



Science, Technology and Education News from Australia, March 2014

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1. Technology

Technique to cut cost of lab tests

(March, 17, 2014)

UNSW PhD candidate Ryan Pawell hopes a manufacturing technique he created will cut the cost of medical diagnostics to a few dollars per experiment or test.

Pawell's research includes a technique for making low-cost lab-on-a-chip devices out of plastic, a visual inspection system to ensure the quality and performance of each device made, and an imaging technique for examining how suspended objects like bubbles or cells flow within the devices at over 10,000 frames per second.

The chips contain an array of 40,000 posts that are one-tenth the thickness of human hair. The posts are arranged into channels to separate and route small amounts of fluid to different outlets on the chip.

The chips could be used, for example, to isolate red and white blood cells.

Pawell says there has been "quite a bit of interest" expressed in the manufacturing technique since it was first published in the journal *Biomicrofluidics* in September last year.

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

2. Life Science

Dolphins use sponges as nose guards

(March, 28, 2014)

Dolphins are known for being clever and resourceful, but one particularly interesting population in Shark Bay, Western Australia, is famous for using sponges as nose-guards while foraging. It's a non-genetic behaviour, which means calves learn it from their mothers. But a study by researchers at the University of New South Wales (UNSW) has found that the genetic makeup of the sponge-using dolphins is significantly different to groups that live where sponges don't grow, suggesting the behaviour has actually shaped the population's genes. The research, published in *Proceedings of the Royal Society B*, looks at the dolphins mitochondrial DNA, which is passed down only from the mother, and also indicates that the sponging dolphins are descendants of a "sponging Eve", a female dolphin that first developed the innovation.

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

Brain development gene revealed

(March, 17, 2014)

New research from the University of Adelaide has confirmed that a gene linked to intellectual disability is critical to the earliest stages of the development of human brains. Known as USP9X, the gene has been investigated by Adelaide researchers for more than a decade, but in recent years scientists have begun to understand its particular importance to brain development. In a new paper published online in the *American Journal of Human Genetics*, an international research team led by the University of Adelaide's Robinson Research Institute explains how mutations in USP9X are associated with intellectual disability. These mutations, which can be inherited from one generation to the next, have been shown to cause disruptions to normal brain cell functioning. Speaking during Brain Awareness Week, senior co-author Dr Lachlan Jolly from the University of Adelaide's Neurogenetics Research Program says the USP9X gene has shed new light on the mysteries of brain development and disability.

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



A fresh look at our kidneys

(March, 13, 2014)

Researchers are taking a fresh look at our wonderful blood-cleaning kidneys, in the hope of delaying the need for dialysis for those in the early stages of disease, and to buy time for those seeking a transplant. The CQUniversity Rockhampton researchers are taking a range of novel approaches to their task of delaying the progression of chronic kidney disease (CKD). They will pioneer investigation at the molecular level with a long-term goal of finding ways to modify the expression of genes involved in CKD. They will use human blood samples to track useful and reliable markers of oxidative stress and inflammation. And they will progress animal studies aimed at proving the effectiveness of high intensity exercise interventions. Dr Vincent Dalbo hails from New Jersey and Patrick Tucker was originally from Nashville, but both are now based at CQUniversity laboratories in Rockhampton.

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

Female birds rivals males in song

(March, 07, 2014)

A team of international researchers has found that bird song is almost as common in female birds as in males, overturning long-held theories that bird song was an exclusively male trait. The findings challenge long-held assumptions about sexual selection in birds, and pose new questions about Darwin's theory of sexual selection and the evolution of elaborate bird song. The research, by the University of Maryland, Baltimore County, the University of Melbourne, The Australian National University and Leiden University in the Netherlands, has been published in the journal *Nature Communications*. "Darwin focused on the evolution of song through sexual selection, and assumed birdsong was a male trait to attract females," said report joint author Dr Naomi Langmore, from the Australian National University's Research School of Biology.

