

as trilobites may have crawled up on to tidal flats.

Fossils found by Gabriela Mángano at Canada's University of Saskatchewan and her colleagues in rock deposits from ancient tidal flats reveal that trilobites took to the land during the Cambrian explosion some 540 million years ago, when the number of animal species increased drastically.

The team discovered the fossils along with fossilized tracks in rocks from the US Appalachian Mountains. The rocks also showed signs of cracks from periodic drying, hinting that they originated in a tidal flat zone.

The finding supports the idea that terrestrial creatures evolved from marine rather than freshwater ancestors. Intertidal zones could have provided food or safe havens for these animals, the researchers suggest.

**Geology** <http://doi.org/qnq> (2013)

#### METABOLISM

## How exercise benefits the body

A small molecule produced by muscles in response to exercise boosts metabolism in other tissues.

Robert Gerszten of Massachusetts General Hospital in Boston and his colleagues discovered the molecule, BAIBA, when they forced muscle cells to express the metabolic regulator PGC-1 $\alpha$  — levels of which increase with exercise. BAIBA levels increased in exercising mice. In animals treated with BAIBA, white fat tissue showed greater expression of genes linked to calorie burning, and the mice gained less weight and had better glucose metabolism than untreated mice.

The researchers also found an inverse association in humans between BAIBA levels and heart-disease risk factors — people with more BAIBA in their blood also had decreased cholesterol levels and less

insulin resistance, for instance. BAIBA could be a target for drugs that treat diabetes and other metabolic disorders, the authors say.

**Cell Metab.** 19, 96–108 (2014)

#### CLIMATE CHANGE

## Past warmth drives glacial melting

The world's glaciers will probably continue to shrink over the next decades, irrespective of the magnitude of future warming.

Ben Marzeion at the University of Innsbruck in Austria and his colleagues ran a global glacier model using various twenty-first-century scenarios for greenhouse-gas concentration. They found only small changes in the loss of mass from glaciers under greatly different climate-change conditions.

Projected glacier melting this century is essentially a delayed response to climate changes in the twentieth century, the authors say. The thinning and retreat of glaciers from low-lying areas make them less sensitive to future warmer temperatures, they conclude.

**Cryosphere** 8, 59–71 (2014)

#### MICROBIOLOGY

## Marine bacteria shed tiny sacs

The most abundant photosynthetic bacterium in the oceans casts off many minute pieces of itself every day, amounting collectively to tonnes of material that potentially influences the global carbon cycle.

Many bacterial species release membrane-bound sacs called vesicles, which have not been well studied in natural ecosystems. Sallie Chisholm, Steven Biller and their colleagues at the Massachusetts Institute of Technology in Cambridge discovered vesicles in laboratory cultures of the microbe *Prochlorococcus*, and in samples from

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#### PHYSICS

## Why penguins do the wave

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9 Dec–8 Jan

Physicists have explained how waves of coordinated motion sweep through huddles of male emperor penguins (*Aptenodytes forsteri*; pictured) as they try to keep warm while incubating eggs in the Antarctic.

Daniel Zitterbart and Richard Gerum at the University of Erlangen-Nuremberg, Germany, and their colleagues analysed video recordings of penguin huddles and built a mathematical model to study the waves. The authors found that any penguin taking a step of two centimetres or more within a densely packed huddle can trigger ripples of disturbance as nearby penguins readjust to keep close (but not too close) to each other.

The movements were similar to those seen in traffic jams in which waves begin at the front of the queue and travel backwards. However, in penguin huddles, waves can move in multiple directions from any location.

**New J. Phys.** 15, 125022 (2013)



the Atlantic Ocean.

Analysis revealed that the laboratory vesicles contained proteins, DNA and RNA, and that each *Prochlorococcus* produced two to five vesicles per generation. The authors estimated that the *Prochlorococcus* sacs could be contributing 10<sup>4</sup> tonnes or more of fixed carbon to the ocean carbon cycle each day. Vesicles might serve to decoy attacking viruses away from the bacterium and aid in gene transfer.

**Science** 343, 183–186 (2014)

#### OCEANOGRAPHY

## Sea-level swings get more extreme

The seasonal rise and fall in sea level along the US Gulf coast has grown more pronounced since the 1990s compared with earlier decades, probably

because of warmer summers and colder winters.

Thomas Wahl and his colleagues at the University of South Florida in St Petersburg compared sea-level measurements collected between 1900 and 2011 with atmospheric data for the Gulf of Mexico coastline. They found that typical differences in sea level between summer and winter have increased during the past two decades.

Higher summer sea levels could increase the chances of hurricane-related flooding, and even slight changes in both summer and winter sea levels may affect sensitive ecosystems, the authors say. **Geophys. Res. Lett.** <http://doi.org/qtd> (2014)

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