habitat is probably present.

Buford Price and Robert Rohde, at the University of California, Berkeley, may have identified this missing habitat. They calculated that enough molecules such as carbon dioxide, oxygen, nitrogen and methane can diffuse through ice to sustain life.

By scanning ice cores with laser fluorimeters they detected protein spikes, some of which were indicative of single isolated cells, in just such habitats.

ASTROCHEMISTRY

Salty stars

Astrophys. J. **668,** L131–L134 (2007)

Researchers in the United States have found a dash of the unexpected in oxygen-rich stars. Lucy Ziurys and her colleagues at the University of Arizona in Tucson used the Submillimeter Telescope on Mount Graham and the 12 Meter Telescope on Kitt Peak, both operated by the Arizona Radio Observatory, to observe two red-giant stars that have shells dominated by oxygen. By analysing the recorded spectra, the team determined that the shells contain NaCl, which has previously been observed only in carbon-rich red giants.

The findings suggest that oxygen-rich stars, like their carbon-rich cousins, may be home to the complex types of chemistry that create molecular precursors to life.

BIOCHEMISTRY

Keeping the 'code'

Cell **131,** 58–69 (2007)

Certain chemical changes, or marks, made to the histone proteins around which DNA wraps seem to tell the cell whether or not that DNA should be transcribed.

Teams led by Matthias Mann at the Max Planck Institute for Biochemistry in Martinsried, Germany, and Marc Timmers at the University Medical Centre Utrecht in the Netherlands looked for proteins that bind to one chemical mark — trimethylation of lysine 4 on the histone H3. This mark is usually associated with transcriptional activity, and they found that a component of the transcription factor TFIID bound it tightly.

Dimethylation of a nearby arginine residue inhibited this binding, and other specific marks strengthened it, lending credence to the hypothesis that a combinatorial 'histone code' determines how cells read their DNA.

PLANT ECOLOGY

Grass attack

J. Ecol. doi:10.1111/j.1365-2745.2007.01307.x (2007)

Looking for signs of biological warfare past, Carolyn Malmstrom of Michigan State University in East Lansing and her colleagues delved into herbarium specimens at two University of California sites and extracted some of the oldest plant-virus RNA ever recovered.

Although ecological theory generally says that invasive species are successful outside their home ranges because they are freed from the pathogens that evolved to plague them, Malmstrom and colleagues suspect that a historical takeover of California grasslands by Eurasian grasses succeeded in part because the invaders brought viruses with them that affected the natives or changed the dynamics of an existing virus population.

They extracted barley yellow dwarf virus RNA from several specimens, including a 1917 invasive wild oat, proving that the virus was present at the time of invasion.

VISION

A scaffold in new light

EYE OF SCIENCE/SPL

Cell **131,** 80–92 (2007)

The fruitfly protein INAD had long been considered to be a scaffolding protein, organizing important visual signalling proteins that attach to it. But recent research suggests that INAD directly regulates visual perception.

Rama Ranganathan, of the University of Texas Southwestern Medical Center in Dallas, and colleagues show that, in response to light, one of five structural 'PDZ' domains of INAD transiently switches from a reduced to an oxidized state, distorting INAD's ability to bind to other molecules. This seems crucial to visually mediated reflex behaviours and for terminating visual responses.

Many scaffolding proteins contain PDZ domains, which could undergo similar conformational changes to that of INAD. Thus, rather than support components, these might serve as control centres for other signalling molecules.

Correction

The Research Highlight 'Volcanic paintings' (*Nature* **449,** 510; 2007) wrongly named Joseph Mallord William Turner as John Mallord William Turner.

JOURNAL CLUB

Andre Geim
University of Manchester, UK

Imploding atoms have softened this experimentalist's teasing views on theoretical physics.

As an experimentalist, I instinctively dislike theory papers. Too many of them seem to be written for the sole purpose of showing off an integral larger than a competitor's, or to present multiple theories just in case one idea proves right and so is hailed as visionary. I feel even less warmly towards theories that are nigh on impossible to check, such as the supposed precursor to a theory of everything, string theory.

But speaking seriously, even the most obscure predictions can turn out to be spectacularly relevant.

In our lab we have been studying graphene, a material that comprises a single layer of carbon atoms arranged similarly to chicken wire. Because electrons in this material mimic ultra-relativistic particles, it should be possible to observe in their behaviour century-long-predicted phenomena such as the Klein paradox (which concerns how highly energetic electrons tunnel through supposedly impenetrable barriers) and *zitterbewegung* (jittery movements of relativistic wave-packets).

Several recent theory papers on the physics preprint server arXiv predict another coup for graphene (see A. V. Shytov *et al.* arXiv:0708.0837; 2007).

According to relativistic quantum theory, atoms containing more than 170 protons cannot exist, because electrons around nuclei with such a large charge would fall into the centre. Nuclear physicists have not come close to creating atoms heavy enough to test this prediction. But the recent theory papers suggest that it should be relatively easy to observe the effect in graphene. This is because electrons in this material interact much more strongly than they do in atoms, so should fall down on charged impurities (standing in for nuclei) rather routinely.

This makes me wonder: could we design condensed-matter systems to test the supposedly non-testable predictions of string theory too?

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