ORGANIC CHEMISTRY
Carbon links without helpful neighbors
It’s an irony of modern organic chemistry that the simplest-looking carbon-carbon bonds are often the hardest to make. Most reactions owe their efficiency to neighboring double bonds or oxygen and nitrogen atoms that linger in the products. Qin et al. now present a broadly applicable protocol for making C-C bonds in the absence of such surrounding help. The nickel-catalyzed process couples a zinc-activated carbon center to an ester that’s poised to lose CO₂. The ready availability of numerous carboxylic acids (which are easily converted to esters) contributes to the reaction’s versatility. — JSY

NEURODEGENERATION
A window into Alzheimer’s disease
Alzheimer’s disease (AD) involves the accumulation of amyloid-β (Aβ) plaques and tau tangles in the brain. The cognitive and pathological results of Aβ deposition in patients with AD have been well studied, owing to the availability of PET (positron emission tomography) imaging ligands. Brier et al. used newly available PET imaging agents for tau to explore the relationship between tau pathology and Aβ pathology in patients with early AD. Overall, tau imaging provided a more robust predictor of disease status than Aβ imaging. Whereas Aβ imaging is a good marker of early AD, tau imaging is a more robust predictor of disease progression. — OMS

Science, this issue p. 801

PSYCHOLOGY
The psychological cost of reconciliation
During civil wars, individuals and communities who were previously good neighbors can end up fighting each other. One approach to reknit these sundered social ties is to bring perpetrators and victims together in truth and reconciliation forums. Cilless et al. found that these forums have helped to reestablish social bonds in Sierra Leone, but that they have also imposed a cost on the victims’ mental health (see the Perspective by Casey and Glennerster). — GJC

Science, this issue p. 787; see also p. 766

IN OTHER JOURNALS
Edited by Kristen Mueller and Jesse Smith

Reclaimed-water nexus
High energy demands lead to the burning of prodigious amounts of fossil fuels and also require huge amounts of water. Cooling water for thermoelectric power plants, for example, constitutes ~40% of the total freshwater withdrawals in the United States alone. Barker and Stillwell evaluated the feasibility of reusing water for cooling power plants under multiple implementation strategies in and around Chicago. Retrofitting current power plants to use reclaimed water resulted in a substantial cost burden. The benefits of stable water temperatures and improved reliability of plants engineered for reuse, however, can potentially outweigh any new infrastructure investments. Sustainably weighing the costs and tradeoffs of water use for power generation will be crucial for current and future power plants to meet future regulatory requirements. — NW


Thermoelectric power plants require huge volumes of water for cooling.
mobility of intracellular proteins and organelles. The cytoplasm actually turns from a liquid-like to a solid-like state. This relative immobility helps the cells survive until growth conditions improve and normal activities can resume. — SMH

PARKINSON’S DISEASE

A view of pathogenic fibrils

The protein α-synuclein (α-syn) accumulates in the brains of people with Parkinson’s disease (PD), forming fibrils that are a hallmark of the disease. Tuttle et al. used sophisticated solid-state nuclear magnetic resonance techniques to determine a high-resolution three-dimensional structure of α-syn fibrils which they validated by electron microscopy and x-ray fiber diffraction. The structure exhibits many of the features that stabilize typical amyloid fibrils (like those seen in Alzheimer’s disease), including a stacked β-sheet structure with a tightly packed core, but in this case the strands in each β sheet follow a serpentine, Greek-key–like pattern. The structure may facilitate the development of diagnostic agents for PD. — VV

SURFACE SCIENCE

Revealing buried hydrogen bonds

One way to stabilize self-assembly monolayers of alkane thiols on gold surfaces is to introduce amide groups into the chain near the thiol groups to form hydrogen-bonding networks. This subsurface location has made direct structural studies challenging, but Thomas et al. have used scanning tunneling microscopy and local tunneling barrier height studies of 3-mercapto-N-nonylpropion- amide on Au(111) (gold films on mica) at cryogenic temperatures to map the spatial orientation of the hydrogen bond. These networks can cross the boundaries between the domains that form with different rotational orientations. — PDS

CLIMATE VARIABILITY

By air and by sea

Ocean circulation is not the only driver of the Atlantic Multidecadal Oscillation (AMO). The AMO, characterized by multidecadal changes of sea surface temperatures throughout North Atlantic, has long been considered to be a result of deep ocean circulation variability, but evidence is building that atmospheric processes are an important cause, too. Brown et al. show that feedbacks between the surface ocean and overlying clouds are needed to produce an observed coherence of temperature change over the entire North Atlantic basin. A better understanding of what controls the AMO should help improve predictions of regional and global climate on decadal time scales. — HJS

VISUAL NEUROSCIENCE

How monkeys see in 3D

The primate brain uses two major visual systems to represent the three-dimensional (3D) shape of objects. A number of heavily interacting cortical areas make up these two systems. To better understand how these systems interact, Van Dromme et al. used a drug to reversibly silence one of these regions in monkeys. In psychophysical tests and functional MRI investigations, this caused not only deficits in the system to which this region belonged but also in the second major system. Using microelectrodes to selectively stimulate the same region indicated complex indirect effects that used a number of interconnected circuits. These data help reveal how several regions in the primate visual system required for 3D object vision functionally interact. — PRS

CONSERVATION BIOLOGY

Can modern technology prevent extinction?

Rising temperatures, habitat loss, and increasing urbanization mean that many animal species are on the brink of extinction. However, Saragusty et al. suggest that advances in stem cell and assisted reproductive technologies might allow scientists to save severely endangered species and to bring extinct species back to life. Examining the case of the northern white rhinoceros, an instance in which only three nonreproducing individuals are known to exist, the authors outline the potential and caveats of applying current methodological advances to save this iconic species. Furthermore, the guidelines laid out for the northern white rhino are likely to be applicable to many other critically endangered species. — LMZ

The northern white rhinoceros is a critically endangered species.
Can modern technology prevent extinction?
Laura M. Zahn

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