investigation and occasional searches, such unpaired poles or 'monopoles' have yet to be seen.

There is growing evidence that 'spin ices', materials containing rare-Earth ions locked into pyramidal lattices, could create something akin to monopoles as a result of the collective behaviour of their individual atoms. Ludovic Jaubert and Peter Holdsworth of the University of Lyon in France have added to that evidence. They show that experimental data for the dynamic magnetic properties of a spin ice are well interpreted in terms of the behaviour of monopoles.

BIOLOGY

Electric cows

Proc. Natl Acad. Sci. USA doi: 10.1073/pnas.0811194106 (2009)

Having previously shown statistically that cows and deer preferentially align their bodies north–south, Hynek Burda of the University of Duisburg-Essen in Germany and his colleagues now provide more evidence for these animals' magnetic sensing.

If this alignment is truly due to some sensing of the magnetic field, strong, nearby magnetic fields such as those from power lines should disrupt ruminant orientation.

Using satellite and aerial photographs, the researchers show that 1,699 cows grazing within 50 metres of overhead power lines at various European locations were randomly oriented. Field observations of 653 deer within 50 metres of power lines in the Czech Republic also revealed random orientation.

IMMUNOLOGY

Self help

J. Exp. Med. **206,** 549–559 (2009)

Dendritic cells, which present antigens to immature T cells to prime them for action against pathogens, seem to contribute to autoimmune disease. But recent findings suggest they can prevent autoimmunity as well. David Voehringer at the University of Munich in Germany and his colleagues have found that ridding mice of dendritic cells seems to cause a severe autoimmune reaction.

They created transgenic mice that selectively expressed a bacterial toxin in their dendritic cells, and had less than 10% of normal levels as a result. These mice were unable to mount an immune response to infections, but by six weeks of age their internal organs had been infiltrated by a large numbers of mature helper T cells, causing inflammation; by eight weeks this process was fatal in 40% of the mice.

ENTOMOLOGY

Sick bugs take drugs

PLoS ONE **4,** e4796 (2009)

The Very Hungry Caterpillar (pictured) in Eric Carle's children's book, which saw its fortieth anniversary this year, may have been hunting for drugs as well as food.

Woolly bear caterpillars (*Grammia incorrupta*) normally ingest small amounts of pyrrolizidine alkaloids to ward off parasites. Michael Singer of Wesleyan University in Middletown, Connecticut, and his team showed that the caterpillars ingested around twice as much of the drug when infected by maggots.

This finding suggests that self-medication is more widespread than previously thought — it has never been clearly demonstrated

E. CARLE/PUFFIN

in insects before. Previous studies by the team have shown that the taste receptors of infected woolly bears are altered to crave more alkaloids when they are infected.

BIOMIMETICS

Steel strong, air light

Science **323,** 1575–1578 (2009)

A research team led by Ray Baughman at the University of Texas at Dallas has created an artificial muscle from a ribbon of aerogel — a lightweight, sponge-like material consisting mostly of air — threaded with carbon nanotubes.

Applying a voltage across the width of the ribbon electrically charges the nanotubes; their mutual repulsion can increase the material's width by a factor of three in an instant. A voltage along the length of the ribbon triggers contraction, making the material dense and stiff. The muscles can be turned on and off 1,000 times a second. They can also be 'frozen' at any desired density, which might open up a range of applications depending on the optical and electronic properties of a specific arrangement of nanotubes.

For a News story on this research see http://tinyurl.com/c68oum

JOURNAL CLUB

Paul J. Dyson
Swiss Federal Institute of Technology, Lausanne

A chemist highlights promising organometallic drugs.

Traditionally, the compounds we use to fight cancer come in two flavours. Inorganic drugs, such as cisplatin — a small molecule with a platinum core — are the workhorses of chemotherapy. They are generally highly toxic to cells, not particularly selective, and are accompanied by side effects ranging from vomiting to kidney damage. Larger organic drugs offer a more targeted but weaker approach. They can selectively pick off key enzymes, but may work on only a narrow range of cancers.

In the search for more effective anticancer weaponry, hybrids of inorganic and organic components — organometallic drugs — are increasingly important. Once thought of as unstable, highly toxic species, these compounds are now being developed by chemists to treat a broad range of tumours and to overcome platinum-resistant cancer cells. Like organic drugs, they have a selective mode of action and so cause fewer side effects.

The dinuclear ruthenium-arene compounds trialled by Bernhard Keppler of the University of Vienna and his colleagues are promising examples (M. G. Mendoza-Ferri *et al. J. Med. Chem.* **52,** 916–925; 2009). These highly cytotoxic compounds contain two ruthenium centres, separated by an adjustable organic linker. By tweaking the length of this chain, the researchers produced compounds that are as active as established platinum-based drugs in human tumour-cell lines.

What's more, the ruthenium drugs could kill tumour cells that were resistant to oxoplatin, a drug related to cisplatin. They work by linking DNA duplexes together, and can also bind histone proteins to DNA.

The compounds have now progressed to experiments in animals. By reducing side effects, I hope the drugs can improve the quality of life for patients undergoing chemotherapy.

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