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

How flowers speak to birds

(March, 05, 2014)

The research, led by the Monash University School of Biological Science Associate Professor Martin Burd, and published in the Proceedings of the Royal Society B, used mathematical models of bird vision to represent the colours of Australian flowers as birds themselves perceive colours. Professor Burd, together with a team of biologists from Monash and RMIT universities in Melbourne and Bucknell University in the US, then used new statistical techniques to show that a small range of novel colors evolved among bird-pollinated flowers far more often than would occur by chance. In the study, Professor Burd and his colleagues measured the spectral reflectance of flowers (the wavelengths of light reflected back from petals) of 234 native Australian species of flowers, consisting of 80 bird-pollinated species and 154 insect-pollinated species. "In our study, we measured these profiles across the ultraviolet and visual wavelengths of light," Professor Burd said.

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

3. Health Care / Biology

Pancreatic cancer, diabetic link

(March, 18, 2014)

Researchers from the University of Melbourne have shown that there is an association between pancreatic cancer and diabetes. In a new study published in *Annals of Surgical Oncology*, clinicians worked with mathematicians to review data from 1973 to 2013 to conclude there was a time-dependent link between being diagnosed with diabetes and pancreatic cancer. A review of 88 international studies to date, is the largest analysis on the topic published.



Dr Mehrdad Nikfarjam, liver, pancreas and biliary specialist from the Department of Surgery at the University of Melbourne said pancreatic cancer was often diagnosed when at an advanced, incurable stage. "This is an important paper that highlights for doctors and in patients with newly diagnosed diabetes without an obvious cause, a diagnosis of underlying pancreatic cancer should be considered," he said.

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

Why C-sections have increased

(March, 12, 2014)

Where a woman gives birth - in a public or private hospital - is a key determinant of whether she has a caesarean section or not, according to findings from three consecutive surveys of more than 14,000 women who had recently given birth in Queensland. Dr Yvette Miller from QUT's IHBI (Institute of Health and Biomedical Innovation) conducted the Queensland Government-funded surveys of different cohorts of women in 2009, 2010 and again in 2012. "Queensland's caesarean rate is the second highest in Australia, after WA, and is rising steadily - 25 per cent in 2001 to 33 per cent in 2011," Dr Miller said. "In Queensland private hospitals almost 50 per cent of births are by caesarean but in the public hospitals it is fewer than 30 per cent. "Obstetric doctors have said this difference is largely driven by the higher number of older women with more risk factors in the private system or more women who want a caesarean." Dr Miller said the results from surveys had shown that was not the case.

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

Alzheimer damages before symptoms

(March, 10, 2014)

The progression of Alzheimer's may slow once symptoms appear and do significant damage, according to a study investigating an inherited form of the disease.

In a paper published in the prestigious journal *Science Translational Medicine*, Professor Colin Masters from the Florey Institute of Neuroscience and Mental Health and University of Melbourne – and colleagues in the UK and US – have found rapid neuronal damage begins 10 to 20 years before symptoms appear.

"As part of this research we have observed other changes in the brain that occur when symptoms begin to appear. There is actually a slowing of the neurodegeneration," said Professor Masters.

Autosomal-dominant Alzheimer's affects families with a genetic mutation, predisposing them to the crippling disease. These families provide crucial insight into the development of Alzheimer's because they can be identified years before symptoms develop. The information gleaned from this group will also influence treatment offered to those living with the more common age-related version. Only about one per cent of those with Alzheimer's have the genetic type of the disease.

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

Understanding our diet

(March, 05, 2014)

Food intake is regulated primarily by dietary protein and carbohydrate, and not by the number of calories consumed, according to the most comprehensive study of macronutrient balance ever undertaken. Conducted by the University of Sydney's ground-breaking Charles Perkins Centre and published in *Cell Metabolism*, the world-first research examines the effects of protein, fat and carbohydrate on energy intake, metabolic health, ageing and longevity in mice. The research demonstrated in mice that calorie restriction, achieved by high protein diets or dietary dilution, has no beneficial effects on lifespan, a phenomenon researchers predict will apply in humans.

