

Atmospheric chemistry

Getting fresh at the weekend

Atmos. Chem. Phys. **3**, 2225–2232 (2003)

Nitrogen oxides in the atmosphere are linked to a suite of adverse effects on both climate and human health. Some 50% of this pollution is thought to come from the burning of fossil fuels. As nitrogen oxides survive for only about a day in the atmosphere, their levels would be expected to dip at the weekend as human activity diminishes. Satellite measurements now show that this is indeed the case throughout the industrialized world.

S. Beirle and colleagues used data from the European Space Agency’s ERS-2 satellite to track levels of NO₂ in the atmosphere’s lowest layer, the troposphere. Their analysis covered the United States, Europe, the Middle East and East Asia.

In regions with a Christian tradition, levels of NO₂ plummeted on Sundays: Milan, in Italy, experienced a drop of 60% relative to weekday levels. Arab cities showed lowest NO₂ levels on Friday, the Islamic day of rest, whereas Jerusalem was least polluted on the Jewish sabbath, Saturday.

China did not show a weekend effect, despite having a Monday–Friday working week. This may be because China’s nitrogen oxide emissions are largely due to power plants and industry, which operate throughout the week, whereas in the West emissions from motor vehicles play an important role.

Michael Hopkin

Cardiovascular biology

Division and development

J. Cell Biol. **164**, 97–109 (2004)

The shape of a heart conjures up thoughts of roses, rings and romance — but little is known about how the pumping human version acquires its characteristic shape. Sigolène M. Meilhac *et al.* have found evidence that the curves arise through carefully arranged cell growth.

The researchers studied genetically labelled single precursor cells in a mouse embryo’s growing heart, as it transformed from a primitive cardiac tube into a four-chambered organ. The label was inherited only by daughter cells, allowing the team to examine where they ended up.

The authors find that, rather than daughter cells spreading randomly around their mother, they take up specific locations in each region. In the elongated outflow tract, for example, the cells arrange themselves in roughly vertical lines. To form the rounded left ventricle that bulges out from the primitive tube, daughter cells

position themselves like the spokes of a wheel.

The finding contradicts a previous idea that organs gain their shape via faster or slower rates of cell division and death in different regions. Although it remains unclear what controls the oriented cell growth, the group suggests that other organs, such as the liver or kidneys, may also use the mechanism to achieve their perfect form.

Helen Pearson

Chemistry

Lizards line up

J. Am. Chem. Soc. doi:10.1021/ja039515r (2004)

Building porous silicates from individual molecules is a useful way to create nanoscale channels that are bristling with organic functional groups. This method is often preferable to starting with grains of silica and then forcing organic molecules into existing pores, which usually results in much lower loading densities.

Qingmin Zhang and colleagues have developed a template molecule that can be assembled into a densely functionalized porous material. They compare this template to a lizard. First, the lizards’ heads join up to make the basic silicate structure. The lizards’ long tails take up enough space to ensure that nanoscale channels run through the newly formed silicate scaffold. A simple hydrolysis reaction cuts the lizards’ tails off and washes them out of the pores, leaving their bodies covering the inner surface of the channels. In this case, the lizards’ bodies are alanine residues, but the authors claim that this method could be used for a wide variety of functional groups.

They also speculate that this may be a swift route to incorporating asymmetric molecules on the internal surfaces of porous materials, for use as catalysts or in sensing devices.

Mark Peplow

Pharmacology

Herbal medicine at work

J. Clin. Invest. **113**, 137–143 (2004)

The herbal tea Yin Zhi Huang, a concentrated extract of four different plants, has been used in Asia for centuries to prevent and treat jaundice in newborn babies. The treatment helps to remove excess bilirubin — a breakdown product of worn-out red blood cells — from the liver. Wendong Huang *et al.* have discovered how the remedy may work.

The team used mice to study a receptor protein called CAR that is thought to aid bilirubin clearance. Treatment with Yin Zhi Huang increased the rate of bilirubin removal in mice that had the protein, and also induced the expression of various genes

involved in bilirubin metabolism. These effects were not seen in mice lacking CAR, suggesting that Yin Zhi Huang functions through this protein.

One particular ingredient from the herbal concoction was similarly effective: scoparone accelerated bilirubin removal in CAR-expressing mice, and activated the expression of genes that are targets of CAR in cultured liver cells. Huang *et al.* conclude that scoparone is an active component of Yin Zhi Huang, and suggest that drugs that target CAR could help to treat jaundice.

Helen R. Pilcher

Animal behaviour

Snap judgements

J. Exp. Biol. **207**, 393–398 (2004)

When an ant finds food, it mentally marks the food’s location by memorizing snapshots of local landmarks. Ants can store several such images, and retrieving the correct one is essential in pinpointing the food on subsequent visits.

Paul Graham and colleagues now help to show how wood ants (*Formica rufa*) interpret these stored visual data. They trained ants to find a dot of sucrose placed between two differently sized cylinders, against either a plain white background or with a patterned curtain against half of the background. The researchers then replaced the cylinders with two of equal, intermediate size, and noted where the ants searched for the sugar.

If the ants possessed a separate snapshot of each of the mismatched cylinders, they would be expected to search at a site closer to the intermediate cylinder that had replaced the larger one. But they were unable to do this when viewing their surroundings against the plain background. Only when the curtain was present did the ants search in the expected place.

The ants used the patterned curtain to tell which of the intermediate cylinders had replaced which of the mismatched pair, the authors explain. This shows that components of a snapshot interact to aid the reliable recognition of a landmark.

Michael Hopkin

