

# RESEARCH HIGHLIGHTS

Selections from the scientific literature

## ASTROPHYSICS

### Cosmic boost reveals dim galaxy

Astronomers have spied the faintest object ever seen in the early Universe.

Leopoldo Infante at the Pontifical Catholic University of Chile in Santiago and his team used NASA's Hubble and Spitzer space telescopes to study distant objects. They examined sections of the sky through a dense cluster of galaxies, which bends and magnifies incoming light, and found 22 faint galaxies. The oldest one was observed as it was 13.4 billion years ago, around 400 million years after the Big Bang.

The small, dim galaxy was named 'Tayna, meaning 'firstborn' in the Native South American language Aymara. It may be more representative of the first galaxies than other distant, brighter examples, say the authors.

*Astrophys. J.* 815, 18 (2015)

## GENOMICS

### Missed mutations in cancer genomes

A comparison of cancer-genome sequences produced by 18 different research teams reveals that less than half of cancer-linked mutations were identified by all the groups. This suggests that differences in experimental procedures and analysis could reduce the accuracy of cancer-genome sequencing, which is increasingly used in the clinic.

Ivo Gut at Spain's National Centre for Genomic Analysis in Barcelona, together with researchers in the International Cancer Genome Consortium, looked for genetic differences in cancerous and healthy tissue from the same person. They then compared these results



RICHARD WHITCOMBE/ALAMY

## ENVIRONMENTAL SCIENCE

### Ocean plastic piling up fast

Up to 240,000 tonnes of plastic particles are polluting the world's oceans — at least three times more than previous estimates.

Each year, 5 million to 13 million tonnes of plastic ends up in the sea, where it slowly degrades into microplastic particles that threaten marine ecosystems. Erik van Sebille at Imperial College London and his colleagues analysed 40 years of data on plastic collected from surface-trawling

plankton nets — more information than in previous studies. By combining those data with sophisticated ocean-circulation models, they estimated that the oceans contain 93,000–236,000 tonnes of microplastic particles.

This represents just 1% of ocean plastic: the rest lies intact (pictured) on the sea floor or shore, or trapped in marine organisms, the authors suggest. *Environ. Res. Lett.* 10, 124006 (2015)

with a benchmark that used ten times more sequencing data than usual. Out of more than 1,200 single-letter mutations, only 40% were identified by all 18 teams.

DNA preparation and other parameters can be optimized easily to improve sequencing accuracy, the authors say. *Nature Commun.* 6, 10001 (2015)

## GEOPHYSICS

### Rising sea levels alter Earth's spin

Researchers have confirmed that rising sea levels caused by melting glaciers are

slowing Earth's rotation.

As ice melts, it redistributes mass across the planet's surface, slightly changing the rate at which Earth spins. But a 2002 study could not explain the observed rotational changes on the basis of its assumptions about rising sea levels. Now Jerry Mitrovica of Harvard University in Cambridge, Massachusetts, and his colleagues say that they have resolved the problem. They used updated numbers for global sea-level rise, which are lower than those assumed in the 2002 study, and recalculated how the geographic poles have shifted

over the past 3,000 years.

The work improves scientists' understanding of how Earth's rotation has changed in the past, and how rising sea levels might continue to alter it in the future.

*Sci. Adv.* 1, e1500679 (2015)

## ASTRONOMY

### Galaxies caught in cosmic web

Astronomers have discovered eight massive young galaxies within what might be a large web of dark matter.

Ordinary matter, including

galaxies, is thought to have aggregated along threads of dark matter in the early Universe. But the progenitors of today's galaxies are often shrouded in clouds of dust, making it difficult for astronomers to spot them and test this theory.

Hideki Umehata at the European Southern Observatory in Garching, Germany, and his colleagues used the high-resolution Atacama Large Millimeter/submillimeter Array in Chile to make detailed observations of a narrow slice of the sky. They compared their results with previous surveys of the region to find the galaxies, which were more than 3.4 billion parsecs (11 billion light years) away and producing hundreds of millions of new stars each year. The study supports the idea that big galaxies form in areas with a high concentration of dark matter.

*Astrophys. J. Lett.* 815, L8 (2015)

## OCEAN SCIENCE

## Possible pause in Arctic sea-ice loss

An expected slowdown of large-scale heat circulation in the Atlantic Ocean could temporarily halt the decline of Arctic sea ice (pictured).

