RESEARCH HIGHLIGHTS

Selections from the scientific literature

MICROSCOPY

Single ions make sharper images

A microscope creates images with nanometre resolution by exposing samples to single ions.

In electron and ion microscopy, increasing a sample's exposure time can improve the signal-to-noise ratio and result in clearer images, but this can damage or contaminate the sample. To avoid this, Georg Jacob at the University of Mainz in Germany and his colleagues used an electric-field 'trap' to release calcium ions one by one.

Each ion, either transmitted or blocked by the sample, corresponds to a pixel. By controlling the release of the ions, the team calculated when those coming from the source and through the sample should arrive at the detector. This allowed the team to turn the detector on only during those times, reducing the number of detected 'noise' ions.

The microscope showed a fivefold increase in the signal-to-noise ratio, and could potentially cut noise signals by a factor of one million, compared with current methods. It also pinpointed the position of a 1-micrometre hole in a diamond sample with a precision of 2.7 nanometres.

Phys. Rev. Lett. 117, **043001 (2016)**

NPL/ALAMY

CONSERVATION

Farmed salmon go wild

Norway's wild salmon owe part of their genetic make-up to escapees from salmon farms, which could compromise the fitness of the wild population.

Wild Atlantic salmon (*Salmo salar*; pictured) are more genetically diverse and generally better adapted to the environment than are their farmed counterparts. Sten Karlsson and his colleagues at the Norwegian Institute for Nature Research in Trondheim looked at genetic markers in 21,562 wild salmon from 147 locations around Norway. They found significant genetic material from farmed salmon in wild fish from about half of these locations, with the average wild population showing 6% farmed genetic heritage. In some locations, this rose to 42%.

Wild populations in areas with many salmon farms contained higher levels of farmed salmon DNA than did those in regions with less farming. Managers of both wild and farmed animals should work to minimize mating between the two populations, the authors say.

ICES J. Mar. Sci. **http://doi.org/bm6j (2016)**

EXERCISE PHYSIOLOGY

Ketones alter metabolism

Athletes' physical endurance can be enhanced by drinking ketones — biochemical fuel normally produced during starvation.

Fasting or prolonged exercise drives liver cells to make ketone bodies as a fast-acting fuel to help tissues cope with the energy deficit. To test the effect of these molecules on exercise metabolism, Pete Cox at the University of Oxford, UK, and his colleagues gave endurance athletes a drink containing ketones. They found that after a prolonged period of cycling, the metabolism of those who consumed ketones had shifted so that they conserved glucose and burned more fat than those who did not receive ketones. In a 30-minute time trial done after one hour of cycling, athletes who had consumed ketones and carbohydrates cycled more than 400 metres further, on average, than those who had eaten only carbohydrates.

Cell Metab. **http://doi.org/bm8z (2016)**

ANIMAL BEHAVIOUR

Humpbacks to the rescue

Humpback whales come to the assistance of other species by harassing the killer whales that are attacking those animals.

Robert Pitman at the Southwest Fisheries Science Center in La Jolla, California, and his colleagues reviewed reports of 115 interactions between humpback whales (*Megaptera novaeangliae*) and killer whales (*Orcinus orca*). In at least 31 cases, humpbacks approached and 'mobbed' killers as the killers attacked or fed — mostly on sea lions, seals and other whale species.

The authors suggest that the