parts contain 11 protofilaments in all other bacteria studied so far.

Edward Egelman of the University of Virginia in Charlottesville and his colleagues uncovered this break from tradition when they examined the species' flagella filaments using electron cryo-microscopy. They propose that *C. jejuni*'s unusual filament structure arose from a minor change in a region of the protein that is responsible for the helical symmetry of flagella filaments.

MOLECULAR BIOLOGY

Arsenic's action

Nature Cell Biol. doi:10.1038/ncb1717 (2008); *Nature Cell Biol.* doi: 10.1038/ncb1716 (2008)

Arsenic trioxide, a poison familiar to readers of Agatha Christie, has been used to treat acute promyelocytic leukaemia since 1992, although how it works has never been fully explained. Two studies have now pin-pointed RNF4, a member of a family of enzymes called ubiquitin ligases, as the reason why the drug destroys PML–RARα, a protein produced in patients with this cancer.

It was already known that arsenic trioxide attaches several copies of SUMO, a signalling molecule, to PML–RARα, and that this addition prompts the destruction of PML–RARα. Ronald Hay of the University of Dundee, UK, Hugues de Thé of the University of Paris and their respective colleagues have shown that the SUMO chains are recognized by RNF4, which directs PML–RARα to an organelle called the proteasome, where PML–RARα is chewed up.

PALAEONTOLOGY

Amphibious origins

Proc. Natl Acad. Sci. USA **105,** 5786–5791 (2008)

Isotopes in the teeth of elephants' extinct relatives are adding weight to the arguments of researchers who think that the Eocene proboscideans from which elephants evolved lived in freshwater.

Alexander Liu at the University of Oxford, UK, and his colleagues measured the oxygen isotopes in enamel taken from the teeth of two late-Eocene genera, *Barytherium* and *Moeritherium*. These genera are closely related 'sister taxa' of modern elephants. The isotopic composition of their teeth matched those of many other aquatic and semi-aquatic mammals, making a case for elephants and sirenians — that is, manatees and dugongs — sharing an amphibious ancestor that lived about 50 million years ago.

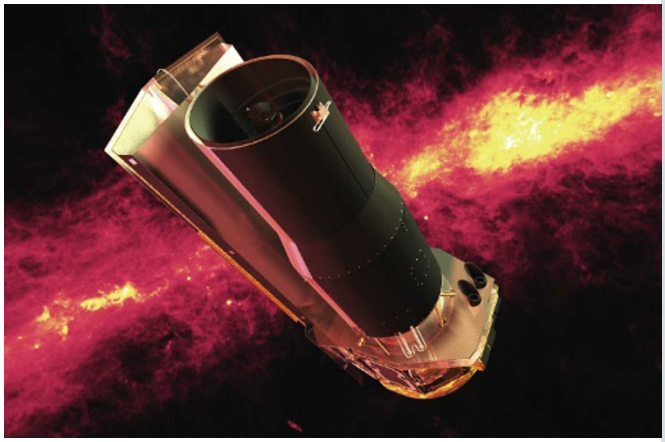
CRYSTALLOGRAPHY

Probing a crystal

Phys. Rev. Lett. **100,** 145502 (2008).

A way to distinguish molecular left- and right-handedness (chirality) has been demonstrated using the SPring-8 synchrotron X-ray source in Harima, Japan.

Yoshikazu Tanaka of the RIKEN SPring-8 Center in Sayo, Japan, and his co-workers have found that the instrument's bright beams of circularly polarized X-rays create disparate diffraction patterns for the two chiral forms of quartz. Normal X-ray diffraction gives identical patterns for both versions. When the angle at which the circularly polarized beam hits the crystals varies between the chiral forms, the intensity at which it is reflected differs. The method can directly ascertain chirality when measuring the rotation of polarized light cannot.



NASA/JPL-CALTECH

ASTRONOMY

Galactic adolescence

Astrophys. J. **677,** 943–956 (2008)

The Spitzer Space Teloscope (picture above) has detected about 2,600 ancient galaxies undergoing a growth spurt. These galaxies are about ten billion light years from Earth and hidden from ground-based telescopes by their own silicate dust, which reddened their light in the same way that our atmosphere reddens sunsets.

Arjun Dey of the National Optical Astronomy Observatory in Tucson, Arizona, and his collaborators used the Spitzer to detect the infrared glow of the galaxies, finding a subset of galaxies that formed hundreds or thousands of stars per year and that had fast-expanding black holes at their centres.

The team believes that this rapid growth lasted for 100–200 million years — a mere blip in galaxy evolution — and that these far-off galaxies went on to resemble the massive galaxies close to our own.

JOURNAL CLUB

Vijay Kuchroo
Harvard Medical School, Boston, Massachusetts

An immunologist muses about inflammation through cell interactions.

I spend my lab hours trying to understand what prompts T cells — a type of white blood cell — to specialize. Some T cells produce soluble molecules that rattle the immune system into an inflamed state; other cells generate molecules that calm the system back down.

Upon infection, cells such as macrophages — another type of white blood cell — produce soluble molecules called interleukins that direct the fate of the responding T cells. An emerging curiosity in the field is which interleukins make certain T cells become pro-inflammatory, and which cause other T cells to become anti-inflammatory. This decision is crucial for determining whether an immune response induces or suppresses inflammation.

Recently, investigators have turned their attention towards an interleukin known as IL-27. This is produced by activated macrophages and was initially thought to induce IFNγ, a signalling molecule that activates macrophages even more.

But work by Nico Giraldi and his colleagues at Genentech in South San Francisco, and other groups, has recast IL-27 as a molecule that primarily directs T cells to suppress inflammation. In a paper published in March, Giraldi's team confirmed that IL-27 acts in this way because it causes CD4+ and CD8+ T cells to make the anti-inflammatory IL-10, and does not work through an alternative pathway (M. Batten *et al. J. Immunol.* **180,** 2752–2756; 2008). Mice with *Listeria* infections or autoimmune tissue inflammation in their brains and spinal cords generated fewer IL-10-producing T cells when they lacked an IL-27 receptor. Whether an analogous interaction occurs in humans is not known, but, if it does occur, this research could become medically useful.

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

©2008 Nature Publishing Group