

# RESEARCH HIGHLIGHTS

Selections from the scientific literature

## PALAEOCLIMATE

### Lake cores support legend of typhoons

Geoscientists have found possible evidence of two typhoons that, according to Japanese legend, wiped out invading Mongol fleets in the years 1274 and 1281.

Jon Woodruff of the University of Massachusetts, Amherst, and his colleagues collected a 2,000-year-old sediment record from a coastal lake on Japan's Kyushu island, where the Mongol attack was aimed. The cores contain flood deposits that show two instances of flooding in the late thirteenth century, which may have come from the pair of 'Kamikaze' typhoons.

Such storms could have been more common at the time, thanks to the presence of an El Niño, which causes changes in temperature and precipitation worldwide.

**Geology** <http://doi.org/xqp> (2014)

## METEOROLOGY

### Lopsided hail hits harder

Hail storms can cause billions of dollars' worth of damage, but until now scientists have known little about the precise mass and shape of hail. A study has found that hailstones that are not perfectly spherical can sometimes travel faster and hit objects with greater force than



spherical hailstones, potentially causing severe damage to homes and cars (pictured).

Andrew Heymsfield of the National Center for Atmospheric Research in Boulder, Colorado, and his colleagues measured nearly 2,300 hailstones that fell across the US Great Plains between 2012 and 2014. Most hailstones were smaller than 3 centimetres in diameter, but those that were bigger tended to be more lopsided than the smaller ones. Calculations suggest that the non-spherical hailstones occasionally hit objects with greater force than would be expected if they were round. The findings could help

to improve weather and hail-damage predictions, the authors say.

**Geophys. Res. Lett.** <http://doi.org/xqq> (2014)

## MOLECULAR EVOLUTION

### How bacteria and host fight for iron

A study of primate and bacterial proteins involved in capturing iron from the blood has revealed an evolutionary arms race in the battle over this important nutrient.

Matthew Barber and Nels Elde at the University of Utah in Salt Lake City focused on transferrin, a protein that

transports iron from the blood into cells. Pathogenic bacteria compete for this mineral by using their own protein, called TbpA, to bind transferrin. The researchers sequenced transferrin from 21 primate species to trace its 40-million-year evolutionary history, and tested the molecules' interactions with TbpA from two common human pathogens. They found specific amino-acid changes in a rapidly evolving region of transferrin that prevent TbpA from binding to it.

They also pinpointed transferrin-binding sites in TbpA that are genetically diversifying under selection,



## ANIMAL BEHAVIOUR

### Fish adopt chemical camouflage

A coral-reef fish can match its scent to the odour of the surrounding reef, masking itself from predators.

Harlequin filefish (*Oxymonacanthus longirostris*; pictured) live around reefs in the Pacific and Indian oceans and feed on particular species of coral. A team led by Rohan Brooker at James Cook University in Queensland, Australia, tested whether aquarium-dwelling fish conceal themselves by emitting a scent that is similar to those generated by the corals that they consume. The authors found that when

they exposed species of coral-inhabiting crabs to the odour of fish that ate that same coral species, the crabs preferred those fish to animals that ate another coral. This suggests that the filefish's diet influences its scent.

Moreover, a filefish predator, cod, had difficulty detecting the fish when they were near the coral on which they were fed. The study provides the first evidence for chemical-based camouflage in a vertebrate.

**Proc. R. Soc. B** <http://dx.doi.org/10.1098/rspb.2014.1887> (2015)