RESEARCH HIGHLIGHTS

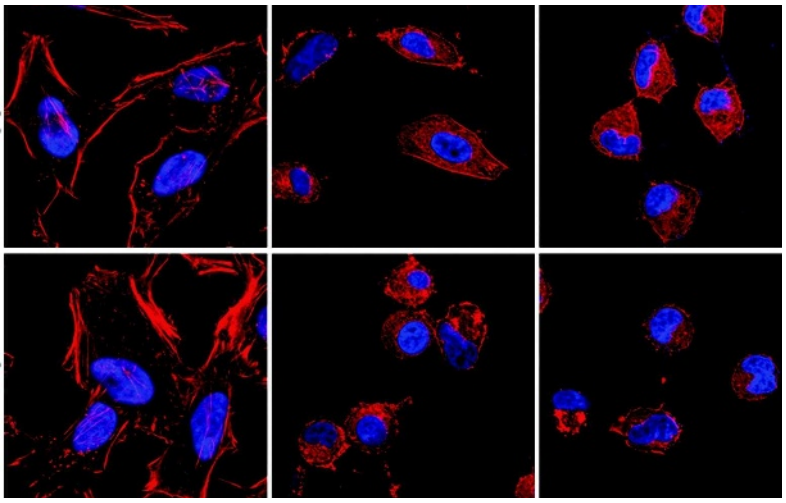
Cause of death

Proc. Natl Acad. Sci. USA **105,** 12497–12502 (2008)

The bacterial pathogen *Vibrio parahaemolyticus* has an unusual way of killing cells, researchers report.

V. parahaemolyticus causes severe diarrhoea and can be life threatening in people with weakened immune systems. Previous work had suggested that the bacteria kill cells by injecting them with proteins that trigger a kind of cellular suicide called apoptosis. But Kim Orth and her colleagues at the University of Texas Southwestern Medical Center have found that dying cells do not express enzymes characteristic of this.

Instead, the cells were inflamed. They became more rounded (progression pictured left to right for two samples), began to degrade their own contents and started to leak. These events occurred in only a few hours, and together provide a new means by which a pathogen that works from outside a cell can kill its target.



D. L. BURDETTE ET AL./PNAS

GEOSCIENCES

Clubmoss clues

Nature Geosci. doi:10.1038/ngeo278 (2008)

Spores in herbaria around the world may help to push back the record of atmospheric ozone concentrations, according to Barry Lomax, now at the University of Nottingham, UK, and his co-workers.

They think that the quantities of two ultraviolet-B-absorbing compounds (*p*-coumaric and ferulic acid) present in the outer walls of spores and pollen can serve as a proxy for stratospheric ozone. This is because the less ozone there is in the atmosphere, the more UV-B radiation reaches Earth, and the more UV-B-protecting chemicals plants make.

Lomax's team tested the idea on two species of clubmoss: *Lycopodium magellanicum* and *L. annotinum*, from which they reconstructed UV-B flux back to 1907 — 20 years earlier than any previous record. Spores from Greenland and South Georgia, an island in the South Atlantic, gave the same pattern.

PHYSICS

A bolt from the blue

Phys. Res. Lett. **101,** 075005 (2008)

Bolts of lightning expand by sending out trees of tiny filaments called streamers, which are ionized air channels. Logic dictates that the channel heads should repel one another because they carry the same electric charge. But, as any lightning-watcher can vouch, streamers touch quite often (pictured right).

Ute Ebert and her colleagues at the National Research Institute for Mathematics and Computer Science in Amsterdam, The Netherlands, have simulated how streamers connect. They have demonstrated that, in a gaseous mixture of nitrogen and oxygen (as in Earth's atmosphere), streamers come together more easily at lower pressures. Thus their model could explain the observations. The work paves the way to simulating a complete lightning fork, not just single streamers.

MOLECULAR BIOLOGY

Precision dumping

Cell **134,** 668–678 (2008)

Editing a molecular tag called polyubiquitin sends two key immune-response proteins into the cellular garbage-disposal system.

There are two main ways of attaching one ubiquitin to another within polyubiquitin, and the one chosen often determines whether the target protein is activated or degraded. Vishva Dixit at Genentech in South San Francisco, California, and his team have made antibodies that can discriminate between the two.

Using these antibodies, they discovered that RIP1 and IRAK1 — proteins involved in a cell's response to immune-system signals — start out with the activating type of attachment, and that this is later 'edited' into the degrading one. This editing could be a way of dampening down other cell-signalling pathways.

R. WETMORE/GETTY

CHEMISTRY

Silicon pulls it off

Science **321,** 118–190 (2008)

Organic molecules containing carbon–fluorine bonds are long-lived atmospheric pollutants that act as powerful greenhouse gases. The secret of their longevity is the stubbornly unreactive nature of these bonds. A catalyst that could turn those tough C–F bonds into C–H bonds quickly and selectively would be a boon to people disposing of ozone-unfriendly molecules of this sort. Christos Douvris and Oleg Ozerov of Brandeis University in Waltham, Massachusetts, have designed one.

Their catalyst contains silicon, which facilitates a bond-swapping reaction. Because the C–F bond is weaker than the Si–F bond and the Si–H bond weaker than the C–H bond, the switch from C–F to C–H by way of Si is thermodynamically favourable. The reaction occurs in mild conditions and the catalyst is reusable.

IMMUNOLOGY

Hitting 'pause'

Cell **134,** 657–667 (2008)

Although senescent cells may appear dormant, they have an important role in protecting the liver from cirrhosis, according to Scott Lowe of Cold Spring Harbor Laboratory in New York and his colleagues.

Cirrhosis results from the long-term accumulation of fibrous scar tissue. Lowe and his team discovered that senescent cells