While a high protein, low carbohydrate diet resulted in reduced body fat and food intake, it also led to a shorter lifespan and poor cardiometabolic health. By contrast, a high carbohydrate, low protein diet resulted in longer lifespan and better cardiometabolic health, despite also increasing body fat.

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



4. Physics / Astronomy

Aussie lasers to clear space junk

(March, 11, 2014)

Mount Stromlo Observatory will play a lead role in cleaning up space junk under a new \$20 million Cooperative Research Centre (CRC), announced by the Australian Government's Industry Department. The new CRC will help scientists find and track tiny pieces of debris orbiting the Earth, which pose serious risk of collision with satellites, space stations and other space craft, similar to the events portrayed in the Oscar-winning movie Gravity. "There are hundreds of thousands of pieces of space junk in orbit that are big enough to do serious damage to a satellite or space station," said Professor Matthew Colless, Director of the ANU Research School of Astronomy and Astrophysics at Mount Stromlo, on the outskirts of Canberra. "Everywhere humans have been in space, we leave some trash behind. "We now want to clean up space to avoid the growing risks of collisions and to make sure we don't have the kind of event portrayed in Gravity."

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

Strings of galaxies found in “voids”

(March, 11, 2014)

Australian astronomers have shown galaxies in the vast empty regions of the Universe are actually aligned into delicate strings in research published in the *Monthly Notices of the Royal Astronomical Society*. A team of astronomers based at The University of Western Australia node of the International Centre for Radio Astronomy Research (ICRAR) has found short strings of faint galaxies in what were previously thought to be extremely empty parts of space. The Universe is full of vast collections of galaxies that are arranged into an intricate web of clusters and nodes connected by long strings. This remarkably organized structure is often called the ‘cosmic web’, with busy intersections of galaxies surrounding vast spaces, empty of anything visible to us on Earth. “The spaces in the cosmic web are thought to be staggeringly empty,” said Dr Mehmet Alpaslan, who led the research. “They might contain just one or two galaxies, as opposed to the hundreds that are found in big clusters.”

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

Supernovae lighter than expected

(March, 06, 2014)

Astronomers searching for clues about dark energy, the mysterious force that is speeding up the expansion of the Universe, have uncovered new evidence about the nature of supernovae, finding many are lighter than scientists had expected. The findings, from an international team from the Nearby Supernova Factory project, overturn previous understanding of white dwarf stars and raise new questions about how these stars explode. “White dwarfs are dead stars, the corpses of stars that were once like our Sun. They won’t explode on their own – they need another star to help blow them up,” said ANU astronomer Dr Richard Scalzo, who led the latest research. “We now know it’s much easier to blow them up than we used to think.” A supernova is a star that explodes and shines much more brilliantly as it reaches the end of its life.

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



5. Environment and Climate Change

New tool in water hunt on Earth and Mars

(March, 18, 2014)

Scientists are using a promising new theory to track down hidden water both on Earth – where fresh water is becoming dangerously scarce in some regions – and in the quest for life on the red planet, Mars. The latest Earth-based groundwater theories may aid mankind in its quest for water on other planets, says Professor Craig Simmons of the National Centre for Groundwater Research and Training (NCGRT) and Flinders University. Prof. Simmons and his colleagues have been working on a theory that groundwater flows faster when it contains salt, heat, radioactive waste or contaminated liquids from landfills – all of which increase the water's density and hence the speed it travels downwards. "When a heavier groundwater layer sits on top of a layer of clean fresh water, it will sink because of gravity," says Prof. Simmons. "Similarly, warmer water that's less dense than cold water rises to the top. This rapid mixing caused by varying water densities appears to drive groundwater much faster than previously thought."

