analysis were carried out by one person using traditional methods it could take weeks.

EARTH SCIENCES

Leaks and flows

Geophys. Res. Lett. **34,** L13612 (2007)

Ocean circulation in the southern hemisphere is characterized by swirling basin-wide currents, known as gyres, contained within the Indian, Pacific and Atlantic Oceans. Now scientists have discovered a 'supergyre' that connects the three basins.

Ken Ridgway and Jeff Dunn of CSIRO Marine and Atmospheric Research in Hobart, Australia, determined flow patterns from temperature and salinity profiles collected since 1950. They found that, in a region south of Tasmania, Pacific waters 'leak' into the Indian Ocean. There is a similar but weaker connection south of Africa between the Indian and Atlantic Oceans.

Models have suggested that the ocean basins are linked, but until now the connecting element had escaped observation. The supergyre seems to be an essential component of the global ocean circulation system.

CELL BIOLOGY

Age: nothing but a pathway

Science **317,** 803–806 and 807–810 (2007)

A molecular pathway that regulates stem cells leads a double life as an usher of old age, two teams have found.

Toren Finkel at the National Heart Lung and Blood Institute in Bethesda, Maryland, and his co-workers examined a strain of mice, known as Klotho, that ages prematurely. The team found that the klotho protein these mice lack keeps the Wnt pathway in check. Wnts are a family of proteins known to stop stem cells from differentiating.

Thomas Rando, at Stanford University School of Medicine in California, and his team noticed the same counterintuitive role for Wnt when they connected the veins and arteries of young and aged mice, so that blood flowed freely between the two. Under these conditions, muscle stem cells in young mice showed signs of fibrosis — a hallmark of old age. Activating Wnt signalling in young mice had the same effect.

ASTRONOMY

Blasts from the past

Astrophys. J. **664,** 1000–1010 (2007)

Short gamma-ray bursts have been a feature of the Universe for longer than some observations have suggested, say Edo Berger of the Observatories of the Carnegie Institution of Washington in Pasadena, California, and his colleagues.

In seconds, these bursts release energy comparable to the Sun's output over its entire lifetime. Berger's team detected nine such events and estimate that up to two-thirds of this type of burst happened more than six billion years ago. They also estimate higher energies for these ancient bursts than have been reported for more recent bursts.

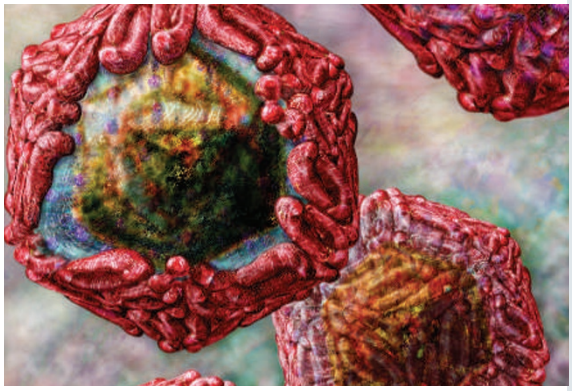
Such observations should help astronomers to work out what causes the explosions: today's best guess is that they result from the merger of two neutron stars, or a neutron star and a black hole.

VIROLOGY

Killer mutation

Nature Genet. doi: 10.1038/ng2097 (2007)

A single mutation may be responsible for the recent increased virulence of the West Nile virus (pictured below). Since 1996, the virus has caused regular outbreaks of severe and even lethal encephalitis in humans. Previously the mosquito-borne, bird-infecting virus had caused only mild infections in humans.



R. KIGHTLEY/SPL

Aaron Brault of the University of California, Davis, and his colleagues analysed the genomes of 21 strains of West Nile virus from around the world. They identified a single base alteration in a gene encoding a helicase enzyme that had arisen independently in at least three strains associated with human outbreaks. Engineering this mutation into a less virulent strain made the virus more lethal to birds, but whether the mutation is associated with increased virulence in humans remains to be determined.

Correction

The Research Highlight 'When dinos hit puberty' (*Nature* **448,** 391; 2007) wrongly implied that modern crocodilians are descended from dinosaurs. Both groups derived from archosaurs.

JOURNAL CLUB

Martyn Poliakoff, University of Nottingham, UK

A champion of environmentally friendly chemistry encourages attempts to identify reactions ripe to be turned 'green'.

The aim of 'green chemistry' is to make the design, production and use of chemicals more sustainable. This means that, unusually for an academic discipline, industrial implementation is an inherent goal.

Research groups in this field, including mine, strive to reduce waste by identifying selective catalysts, alternative solvents or renewable feedstocks that could lead to new industrial processes.

But how do we choose which reactions to try to green? Some targets are obvious; the reactions are notoriously inefficient. However, many chemical manufacturers are understandably reticent about the shortcomings of their processes.

It was therefore particularly refreshing to find a paper that results from the collaboration of seven pharmaceutical companies and highlights key research areas for green chemists (D. J. C. Constable *et al. Green Chem.* **9,** 411–420; 2007). The paper describes several classes of reaction that, if 'greened', would significantly lessen the pharmaceutical industry's effect on the environment.

For example, the paper asks that researchers develop methods to carry out oxidations safely in non-chlorinated solvents (chlorinated solvents are non-flammable but toxic); or to find ways to tame the fearsome reactivity of fluorine so that fluorination occurs selectively.

Another clear message is that new strategies for using solvents could lead to substantial reductions in waste. Could reaction vessels be cleaned out at the end of a process without using organic solvents?

This paper is a great start, but I think the authors have been too conservative. They could have asked for more, such as catalysts that can trigger two or more reactions in sequence. We need really tough challenges to intrigue academic chemists and bring new blood to the task of greening chemistry.

Discuss this paper at **http://blogs.nature.com/nature/journalclub**