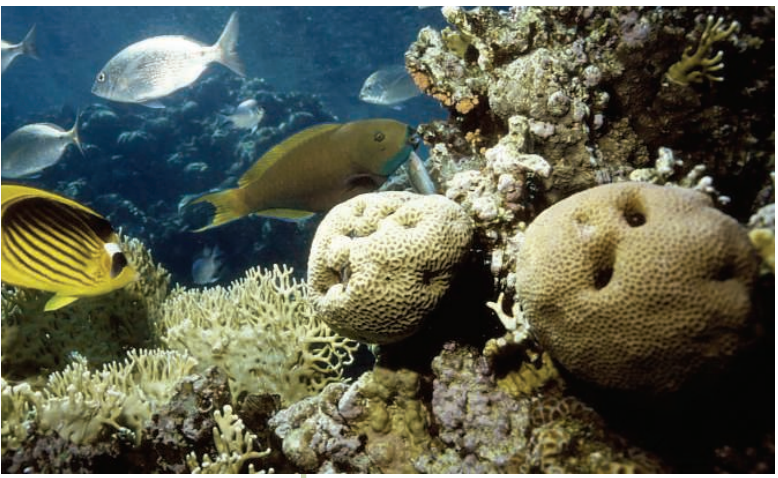
EDITED BY STELLA HURTLEY AND JAKE YESTON



ECOLOGY

Single Symbionts for Corals

Tropical coral reefs are stressed by sea-level rise and higher water temperatures brought on by climate change. Stress prompts corals to shed their photosynthetic symbionts, or zooxanthellae, and large areas of reefs can "bleach," sometimes killing the coral. Controversy has centered on whether bleaching is adaptive to enable bleached corals to acquire different symbionts that could endow their hosts with different physiologies to cope with different conditions, in particular greater temperature tolerance. Symbiont shuffling could happen only if the host coral can naturally tolerate a variety of symbionts. Goulet has undertaken a meta-analysis and review of 43 papers containing genotype data for 442 coral-zooxanthellae associations. It seems that most mature hard coral individuals harbor only one strain of symbiont and will retain the same genotype for decades, even after transplantation from one site to another. It remains unclear how the remaining 23% of corals that can host several symbionts respond to bleaching conditions. — CA

Mar. Ecol. Prog. Ser. **321**, 1 (2006).

CHEMISTRY

Flowing Precious Metals

With the exception of mercury, metals tend to require substantial heating before flowing as liquids; even alloys expressly designed for use as soldering fluxes generally melt well above room temperature. Warren *et al.* show that a particular ligand and counter-ion combination confers flowing properties to a range of precious metal nanoparticles ~2 nm in diameter. Crystalline particles of platinum and gold, and predominantly amorphous palladium and rhodium particles, were prepared with *N,N*-dioctyl-*N*-(3-mercaptopropyl)-*N*-methyl ammonium capping ligands (bound to the metal through sulfur) by reduction of metal salts in tetrahydrofuran solution. Exchange of bromide counter-ions with sulfonates bearing long hydrophobic tails yielded a substance that, after thorough drying under vacuum, exhibited highly viscous liquid-like flow at room temperature; a 50-mg droplet moved at a rate of just over 2 cm/hour down an inclined glass plane. The authors envision that these flowing nanoparticles may offer convenient routes to self-assembled materials, as well as applications in heat-transfer media. — MSL

J. Am. Chem. Soc. **128**, 10.1021/ja064469r (2006).

GEOLOGY

Tales of Wander

True polar wander describes relative motion between Earth's spin vector and the solid Earth. One class of this phenomenon, inertial interchange true polar wander, occurs when normal advection of mantle density heterogeneities produces changes in the relative magnitudes of the principal inertia axes, causing Earth to rotate quickly by as much as 90°, until the new major rotational axis is aligned with the spin vector. In addition to the paleomagnetic variations that would accompany such a rapid change of Earth's orientation, another observable consequence could be transient sea-level variations resulting from the differential response of the slowly re-equilibrating mantle/lithosphere and the rapidly re-equilibrating world ocean. A third potential but indirect effect, arising from sea-level change, is perturbation of the carbon cycle, as marine biological productivity is affected by water depth variations.

Svalbard stone.

In an investigation of possible true polar wander, Maloof *et al.* present paleomagnetic data from three Middle Neoproterozoic carbonate units in Svalbard, Norway, which show large shifts in paleomagnetic orientation coincident with abrupt changes in $\delta^{13}C$ and relative sea level. They conclude that the best explanation for the data is that this area experienced rapid shifts of paleogeography during a pair of true polar wander events. Their hypothesis can be further tested by analyzing sediments of the same age from other basins for predictable related changes. — HJS

Geol. Soc. Am. Bull. **118**, 1099 (2006).

