

PLANETARY SCIENCE

Titan's sea is super salty

Saturn's largest moon, Titan, has a buried ocean that is saltier than many seas on Earth.

Titan, with its thick atmosphere and bodies of surface liquid, is of great interest to scientists looking for life beyond Earth. A team led by Giuseppe Mitri, of the National Institute of Astrophysics in Rome, looked at gravity and elevation measurements taken by NASA's Cassini spacecraft over more than a decade.

The scientists calculated that Titan's icy outer shell is less than 100 kilometres thick and is in the process of freezing and growing thicker. They also calculated that the underlying water is about as dense as the Dead Sea, probably because of high concentrations of sulphur, potassium, sodium and other salts, the authors say.

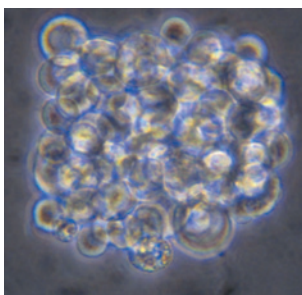
Icarus 236, 169–177 (2014)

CANCER

Roving tumour cells tracked down

Cancer cells in the blood can now be isolated and studied in culture, opening up the possibility of personalizing treatment strategies.

Tumours shed small amounts of cancer cells into



the bloodstream, but it has been difficult to isolate and grow these cells. Shyamala Maheswaran and Daniel Haber of Massachusetts General Hospital in Boston and their colleagues developed an improved microfluidic system that filters out normal blood cells, leaving tumour cells unharmed.

The team used the device to harvest circulating tumour cells from the blood of patients with advanced breast cancer. These were then grown in culture (pictured) and sequenced to reveal key mutations in certain cancer genes. The researchers also

tested the cells' sensitivity to various drugs.

With further improvements, the technique could one day be used to guide therapy, the authors say.

Science 345, 216–220 (2014)

ECOLOGY

Ocean reserves miss key target

Marine reserves may not be protecting the world's most vulnerable reef-fish communities.

Marine protected areas exist mainly in regions with a large number of different fish species. Valeriano

Parravicini at the Centre for the Synthesis and Analysis of Biodiversity in Aix-en-Provence, France, and his colleagues mapped the ranges of more than 6,000 species of tropical reef fishes and quantified the sensitivity of these species to human threats.

They found that areas where species are vulnerable to extinction do not often overlap with protected regions of high species richness. For example, seas off the coast of Chile and the eastern Atlantic were areas of high vulnerability, but species-rich hotspots are centred around Indonesia and Australia.



AGRICULTURE

Global warming could hurt crops

The warming climate could put food supplies at risk over the next decade or two.

Using various combinations of climate models, David Lobell at Stanford University, California, and Claudia Tebaldi at the National Center for Atmospheric Research in Boulder, Colorado, compared expected yields of maize (corn) and wheat growing under natural

climate variations to projected yields influenced by human-induced climate change. The results suggest that with climate warming, the risk of losing 10% or more of the global wheat yield over the next two decades increases tenfold, to a 1 in 20 chance. For maize, the risk increases by 20 times, to a 1 in 10 chance.

Environ. Res. Lett. 9, 074003 (2014)

More marine areas need to be protected to maintain tropical fish biodiversity, the authors say.

Ecol. Lett. <http://doi.org/tn4> (2014)

NEURODEGENERATION

Antibodies fight Parkinson's

Antibodies that target a protein associated with Parkinson's disease reverse some symptoms in a mouse model of the neurodegenerative disorder.

In the brains of patients with Parkinson's, the α -synuclein protein clumps together and spreads between cells. Eliezer Masliah at the University of California, San Diego, and his colleagues made various antibodies that bind to one end of the protein, and injected them into transgenic mice that overexpress α -synuclein. Some of the antibodies reduced the accumulation of α -synuclein in the animals, improved their memory and movement, and, in cell culture, reduced the spreading of α -synuclein between cells.

