

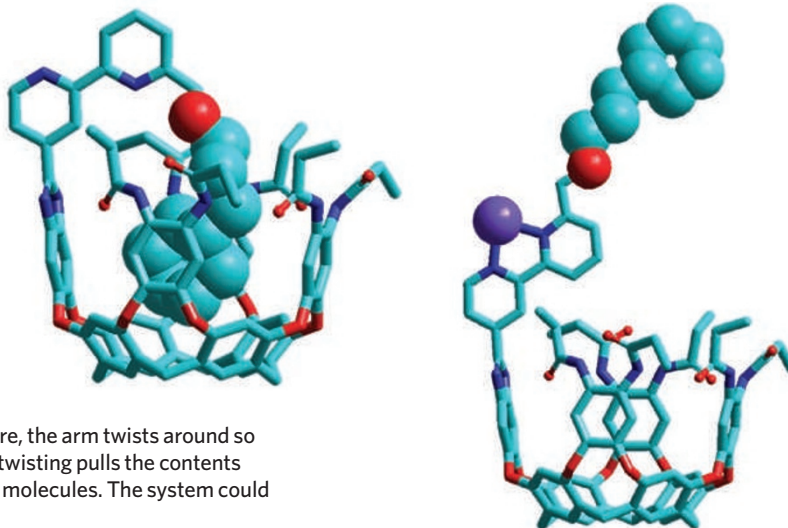
RESEARCH HIGHLIGHTS

An open and shut case

Angew. Chem. doi:10.1002/anie.200906753 (2010)
The name Ouroboros, given by the ancient Greeks to a mythological serpent that bites its own tail, has now been bestowed on a molecular capsule that can similarly capture and release the end of its own arm to close and open an internal cavity (pictured).

Fabien Durola and Julius Rebek at the Scripps Research Institute in La Jolla, California, synthesized the ouroborand molecule, which consists of a bucket-shaped cavity and a rotating arm. The arm attaches to a bipyridyl unit on one end and bears a guest molecule on the other. The arm reaches over and places the guest in the cavity, closing it off.

When metal ions such as zinc are added to the mixture, the arm twists around so that the bipyridyl unit can bind to these ions. This arm-twisting pulls the contents out of the box, making the cavity accessible to external molecules. The system could be used as a tiny reaction flask, the authors say.



WILEY-VCH

DEVELOPMENTAL BIOLOGY

Hidden differences

Genome Res. doi:10.1101/gr.100594.109 (2010)
The earliest stages of embryo development seem to be almost identical among mammals. However, Sheng Zhong at the University of Illinois at Urbana-Champaign and his team have found that 40.2% of the genes shared by humans, mice and cows are expressed differently at this point.

Their analysis of gene-expression patterns in embryos at various stages early in development showed that differences result from altered gene regulation. In some cases, mutations affected the binding of regulatory proteins. In others, transposons or 'jumping genes' had hopped in front of the genes, changing their regulation.

This variation among species suggests that multiple gene networks can guide embryo development, and could be harnessed to generate embryonic stem cells.

IMMUNOLOGY

Misplaced target

Science 328, 508-512 (2010)
Patients with HIV are prone to life-threatening *Salmonella* infections, thought to be a result of HIV hijacking cellular immunity. But the real culprit may lie in the antibody-based immune system, according to a study conducted at the University of Malawi in Blantyre and the University of Birmingham, UK.

The team, led by Calman MacLennan in Birmingham, found that HIV-infected serum contains high levels of an antibody that binds lipopolysaccharide (LPS) molecules in the bacteria's outer membrane, inhibiting the

normal destruction of *Salmonella* by the immune system. Antibodies that bind to the bacteria's outer-membrane proteins, the team finds, restore the ability to kill the invaders.

Researchers have previously proposed a *Salmonella* vaccine targeting LPS, but the findings suggest that this approach may actually boost infection. The outer-membrane proteins may be a better vaccine target.

WILDLIFE BIOLOGY

Fussy eaters

Anim. Behav. doi:10.1016/j.anbehav.2010.03.002 (2010)

Generalist predators can feed on a variety of organisms to ensure a balanced diet, but specialists that prey on only one animal do not have this luxury. Stano Pekár of Masaryk University in the Czech Republic and his team looked at how ant-eating *Zodarion rubidum* spiders (pictured) cope with this dietary limitation.

They found that spiders fed only ant foreparts grew faster and survived longer than those consuming whole ants. Both fared better



than those eating only ant gasters (hind parts). When presented with large whole ants, the spiders fed longer on the protein-rich foreparts than on the lipid-rich gasters. This shows how feeding behaviour might allow specialist predators to balance their nutrient intake.

EVOLUTION

Sex and immunity

Evolution doi:10.1111/j.1558-5646.2010.00989.x (2010)

Sexual promiscuity has been thought to be an important contributor to the evolution of the immune system, owing to the link between sexual activity and disease exposure. Gabriela Wlasiuk and Michael Nachman at the University of Arizona in Tucson have now found evidence for this at the genetic level.

They estimated the molecular evolution rate of proteins coded by 15 immune-defence genes in several primate species, and found a weak but statistically significant correlation with female promiscuity.

The researchers suggest that higher levels of promiscuity may increase exposure to sexually transmitted diseases, thus increasing the potential for natural selection to act on the immune system and drive the evolution of immunity genes.

CANCER BIOLOGY

Cellular battering ram

J. Cell Biol. doi:10.1083/jcb.200909113 (2010)

In order to spread, or metastasize, tumour cells must break through the basement membrane that separates the tumour from the underlying tissue. Using *in vitro* assays to mimic this invasion, Marie Schoumacher

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