RESEARCH HIGHLIGHTS

Selections from the scientific literature

NEUROSCIENCE

Pups' smell tunes mum's hearing

The smell of their pups alters the neural responses of lactating female mice, making the mothers more sensitive to pup sounds.

Adi Mizrahi and his colleagues at the Hebrew University of Jerusalem in Israel recorded the activity of single neurons in the primary auditory cortex of female mice. They found a more variable neuronal firing rate in lactating mothers exposed to pup odours than in lactating animals exposed to nesting materials or in virgin females. In an experimental test of maternal behaviour, both mothers and virgins with experience of pups responded to the cries of pups that had strayed from the nest and retrieved them, whereas naive virgins did not. Furthermore, the auditory neurons of females that had interacted with pups were more sensitive to certain pup sounds than those of naive females.

Neuron 72, **357–369 (2011)**

INFECTIOUS DISEASE

Antibody beats emerging virus

A human antibody prevents disease in monkeys infected with the deadly Hendra virus. The virus, first identified in 1994, normally sickens horses, but also kills about 60% of humans who become infected.

Christopher Broder at the Uniformed Services University in Bethesda, Maryland, and his colleagues show that a human monoclonal antibody, m102.4, blocks the disease in African green monkeys. These animals provide a model in which the blood-vessel-destroying infection mirrors that in humans. The researchers infected 14 monkeys with lethal doses of the virus. They then infused 12 of the animals with two doses of the antibody, which binds to a viral protein used by the virus to attach to host cells. Monkeys injected 10 and 24 hours after infection remained disease-free; those injected after 72 hours exhibited neurological symptoms, but recovered. The two control monkeys died. The team next plans to test this antibody against the closely related, and even more deadly, Nipah virus.

Sci. Transl. Med. 3, **105ra103 (2011)**

N. NAGALINGUM/SCIENCE/AAAS

EVOLUTION

New origins for old plants

Plants called cycads, which resemble ferns and palms, emerged more than 260 million years ago and are thought to have changed little since. However, today's cycads have more recent roots.

Nathalie Nagalingum at the Royal Botanic Garden Sydney in Australia, Sarah Mathews at Harvard University in Cambridge, Massachusetts, and their team created an evolutionary tree charting the relationships between two-thirds of the world's 300 extant cycad species (one, *Cycas thouarsii*, pictured). The tree, based on genetic data and fossil records, points to a boom in cycad diversity less than 12 million years ago, during the late Miocene.

A shift to more seasonal climates across the globe during this period may have driven cycad diversification by allowing the plants to expand their range, the authors say.

Science **http://dx.doi.org/10.1126/science.1209926 (2011)**

ECOLOGY

Predators can kill by presence alone

No hunting required: simply by being exposed to their prey, predators can prove lethal to them.

Shannon McCauley and her colleagues at the University of Toronto in Canada exposed caged dragonfly larvae (*Leucorrhinia intacta*) to predators, either fish or another dragonfly species. Survival rates of larvae not exposed to predators were 2.5–4.3 times greater than those of larvae that were exposed.

Another experiment focused on larvae attempting to metamorphose into their adult stage — 11% of those that had been exposed to fish died in the process, compared with just 2% of those in a fish-free environment. The authors suggest that increased stress made the exposed dragonflies more vulnerable to other potentially lethal factors.

Ecology 92, **2043–2048 (2011)**

ASTRONOMY

Ice in the outer reaches

A European satellite has detected a reservoir of ice in the dusty outer reaches of a planetary system forming around a nearby ten-million-year-old star.

Michiel Hogerheijde of the Leiden Observatory in the Netherlands and his colleagues analysed data from the Herschel Space Observatory. From these, they identified a thin layer of water vapour that implies the existence of water ice — several thousand Earth oceans' worth — locked in the ice-coated grains of the circumstellar dust disk.

The measured spin characteristics of the hydrogen atoms in the water vapour, which may indicate the location of ice formation, differ from those of watery comets in our Solar System. This suggests that substantial mixing of ice occurs across a planetary disk, which comets then collect during the early stages of planet formation. Comets are thought to be responsible for delivering water to inner-Solar-System planets such as Earth.
Science 334, **338–340 (2011)**

ANIMAL COGNITION

Tools don't make for brainy birds

The ability to use tools is not always a sign, or a driver, of intelligence — certainly not in some Galapagos finches.

