RESEARCH HIGHLIGHTS

Selections from the scientific literature

STRUCTURAL BIOLOGY

Enzyme shifts shape to edit DNA

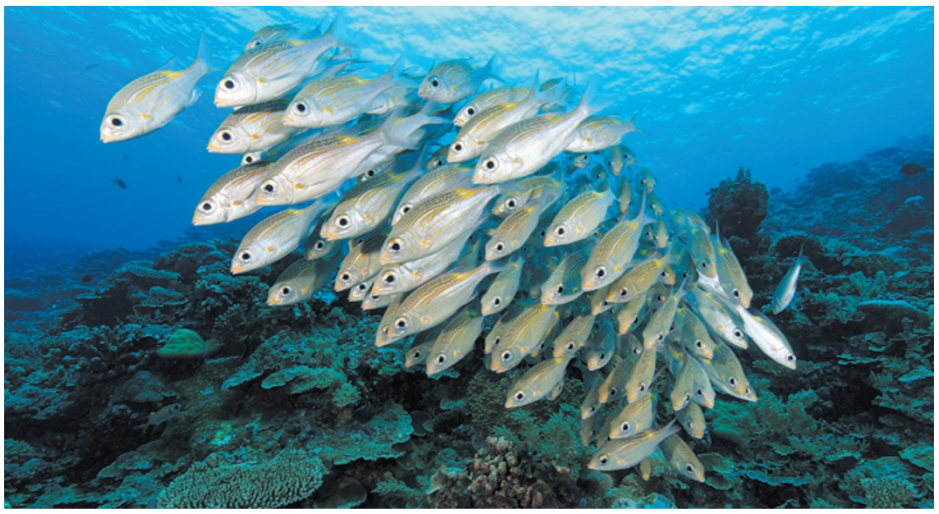
Structural biologists show how the DNA-cutting enzyme at the heart of a powerful gene-editing system changes shape to slice through DNA.

Martin Jinek at the University of Zurich, Switzerland, and his colleagues studied the CRISPR–Cas system, in which an RNA molecule is used to guide and program the Cas enzyme to break through a specific segment of DNA.

The team used X-ray crystallography and single-particle electron microscopy to explore the structure of Cas9 enzymes from two different bacterial species. They found that when the Cas9 enzymes bind to the guide RNA, the active sites rearrange to form a central channel that can attach to DNA.

Furthermore, the Cas9 enzyme is easily programmed by certain guide RNAs because of the amino-acid sequence at the enzyme's active site, which allows the enzyme's shape to be customized.

Science **http://doi.org/rcs (2014)**



BERNARD RADVANER/CORBIS

ZOOLOGY

Fish have it easy in schools

Fish might expend less energy swimming in a school than alone, probably by benefiting from wakes created by nearby fish.

Charlotte Hemelrijk at the University of Groningen in the Netherlands and her colleagues modelled the fluid dynamics of two-dimensional schools of animals, using various configurations of fish-like shapes. They found that fish in almost all the arrangements convert power more efficiently into forward speed than do lone swimmers.

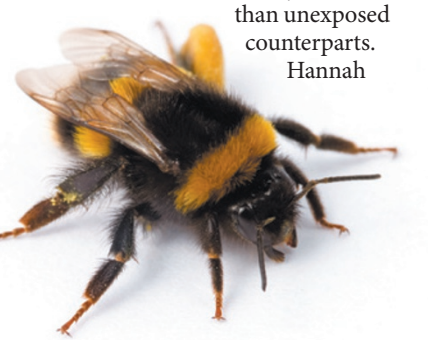
In some configurations, this occurs as fish swim behind one another and move their heads side to side. This means that they benefit from wakes from the preceding fish that speed them up, and are not impeded by swirling wakes that would slow them down.

Fish Fish. **http://doi.org/rb9 (2014)**

ECOLOGY

Pesticides drag bumblebees down

Bumblebees exposed to pesticides bring pollen back to their colonies less often and have lower body mass than unexposed counterparts.



REDMOND DURRELL/ALAMY

Hannah Feltham at the University of Stirling, UK, and her colleagues fed bumblebees (*Bombus terrestris*; **pictured**) in the lab for two weeks on pollen and sugar water laced with doses of the pesticide imidacloprid that they might come across in the field. The researchers then attached tiny radio tags to the bees and placed colonies out in the field to monitor their foraging behaviour. They found that exposed insects carried pollen back to the colonies on 40% of trips, compared with more than 60% for unexposed bees.

Gemma Baron and her colleagues at Royal Holloway University of London in Egham, UK, tested the effect of the pesticide λ-cyhalothrin. They discovered that pesticide-treated colonies produced smaller workers than unexposed colonies.

The researchers suggest that pesticides could contribute to a reduction in queen production and to bumblebee colony failure.

Ecotoxicology **http://doi.org/rct (2014);** ***J. Appl. Ecol.*** **http://doi.org/rcv (2014)**

MICROBIOLOGY

Glowing probe reveals infection

A fluorescent probe could help physicians to pinpoint where the dangerous bacterium *Staphylococcus aureus* is living in a patient's body.

Some bacterial infections are difficult to locate directly, so James McNamara of the University of Iowa in Iowa City and colleagues created a molecular probe that reacts with an enzyme made by *S. aureus* called micrococcal nuclease. The enzyme cuts up small strings of nucleic acid molecules, and the probe consists of two nucleic acid bases attached to a fluorescent molecule.

The researchers injected the probe into a mouse with a *S. aureus* infection in its muscles. The bacterial enzyme cut the probe in two, activating the fluorescent molecule and