



Science, Technology and Education News from Australia, February 2014

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1. Technology

Atomic clocks detect physics shifts

(February, 18, 2014)

A new class of super-accurate atomic clocks may detect minuscule changes in the laws of physics and shed light on how and why life exists in the universe, Sydney physicists have found. Andrew Ong and his collaborators at the University of New South Wales discovered that the clocks could detect potential changes in a fundamental constant that governs the interaction between electrically charged objects. "A changing fine-structure constant could explain why the conditions of our universe are so finely-tuned for all life to exist," says Andrew, who did the research as part of his PhD. "The value of the certain physical constants have to fall within a narrow range in order for carbon to be produced in stars. Without this mechanism, there would be no building blocks for all carbon-based life on our planet," he says.

To read the full article click [here](#).

Study impacts design of shoes

(February, 13, 2014)

New insights into how foot muscles support the arch of the foot could spark a change in the design of running shoes, following a study led by The University of Queensland. The study's findings are also expected to impact the treatment of foot conditions, the design of efficient prosthetic and robot limbs and improve understanding of how humans came to walk and run efficiently on two feet. Dr Glen Lichtwark at UQ's School of Human Movement Studies said the importance of muscles in moving a person's legs was already well-known, but muscles in the foot had been deemed less important.

To read the full article click [here](#).

H Batteries soon reality

(February, 06, 2014)

Researchers have developed a concept hydrogen battery based simply on storing protons produced by splitting water. The concept advances the potential for hydrogen to replace lithium in battery-powered devices. The novel concept developed by researchers at RMIT University advances the potential for hydrogen to replace lithium as an energy source in battery-powered devices. The proton flow battery concept eliminates the need for the production, storage and recovery of hydrogen gas, which currently limit the efficiency of conventional hydrogen-based electrical energy storage systems. Lead researcher Associate Professor John Andrews, from RMIT's School of Aerospace, Mechanical and Manufacturing Engineering, said the novel concept combined the best aspects of hydrogen fuel cells and battery-based electrical power.

To read the full article click [here](#).

One way light to advance communication

(February, 03, 2014)

An international team of researchers has combined fundamental ideas of quantum mechanics with modern optical technology to take light on a one-way trip for the first time. The physics breakthrough, which works in a similar way to one-way sunglasses – the person wearing the glasses can see out, but others can't see in – was published in *Nature Communications* on Thursday 30 January. Lead author Dr Enbang Li, from the University of Wollongong's School of Physics, said the results pointed to new possibilities to control and manipulate light, which could have various critical applications in defence, sensing, and telecommunications in the future.



“Through normal optical materials (like glass, water or Perspex) and optical systems (like the rear view mirrors in your car), if I can see you, then you can also see me. This is because that the above mentioned materials and systems are reciprocal (like a two-way road),” Dr Li said.

To read the full article click [here](#).

2. Life Science

Time to exercise a little bit more

(February, 20, 2014)

New guidelines on physical activity that double the levels previously recommended are a “wake up call” for Australians, the lead author says. Director of The University of Queensland’s Centre for Research on Exercise, Physical Activity and Health (CRExPAH), Professor Wendy Brown, is the lead author of the new guidelines released on Tuesday by the Australian Government Department of Health.

The new Australian physical activity guidelines recommend adults should be completing between 150 and 300 minutes of physical activity per week, twice the amount of the previous government recommendations. The guidelines draw on research which suggests that while the previous recommendation of 150 minutes per week of moderate activity was sufficient for general health benefits, a higher level is needed to prevent weight gain and some cancers.

To read the full article click [here](#).

Ancient immune Systems

(February, 12, 2014)

The immune systems of crocodiles and alligators have remained relatively unchanged for centuries despite their worldwide distribution, as revealed for the first time by University of Sydney researchers. This new knowledge could assist in the conservation and breeding strategy of Australian freshwater and saltwater crocodiles.

Dr Jaime Gongora, research project leader from the University of Sydney’s Faculty of Veterinary Science said “Alligators and crocodiles occupy an evolutionary mid-point between mammals and birds so they provide a unique link. Our research helps address fundamental questions about how evolution drives and maintains genetic diversity of the immune genes.”