By binding to one end of α -synuclein, the antibodies prevent the protein from aggregating and propagating, the authors suggest.

J. Neurosci. 34, 9441–9454 (2014)

APPLIED PHYSICS

Phone powers electronic label

A small electronic device that is powered by wireless signals from mobile phones could one day be used to label and connect a wide range of products to the Internet.

A team led by Magnus

Berggren at Linköping University and Göran Gustafsson at Acreo Swedish ICT, both in Norrköping, Sweden, developed a printed, flexible silicon diode with a small antenna that picks up the signal emitted by a nearby phone during a call. The diode then converts the signal to a current that powers a display (pictured).

Electronic labels that can communicate with web-connected devices could be important for a future 'Internet of things', in which ubiquitous objects such as sensors and appliances can be controlled through the Internet.

Proc. Natl Acad. Sci. USA <http://doi.org/tnz> (2014)

VISION

Prism of the eye guides light

A group of cells in the retina splits white light and channels specific wavelengths to light sensors to improve daytime vision.

Amichai Labin, Ido Perlman and their colleagues at the Technion Israel Institute of Technology in Haifa used a computer model to study the role of Müller cells, which funnel light towards light-sensitive cells in the human retina.

The team found that Müller cells concentrate green and red light onto the daytime-light-sensing cones, increasing by up to ten times the amount of light they absorb than if Müller cells were absent. Blue light, however, leaks out of Müller cells towards rod cells, which enable night vision. Imaging experiments on isolated guinea-pig retinas largely confirmed the model's results.

The findings could explain how light is able to travel efficiently through various cellular layers in the retina to reach the cone cells. *Nature Commun.* 5, 4319 (2014)

SOCIAL SELECTION

Popular articles on social media

Bigfoot sighted on Twitter

Researchers had some fun on social media with a rare appearance of Bigfoot in the scientific literature. A team led by geneticist Bryan Sykes at the University of Oxford, UK, ran DNA tests on 30 hair samples reputed to come from "anomalous" primates, including Bigfoot and the Himalayan yeti. As it turned out, the origins of the hairs could be explained without invoking any elusive hominins. Malcolm Campbell, a cell biologist at the University of Toronto, summed up the paper in his tweet: "Cows, and horses, and bears, oh my. 'Bigfoot' & 'Sasquatch' samples come from extant mammals." And plant scientist David Baltrus of the University of Arizona in Tucson tweeted: "That clump of Bigfoot hair you found outside your cabin ... yeah, prolly not Bigfoot."

Proc. R. Soc. B. 281, 20140161 (2014)



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VIROLOGY

What makes HIV fit to spread

HIV isolated from newly infected people tends to have certain genetic variations that help it to thrive in its new host.

When HIV-1 spreads from one heterosexual partner to another, a single viral variant typically takes hold. To determine if these successful viruses share any traits, a team led by Jonathan Carlson at Microsoft Research in Redmond, Washington, and Eric Hunter at Emory University in Atlanta, Georgia, analysed viral genetic diversity in 137 heterosexual pairs shortly after HIV transmission from one partner to the other.

The viruses that established infection tended to have the same genetic mutations that boost fitness — for instance by improving the stability of the virus's proteins.

Drugs or vaccines that drive the selection of even slightly less fit HIV variants could prevent new infections, even

when the virus is transmitted, the researchers say. *Science* <http://doi.org/tpc> (2014)

COGNITION

Chimp intelligence partly inherited

Genetics could explain about half of the intelligence of chimpanzees.

William Hopkins and his colleagues at Georgia State University in Atlanta used a battery of tests to measure the intelligence of 99 chimpanzees aged 9 to 54 years old. A statistical analysis revealed a correlation between the animals' performance on these tests and their relatedness to other chimpanzees in the study. About half of the difference in performance between individual apes was genetic.

The findings could lead to the discovery of genes linked to intelligence, the authors say. *Curr. Biol.* <http://doi.org/tn3> (2014)

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