EDITORS' CHOICE

edited by Gilbert Chin

ECOLOGY/EVOLUTION

Planting the Seeds of Chaos

Most perennial plant species reproduce every year, but some produce flower and fruit only at longer intervals, sometimes many years apart. This phenomenon, known as masting, involves the synchronous flowering of all the individuals in a population, and has long remained an evolutionary and mechanistic puzzle. What do masting plants gain from such behavior, and how do they achieve the synchrony necessary for masting to occur at all?

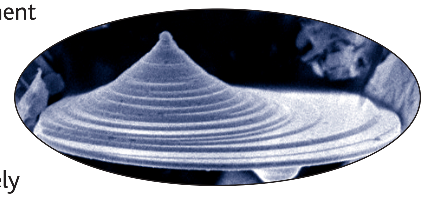
Rees *et al.* have studied the masting grass species *Chionochloa pallens* in New Zealand, using data from individual plants gathered over a decade. Models based on the variation in the plants' resources or on environmental cues failed to reproduce the observed masting pattern. However, models incorporating both resource and climatic cues produced patterns in agreement with the data at the individual and population levels. The resource-based component of the model produced chaotic dynamics in flowering, which were synchronized across individuals by the environmental cue. The resulting pattern is selectively advantageous in reducing the proportion of seeds lost to predators. — AMS

Am. Nat. **160**, 44 (2002).

CHEMISTRY

Tin Oxide Diskettes

The controlled synthesis of a variety of nanosized objects has been reported for several oxide materials. For tin oxide, there have been previous reports on the synthesis of nanoscale tubes, wires, and ribbons. Dai *et al.* report on the preparation of single-crystalline disks, starting from either SnO or SnO_2; the disks formed at temperatures between 200° and 400°C and had a final composition of SnO. Two morphologies were observed: Two solid "wheels" fused together to form a drop-center rim, or a cone-like structure formed from a main disk and a series of spiral-stepped ridges.



Terraces and spiral steps on a SnO diskette.

The latter morphology is thought to be produced by the presence of impurities during the growth cycle. During a subsequent annealing step, the disks oxidized through a complex transformation process, with Sn_3O_4 observed as an intermediate oxide material, and became polycrystalline. — MSL

J. Am. Chem. Soc., 10.1021/ja026262d (2002).

CLIMATE SCIENCE

Heating the Poles

Paleoclimate data indicate that during the Eocene epoch [55 to 38 million years ago (Ma)] and the Cretaceous period (135 to 65 Ma), land and surface ocean temperatures at high latitudes were much higher than they are at present, and tropical flora and fauna extended into much higher latitudes than they do now. Tropical temperatures, however, were similar to or only slightly higher than they are today. Global climate models with Eocene-like boundary conditions predict much lower polar temperatures than those inferred from the geological record and do not reproduce the warm winters seen in continental interiors. This suggests that the models have neglected a strong warming mechanism and that climate predictions for a warmer future might also underestimate temperatures at high latitudes and in continental regions.

Kirk-Davidoff *et al.* propose that this discrepancy may be due to a failure of the models to reproduce the development of the polar stratospheric clouds (PSCs) that form in response to changes in stratospheric circulation and water content. In their model, which invokes polar stratospheric cooling and tropical stratospheric warming caused by a reduced equator-to-pole temperature (from higher atmospheric CO_2 concentrations), an optically thick layer of PSCs forms owing to cooler temperatures and increased moisture in the polar stratosphere. The additional heat trapped by these clouds further increases high-latitude surface temperatures, leading to continued high CO_2 concentrations and low equator-to-pole temperature gradients in a positive-feedback loop. — HJS

Geophys. Res. Lett. **29**, 10.1029/2002GL014659 (2002).

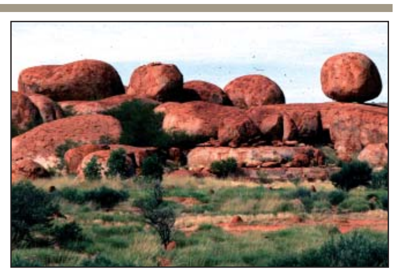
GEOLOGY

Wear-Resistant Rock

Long-term erosion rates of hills and mountains range from highs of centimeters or more per year in active mountain belts such as the Himalayas to lows of a millimeter per year in stable cratons. It has been suggested that, in parts of Australia, prominent granite domes known as inselbergs have persisted for 100 million years, during which almost no erosion has occurred, preserving a Mesozoic erosion surface.

Bierman and Caffee measured the accumulation of cosmogenic nuclides in several inselbergs to determine their long-term erosion rate. These nuclides accumulate in a rock when it is exposed on the surface and bombarded by cosmic rays. The data imply that the tops of the inselbergs are eroding at rates as low as 0.3 mm per year, one of the lowest rates in the world. Nonetheless, this process is still fast enough that it is unlikely that a Mesozoic erosion surface has been preserved, and thus inselbergs are indeed dynamic landforms. However, because the tops of the inselbergs are eroding no faster (or even slower) than their sides and the valleys, it is likely that the dramatic topography has persisted over that time. — BH

Geol. Soc. Am. Bull. **114**, 787 (2002).



Devil's Marbles, Northern Territory (above) and lichen-mantled granite on Yarwondutta Rock, South Australia.

APPLIED PHYSICS

All-Plastic Electronics

Organic thin-film transistors have substantial benefits over their inorganic counterparts in terms of the ease of processing, weight, and cost, but tend

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CREDITS: (TOP) DAI *ET AL.*, *J. AM. CHEM. SOC.*, 10.1021/JA026262D (2002); (BOTTOM PHOTOS) PAUL BIERMAN