To read the full article click [here](#).

Ancient DNA reveals Ice Age Diet

(February, 09, 2014)

A consortium of research groups, including one from University of Wollongong, has helped to create a fuller and more complete picture of the vegetation that existed across the Arctic during and after the last Ice Age and its role in the extinction of ancient megafauna, such as the iconic woolly mammoth. The results of this study are published in the latest edition of *Nature*, highlighting the last 50,000 years of changes in plant life and megafauna diet across the Arctic.

By examining DNA samples from ancient plants and animals, the contributing teams of scientists have helped determine that the protein-rich herbaceous plants, or forbs, that were once plentiful across the Arctic were massively reduced during the coldest part of the last Ice Age, 25,000 to 15,000 years ago. The loss of these forbs, which were a staple food for large creatures such as woolly mammoths, woolly rhinoceros and horses, never recovered afterwards, leaving instead a landscape dominated by low protein grasses, which contributed to the extinction of these giant animals.

To read the full article click [here](#).



The social side of lizards

(February, 07, 2014)

One of the first studies conducted on young reptiles reared without contact with their siblings is challenging the assumption that only mammals and birds are shaped by social interactions.

"Our results demonstrate that rearing these animals in different environments strongly affects their social development," said Cissy Ballen, a PhD candidate in the University of Sydney's School of Biological Sciences and lead author of the paper published in *Animal Behaviour*.

"These chameleons catch insects using a 'ballistic' rapid fire tongue movement and use dramatic colour changes to signal dominance. The lizards raised in isolation were more submissive, were slower at attacking certain food and displayed darker and duller colours than those raised with their siblings."

To read the full article click [here](#).

Shivering burns fat

(February, 05, 2014)

Shivering against the cold may have the added benefit of burning body fat, a new study led by a University of Queensland researcher has found. The study, which determined the role of hormones in regulating how humans respond to cold, showed that shivering caused the body to secrete hormones that transform ordinary white fat into fat-burning brown fat. Dr Paul Lee, who led the study, is a UQ/National Health and Medical Research Council-funded endocrinologist and visiting fellow at the National Institutes of Health (NIH) in the United States. "Unlike ordinary white fat, which primarily stores excess calories, brown fat may actually help the body burn calories when activated," Dr Lee said.

To read the full article click [here](#).

Rattlesnake has localised venom

(February, 03, 2014)

A surge in snakebite deaths caused by one of North America's most dangerous snakes has been baffling doctors, but new research may hold the key to saving lives. A study of Southern Pacific Rattlesnake venom, led by The University of Queensland's Associate Professor Bryan Fry, has found that by knowing the location where a person was bitten, doctors are better equipped to offer life-saving treatment.

"If clinicians know where a person was bitten, they will know how the patient is likely to be affected," Dr Fry said.

"These snakes live in habitats as diverse as the isolated Catalina Island, the high-altitude San Jacinto mountains, the grassy hills of Loma Linda and the desert transition zone of Phelan. "In a two-hour drive from the desert floor to the top of the San Jacinto Mountains, the venom goes from destroying the blood to frying the nerves instead.

To read the full article click [here](#).

3. Health Care / Biology

High chlamydia in Aussie men

(February, 18, 2014)

The largest Australian chlamydia study to date, led by the University of Melbourne, has found more men contract chlamydia than previously thought and most cases of infection are being missed. The pilot study published in the *Medical Journal of Australia* today detailed chlamydia prevalence in 4284 patients attending 134 general practices around Australia, via direct questionnaire and chlamydia tests.



Lead researcher Associate Professor Jane Hocking from the University of Melbourne's School of Population and Global Health said the research involved the largest sample of men to date and highlighted the need to better monitor rates of chlamydia in men. "We all know that women must be targeted for chlamydia testing, but our results show there is a lot of chlamydia in men so any chlamydia control intervention must also include men."

To read the full article click [here](#).