Stephen Yeager at the National Center for Atmospheric Research in Boulder, Colorado, and his colleagues used an Earth-system model to analyse the causes of decadal trends in sea-ice extent in the North Atlantic. They found that the drastic retreat of sea ice since 1990 coincided with a strong Atlantic circulation



RAGNAR TH. SIGURDSSON/ARCTIC IMAGES/ALAMY

that brought warm surface water from the tropics to high latitudes. If this circulation were to weaken, as observations suggest that it will, less heat arriving in the Arctic Ocean will probably lead to a pause in winter sea-ice loss over the next 5 to 10 years, the authors conclude.

They add, however, that the rate of sea-ice melting could jump back up afterwards as global warming continues. *Geophys. Res. Lett.* <http://doi.org/9wz> (2015)

## EVOLUTION

## How birds spread around the globe

The common ancestor of all modern birds lived in South America some 95 million years ago.

Birds inhabit every continent, and are among the most diverse vertebrate groups on Earth. To chart birds' rise and spread, Santiago Claramunt and Joel Cracraft at the American Museum of Natural History in New York created an evolutionary tree based on DNA sequences from 230 bird species and fossil records for 130 extinct species.

They found that bird diversity expanded rapidly after the demise of dinosaurs some 66 million years ago, dispersing along two primary routes. From South America, birds moved into North America, spread to Eurasia through the Arctic and then on to Africa. Birds arrived in Australia by way of Antarctica. *Sci. Adv.* 1, e1501005 (2015)

## MATERIALS

## Electrons dance in pulled graphene

Stretching an atom-thick strip of carbon could mimic the effects of a magnetic field, changing the behaviour of electrons so that the effect is 100 times stronger than that from normal magnets.

Teng Li at the University of Maryland in College Park and his colleagues calculated

## SOCIAL SELECTION

Popular topics on social media

## Deleting journal names triggers debate

Michael Eisen has long argued that research papers should be judged on the basis of their content, not on which journal they were published in. On 6 December, Eisen — a biologist at the University of California, Berkeley, and co-founder of the open-access publisher PLOS — decided to prove his point. He revamped his laboratory's website and announced on Twitter: "Made a new lab website — completely scrubbed any mention of journal titles — <http://www.eisenlab.org/publications.html>." A few other scientists followed suit, and one even went a step further. Plant geneticist Jeffrey Ross-Ibarra at the University of California, Davis, tweeted: "Following @mbeisen, removed journal names from website. But also links to cites, almetrics, [sic] & preprints. <http://www.rilab.org/pubs.html>." Others were sceptical. Manolis Dermitzakis, a geneticist at the University of Geneva, Switzerland, posted: "I don't see the point. The paper is published in a journal so this is just artificial. Or publish your papers on your website only."

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how to engineer the large pseudomagnetic fields that are produced when graphene is pulled from two ends. This strains bonds between carbon atoms, causing their electrons to move in a way that is similar to what happens in a magnetic field. The team found that a small tug (of up to 15% stretch) on certain shapes of graphene strip could produce a strong, nearly uniform field.

The designer shapes could help researchers to study the properties of graphene under extreme conditions — such as large magnetic fields — that are usually unattainable, the authors say.

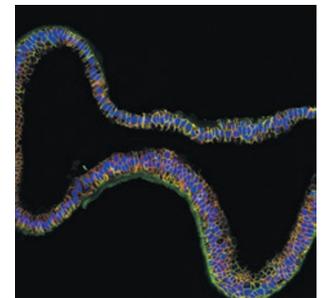
*Phys. Rev. Lett.* 115, 245501 (2015)

## DEVELOPMENTAL BIOLOGY

## Mini Fallopian tubes in a dish

Human Fallopian tubes contain adult stem cells that, when grown in the lab, can form miniature 3D structures resembling Fallopian tubes (pictured).

Thomas Meyer at the Max Planck Institute for Infection Biology in Berlin and his



colleagues isolated cells from human Fallopian-tube samples and grew them in 3D cultures. Two weeks later, they saw mature 'organoids' that had folds in the tissue, hair-like structures called cilia, and secretory cells — all characteristics of the Fallopian tube. The organoids were stable for more than 16 months and sensitive to the hormones oestradiol and progesterone.

The organoids could be used to study tube pathology and certain types of ovarian cancer that are thought to originate in the Fallopian tubes, the authors say.

*Nature Commun.* <http://doi.org/9wr> (2015)

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