

## ATMOSPHERIC SCIENCE

### High-energy flashes in the sky

High-frequency electromagnetic flashes, once thought to be rare, may go off regularly alongside lightning in the atmosphere.

In 1994, physicists discovered flickers of  $\gamma$ -rays associated with lightning storms, but had seen relatively few of them. A team led by Nikolai Østgaard at the University of Bergen, Norway, looked for more of these terrestrial  $\gamma$ -ray flashes in data taken by the Reuven Ramaty High Energy Solar Spectroscopic Imager satellite in 2006 and 2012.

The researchers found nearly 200 flashes; these may be more common, and release more energy into the atmosphere, than scientists had suspected.

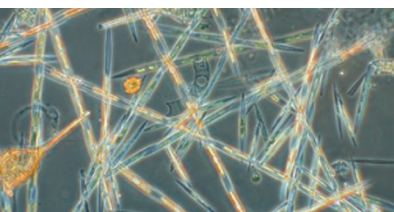
**Geophys. Res. Lett.**  
<http://doi.org/97g> (2015)

## ECOTOXICOLOGY

### Toxin clouds sea-lion memory

Toxic algal blooms could be impairing the memory and navigation of California sea lions (*Zalophus californianus*), possibly interfering with how they forage.

Domoic acid is a naturally occurring neurotoxin that is released by certain algae (such as *Pseudo-nitzschia* species, pictured). It is known to damage the hippocampus, a key memory centre in the brain, but its effects on



THOMAS MANGELSEN/MINDEN PICTURES/FLPA

## ANIMAL BEHAVIOUR

### Female elephants inherit social roles

Female elephants fill their mothers' social roles after a matriarch dies, making pachyderm networks resilient to the effects of poaching.

African elephants (*Loxodonta africana*) are organized in family groups of females, which are linked together to form 'bond' groups and loosely affiliated clans. Shifra Goldenberg at Colorado State University in Fort Collins and her team analysed the animals' female social networks in Kenyan reserves over 16 years.

There was a roughly 70% turnover in adult females from poaching and natural causes, but the overall female-led social structure persisted.

The researchers found that daughters took up their mothers' positions in networks when mothers died, and emulated their patterns of contact with other elephants. This 'network resilience' is postulated by network theory but is rarely observed in nature, the authors say.

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behaviour have been unclear. Between 2009 and 2011, Peter Cook, now at Emory University in Atlanta, Georgia, and his team studied 30 wild sea lions that were undergoing veterinary rehabilitation off the California coast. Using magnetic resonance imaging, the team found that animals with greater neurotoxin damage to the upper right portion of the hippocampus performed worse than animals with less-damaged brains on several spatial memory tasks, such as recalling the location of a bucket of fish.

Because these animals rely heavily on foraging, the toxin

could affect their survival in the wild, the authors say.

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## PALAEONTOLOGY

### Maternal care evolved early

Fossils of a female crustacean — the oldest known example of a female animal with eggs — suggest that parental care is almost as ancient as animals themselves.

Jean-Bernard Caron at the Royal Ontario Museum in Toronto, Canada, and Jean Vannier of Claude Bernard University Lyon in France

report the discovery of 5 well-preserved, 508-million-year-old fossils of the extinct crustacean *Waptia fieldensis*, with remnants of embryos visible. The specimens showed that *Waptia* carried broods of around 24 large eggs, each measuring up to 2.5 millimetres across, in a crevice between the body and the shell. The shell may have helped parental care to evolve by providing a safe environment to incubate eggs.

The findings suggest that parental care appeared less than 50 million years after the evolution of animals.

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