Overweight don't live longer

(February, 17, 2014)

Australian National University-led research has busted the myth that overweight people live longer than people with a lower body mass index (BMI). The research examined the way in which data were analysed in a range of studies, some of which had suggested that overweight people can actually live longer and others which had suggested the contrary. The new study published in the peer-reviewed online journal *PLOS ONE* provides direct evidence as to why some studies can come up with apparently different results.

To read the full article click [here](#).

Mind-body therapy aids diabetics

(February, 04, 2014)

A University of Queensland study has shown ancient Chinese mind-body movement therapy could offer dramatic health benefits for people with chronic conditions such as diabetes or obesity. The study examined whether adults with diabetes or at risk of type 2 diabetes could improve their health by undertaking the SMILE Wellness program, a low-impact gentle mind-body movement therapy based on Tai Chi and Qigong. Researcher Dr Xin Liu, from UQ's School of Medicine, said the study results were encouraging. "The therapeutic program resulted in many health benefits for participants, including reduced blood sugar, blood pressure, body weight and waist circumference," Dr Liu said.

To read the full article click [here](#).

Study: quick exercise best for heart

(February, 03, 2014)

A University of Queensland study has found high-intensity short-duration exercise provides better results than the recommended 30 minutes of daily exercise. Researchers are looking at the benefits of high intensity interval training as the most effective way of reducing the risk of heart disease in people with metabolic syndrome. Metabolic syndrome, suffered by 30 per cent of the Australian population, involves a combination of being overweight or obese and having either high blood pressure, high cholesterol or diabetes. Professor Jeff Coombes at UQ's School of Human Movement Studies said the trial was in early stages; but results had been promising. "Out of the 25 participants who have taken part in the high intensity exercise program, seven no longer have metabolic syndrome," Professor Coombes said.

To read the full article click [here](#).



4. Physics / Astronomy

Martian crystals could support life

(February, 25, 2014)

Evidence of life on Mars may have drawn one step closer after geological scientists discovered how water and nutrients could be found on the red planet. Siobhan Wilson, of Monash University, has collaborated with America's Indiana University to find that water-bearing crystals on the planet's surface can produce water and help release nutrients, supporting the possibility that minerals could sustain life beyond Earth. "Some types of salt minerals found in Martian soil can dissolve in the atmosphere if it's humid enough – this is the same process that makes table salt sticky on summer days," says Siobhan, a lecturer at Monash University, who conducted this research with David Bish at Indiana University.

To read the full article click [here](#).

Oldest known star discovered

(February, 10, 2014)

A team led by astronomers at The Australian National University has discovered the oldest known star in the Universe, which formed shortly after the Big Bang 13.7 billion years ago. The discovery has allowed astronomers for the first time to study the chemistry of the first stars, giving scientists a clearer idea of what the Universe was like in its infancy. "This is the first time that we've been able to unambiguously say that we've found the chemical fingerprint of a first star," said lead researcher, Dr Stefan Keller of the ANU Research School of Astronomy and Astrophysics. "This is one of the first steps in understanding what those first stars were like. What this star has enabled us to do is record the fingerprint of those first stars."

To read the full article click [here](#).

Earth's crust tells a different story

(February, 07, 2014)

Provocative new research published this in the journal *Geology* suggests that oceanic plate subduction was operating from the earliest times in Earth's history, meaning conditions for the formation of life may have existed up to a billion years earlier than generally thought. These findings came from a team of Australian researchers, who analysed similarities between modern-day subduction zones near Japan and early-Earth rock sequences from Quebec, Canada. Subduction is a process whereby an oceanic plate descends beneath another plate (a characteristic of modern plate tectonics). Lead author, Macquarie University's Professor Simon Turner says, "Modern subduction settings, such as the Mariana arc, have all the right chemical ingredients to grow and sustain primitive life forms."

To read the full article click [here](#).