MOLECULAR BIOLOGY

Circle of One

All living things must maintain and repair their genomes, and nonhomologous end joining (NHEJ) is one of the most important pathways for patching up potentially disastrous double-strand (ds) breaks in DNA; so-called Ku proteins play a central role in the process. But viruses, so it was thought, don't seem to use NHEJ in this way.

Corndog and Omega are dsDNA viruses or, more precisely, bacteriophages that infect bacteria, in this case, *Mycobacterium* species. Oddly enough, as Pitcher *et al.* now show, Corndog and Omega both contain Ku homologs in their genomes. The viral Ku proteins can work together with the bacterial ligase LigD to repair ds breaks in a yeast system. This suggests that NHEJ is somehow involved in the viral life cycle, where previously there was no indication of such a requirement.

Corndog and Omega enter bacterial cells as linear viruses that must circularize to allow rolling circle replication—an essential part of

CREDITS (TOP TO BOTTOM): GOULET, *MAR. ECOL. PROG. SER.* **321**, 1 (2006); MALOOF *ET AL., GEOL. SOC. AM. BULL.* **118**, 1099 (2006)

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the viral life cycle. Related viruses, such as Lambda, have long 9–nucleotide (nt) cohesive (*cos*) ends that provide a favorable equilibrium for self-association. Corndog and Omega have very short *cos* ends, of only 4 nt, which are too short to self-associate efficiently and promote genome circularization. Thus the viral Ku, working together with the host LigD, may help to bring the *cos* ends together, paralleling their function in dsDNA break repair. — GR

Mol. Cell **23**, 743 (2006).

ECOLOGY/EVOLUTION

In Perfect Symmetry

Bilaterally symmetric flowers have evolved from radially symmetric flowers in a range of plant families, and this transition is usually correlated with a switch from generalist to specialist pollinators. Although the developmental changes involved in the transition are relatively well understood at the molecular genetic level, the selective forces behind it are less clear. Gomez *et al*. monitored the pollination rates of *Erysimum mediohispanicum*, a herbaceous plant of the southern Spanish mountains, which shows intraspecific variation in flower shape and is pollinated by beetles, bees, and hoverflies. The more bilaterally symmetric flowers were favored by the most abundant pollinating insect, the generalist beetle *Meligethes maurus*, and these flowers also produced the highest number of offspring. The significant fitness differences between flowers of differing shape suggest the adaptive route by which bilateral symmetry can evolve, even if the pollinators are generalists like most beetles. — AMS

***Erysimum mediohispanicum* variants.**

CREDIT: GOMEZ ET AL., AM. NAT. **168**, 10.1086/507048 (2006)

Am. Nat. **168**, 10.1086/507048 (2006).

CLIMATE SCIENCE

Shedding Light on the Sun

Satellite measurements show that solar irradiance, essentially the amount of energy that reaches Earth, varies over the 11-year solar cycle by ~0.1%, too small a change to have a noticeable impact on Earth's average temperature. However, a long-standing question in climate science is whether larger solar changes have occurred that might have caused warming over the past century or climate change at some stage of the Holocene (or an even longer span of time).

Bard and Frank provide a thorough critical review of both the problematic evidence for longer changes in solar irradiance and the possible climatic effects these changes could have induced. The authors point out that many proposed connections, for example between the records of cosmogenic nuclides such as ^{14}C and ^{10}Be and records of climate change, are based on correlations—some of which have large and perhaps unappreciated uncertainties—and on imperfect and indirect records. They conclude that there might still be a connection between solar changes and the Medieval Warm Period and Little Ice Age, but that overall solar changes, most of which remain unproven, probably represent a second-order influence on the behavior of Earth's recent climate. — BH

Earth Planet. Sci. Lett. **248**, 1 (2006).

IMMUNOLOGY

Vascular Origins

During the development of an embryo, cells of the hematopoietic system and endothelium have a common origin. Bone marrow–derived cells may even contribute to vessel growth in some settings. It has not been clear, however, whether hematopoietic cells normally contribute to vascular development.

Sebza *et al*. extend previous work in which the hematopoietic immune signaling proteins Syk and SLP-76 were found to regulate the developmental separation of lymphatic and blood vessel systems [*Science* **299**, 247 (2003)]. Directed transgenic reexpression of SLP-76 in a subset of hematopoietic cells was sufficient to correct the defect in lymphatic-vascular connection apparent in mice that lack Syk and SLP-76. By generating chimeric animals bearing both wild-type and Syk/SLP-76–deficient cells, it was also possible to establish this phenomenon as an endothelial cell-autonomous effect. Thus, the study demonstrates that under steady-state conditions, cells of hematopoietic origin can contribute directly to blood lymphatic-vascular separation as precursors of endothelial cells. It will now be interesting to pursue experiments that more precisely characterize the progenitor cells and their relationship with endothelium during the processes of blood and lymphatic vessel growth and repair. — SJS

Dev. Cell **11**, 349 (2006).