Various animals use tools such as twigs to gain better access to food sources. This puts them at an evolutionary advantage, so tool use has long been linked to higher cognitive function. But Sabine Tebbich at the University of Vienna and her colleagues found that tool-using woodpecker finches (*Cactospiza pallida*) are no more adept at a physical task that mimics tool use than non-tool-using individuals of the same species. Furthermore, the closely related small tree finch (*Camarhynchus parvulus*; **pictured**), which never uses tools, performed just as well at physical tasks as tool-using *C. pallida* birds, and failed just one of the learning tasks.

The findings show that physical and cognitive abilities do not always evolve hand-in-hand.
Anim. Behav. 82, **945–956 (2011)**

P. OXFORD/NATURE PICTURE LIBRARY

CANCER BIOLOGY

A sirtuin helps cells divide

Some members of the sirtuin protein family have been implicated in age-related diseases. Researchers now report that one family member, SIRT2, regulates cell division and suppresses tumour formation in mice.

SIRT2 localizes to structures that assist in cell division, but its role in the development of cancer has been unclear. Chu-Xia Deng of the National Institutes of Health in Bethesda, Maryland, and his colleagues found that some human tumours produce abnormally low levels of SIRT2, and that mice lacking the *Sirt2* gene are prone to tumours.

Cells lacking SIRT2 also failed to divide properly: about 35% of *Sirt2*-mutant cells grown in culture had an abnormal number of chromosomes. Lack of SIRT2 reduced the activity of a complex of proteins called APC/C, which is vital for correct apportioning of chromosomes into dividing cells.
Cancer Cell 20, **487–499 (2011)**

NEUROSCIENCE

New neurons detail memories

Neurons are constantly being born in the adult hippocampus, a region of the brain central to memory formation, but whether they have a role in the making of new memories has been unclear.

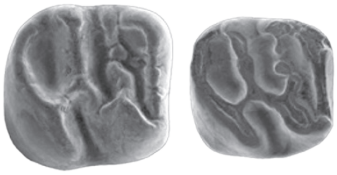
Paul Frankland at the Hospital for Sick Children in Toronto, Canada, and his colleagues identified a way to target these new neurons in mice — by genetically manipulating the animals so that an injection of a natural toxin would kill the cells. The authors trained the mice on a memory task, then administered the chemical. The animals' memories faded, but did not disappear completely. For example, a mouse could still remember that a hidden platform was near a patterned visual cue — just not which pattern. The results suggest that adult-generated neurons are essential to the finer details of memory.
J. Neurosci. 31, **15113–15127 (2011)**

PHYLOGENETICS

From Africa to Amazonia

Fossil teeth from South America's oldest known rodents reveal that the creatures probably originated in Africa, roughly 40 million years ago.

Because South America has a paucity of fossils older than 34 million years, the origins of the continent's rodents, including guinea pigs and chinchillas, have been debated. Pierre-Olivier Antoine at the University of Montpellier in France and his colleagues analysed the small, 41-million-year-old fossil teeth (**pictured**) from the Peruvian Amazon and found strong similarities with the teeth of the rodents' Old World relatives. These animals were probably among the first to adapt to South American habitats and it is likely that their last common ancestor came from Africa, which served as a stopover during the ancestors' dispersal from Asia.
Proc. R. Soc. B **http://dx.doi.org/10.1098/rspb.2011.1732 (2011)**



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MATERIALS

Wipe-on water repellent

HIGHLY READ on pubs.acs.org in September

From non-stick pans to waterproof jackets, water-repellent materials are in high demand. But many of the processes used to deposit hydrophobic coatings are expensive and complicated.

Yong-Lai Zhang at Jilin University in Changchun and Feng-Shou Xiao at Zhejiang University in Hangzhou, both in China, and their colleagues have created a hydrophobic chalk made of nanoporous polydivinylbenzene that can be easily wiped or painted onto surfaces. The porous structure renders the material's surface rough and reduces its contact with water droplets, making the material hydrophobic.

The team tested their coating by applying the fine powder to paper, a piece of silicone and human skin. Fingers smeared in the chalk and dipped in water remained dry. The group speculates that the substance could be used by swimmers to reduce drag or for various industrial applications.
Langmuir 27, **12585–12590 (2011)**

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