5. Environment and Climate Change

New map shows climate shifts

(February, 11, 2014)

An international team of scientists has produced global maps showing how fast and in which direction local climates have shifted. In research published in the journal *Nature*, CSIRO and an international team of scientists revealed global maps showing how fast and in which direction local climates are shifting. This new study points to a simpler way of looking at climatic changes and their likely effects on biodiversity. As climate change unfolds over the next century, plants and animals will need to adapt or shift locations to track their ideal climate. "The maps



show areas where plants and animals may struggle to find a new home in a changing climate and provide crucial information for targeting conservation efforts,” CSIRO's Dr Elvira Poloczanska said.

To read the full article click [here](#).

Plastic linked to metals in seabirds

(February, 03, 2014)

New research by the University of Tasmania has examined the toxic effects of seabirds ingesting marine plastic pollution and population decline. UTAS' Institute for Marine and Antarctic Studies (IMAS) Research Fellow Dr Jennifer Lavers conducted the study over four years in collaboration with researchers at the Lord Howe Island Museum and Royal Society for the Protection of Birds. The study sampled the breast feathers and stomach contents from Flesh-footed Shearwater fledglings in eastern Australia. Her paper, Plastic ingestion by Flesh-footed Shearwaters (*Puffinus carneipes*): Implications for fledgling body condition and the accumulation of plastic-derived chemicals, has just been published online in the international journal, *Environmental Pollution*.

To read the full article click [here](#).

Fewer but stronger cyclones ahead

(February, 03, 2014)

Researchers from James Cook University in Cairns have confirmed that tropical cyclone activity in both Western Australia and Queensland is at its lowest activity for many centuries. That's the good news from research by post-graduate research student Jordahna Haig, published this week in the science journal *Nature*. The downside is that the findings are in close agreement with several recent studies that predict that climate change will bring a reduction in the number of tropical cyclones, but an increase in their intensity. Ms Haig's findings are based on a study of ancient cyclone records, found in slow-growing stalagmites in limestone caves.

To read the full article click [here](#).

6. Education

New wave of MOOCs about to go live

(February, 24, 2014)

Although the rush to offer massive open online courses (MOOCs) by the world's elite universities is more than two years old, most of Australia's top institutions have been late to the party. But now they are about to turn up. The University of Queensland, the University of NSW, the Australian National University (ANU) and Monash University, all part of the elite Group of Eight, are about to take their first steps in MOOC world. Next week the University of Queensland will launch its first MOOC, *The Science of Everyday Thinking*. This will be followed by three in April, *Hypersonics – from Shock Waves to Scramjets*, *Introduction to Biomedical Imaging* and *Tropical Coastal Ecosystems*. The University of NSW's first MOOC, *Introduction to Systems Engineering*, goes live in April, followed by two more later in the year.

To read the full article click [here](#).

Australians students turn away from accounting

(February, 12, 2014)

The number of Australians studying accounting has fallen 20 per cent since 2001, with foreigners now vastly outnumbering local graduates. The number of international graduates finishing undergraduate accounting degrees skyrocketed by 500 per cent between 2001 and 2012, while the number of local students dropped. By 2012, there



was just one local graduate for every 2.5 international graduates, *The Australian Financial Review* analysis of university course data shows. The lack of interest by local students in accounting comes as the federal government and the peak accounting bodies argue over how hard it is for accountants to get a job. The Department of Employment says there is no shortage of accountants in Australia and has called for accounting to be taken off the Skilled Occupation List for migrants.

To read the full article click [here](#).

Graduates need to upskill to find IT work

(February, 11, 2014)

A combination of under-qualified university graduates and aged workers with outdated skills are exacerbating a shortage of experienced information technology professionals in Australia, with experts warning shortages could spread in the years to come. Technology companies have disputed government statistics that suggest there is no shortage in the industry, with concerns mounting that a 36 per cent decline in undergraduate students taking up computer science degrees since 2001 could see the situation worsen. "There's both a skills shortage and a skills glut simultaneously," said Simon Kaplan, director of skills and industry transformation at National ICT Australia. "We've seen a big shift from the massive, back-end enterprise systems that dominated IT in the '80s, '90s and early 2000s, to a much more fluid and fast-moving kind of technology that uses different kinds of techniques and tools.

To read the full article click [here](#).

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