Overall, the results indicate that it may be possible to tune the fine structure of a ZIF framework at the synthesis stage, rather than through complicated postsynthetic modifications. — MSL

Chem. Mater. **24**, 10.1021/cm3006953 (2012).

IMMUNOLOGY

Detecting Danger

Besides responding to infections, the immune system can also recognize tissue injury in the absence of any infectious agents. Examples of this include antitumor immunity and responses to transplanted organs. During these "sterile" responses, the immune system is triggered by so-called DAMPs, danger-associated molecular patterns. These include intracellular contents such as ATP and HMGB1 that are released upon cell damage or death. The C-type lectin DNGR-1 (Clec9a) is a receptor expressed by certain subsets of dendritic cells that is required for the presentation of antigens derived from necrotic cells to T cells. What it recognizes on dying cells, however, has remained a mystery. After a rather challenging hunt, Zhang *et al.* and Ahrens *et al.* now report that DNGR-1, recognized actin filaments. Monomeric actin, or G-actin, was not recognized by DNGR-1, and actin binding proteins such as spectrin enhanced DNGR-1 recognition of actin. The identification of F-actin as a ligand for DNGR-1 reinforces the idea that molecules that normally play a housekeeping role in healthy cells are able to activate the immune system when released into the extracellular milieu. Although this often triggers a controlled immune response that promotes tissue repair, alterations in this response could drive inflammation and contribute to disease processes. — KLM

Immunity **36**, 635; 646 (2012).

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