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

Saving Australia's Wombat's

(March, 13, 2014)

The endangered northern hairy-nosed wombat has been losing a small piece of its hair - all in the name of research, monitoring and conservation of its small population. University of Adelaide PhD student Lauren White has spent the past six months working on a population census of the wombat with the Queensland Parks and Wildlife Service and the University's Australian Centre for Ancient DNA (ACAD). She spent two weeks in Queensland collecting hair samples by stringing double-sided sticky tape across the burrow entrances. "As the wombats enter or exit their burrows overnight they get a small wax and hair is stuck to the tape," says Lauren. "We collected 1,260 hairs and every single one was carefully placed in its own very small tube and transported back to ACAD for DNA analysis."

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

Volcanoes helped ice age survivals

(March, 11, 2014)

An international team of researchers has found evidence that the steam and heat from volcanoes and heated rocks allowed many species of plants and animals to survive past ice ages, helping scientists understand how species respond to climate change. The research could solve a long-running mystery about how some species survived and continued to evolve through past ice ages in parts of the planet covered by glaciers. The team, led by Dr Ceridwen Fraser from the Australian National University and Dr Aleks Terauds from the Australian Antarctic Division, studied tens of thousands of records of Antarctic species, collected over decades by hundreds of researchers, and found there are more species close to volcanoes, and fewer further away. "Volcanic steam can melt large ice caves under the glaciers, and it can be tens of degrees warmer in there than outside. Caves and warm steam fields would have been great places for species to hang out during ice ages," Dr Fraser said.

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

Climate change “oases” found

(March, 10, 2014)

Breakthrough research on identifying potential climate oases, called microrefugia, could set a new standard for reducing risk in land management, writes UTS research fellow Dr John Gollan. How land for biodiversity conservation is chosen has been a research topic for decades. The more "traditional" ways are based on structural measures of biodiversity such as species richness (the numbers of different species), numbers of endemics (species restricted to an area), or the presence of species that may be endangered, threatened, or vulnerable. While these methods



will always be important, they fail to account for physical spaces in the landscape that will provide resilience and protection for biodiversity under a warming climate. One category of space that is gaining much attention for climate change adaptation strategies is microrefugia – small areas of favourable climate within a region of generally unfavourable climate. However these pockets are also difficult to pinpoint and until now no study has ever attempted to map these across the landscape.

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

6. Education

More students for fewer schools

(March, 31, 2014)

The number of school students in Australia continues to grow but the number of schools is going down. Figures from the Australian Bureau of Statistics show there were 9393 schools in Australia in 2013, 169 fewer than in 2008. As a result, the average number of students in each school is rising. In the 2008 to 2013 period, government schools grew from 347 to 370 students, and non-government schools from 442 to 470 students. The student-teacher ratio has remained stable over this five-year period at 13.9 students per teacher.

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

Employers value skills over degrees

(March, 24, 2014)

Universities in Asia-Pacific, including Australia, should prepare themselves for a fundamental change in their relationship with employers, who increasingly want students with particular skills rather than degree qualifications. Andrew Thompson, who connects with universities in the Asia-Pacific area for global networking firm Cisco, said that employers were moving past the 20th-century model in which students removed themselves while they studied for a bachelor's degree, and then possibly a master's degree, before entering the workforce. "This is a fundamental change. The credential is still important but it's actually the skills that are attached to it that will drive the economy forward," said Mr Thompson, who is sales director, public sector business development, for Cisco in the Asia-Pacific region. He pointed to a US Gallup poll published last month which illustrated a global trend for employers to pay more attention to the skills of a job candidate, rather than their university credentials. "Only 9 per cent of employers in the Gallup poll said they were very interested in where a person went to university. Only 28 per cent said it was very important as to what the person's major was," Mr Thompson said.

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

Slower growth in numbers of Chinese students of concern

(March, 17, 2014)

The growth in the number of Chinese students studying overseas is tapering off, in worrying news for Australia's international education industry. Some 413,900 students went overseas to study last year, according to the latest figures released by China's Ministry of Education. While this is an increase of 3.5 per cent over 2012, it ends a five-year period in which the growth in the number of Chinese students starting study overseas averaged over 20 per cent a year. The executive director of the International Education Association of Australia, Phil Honeywood, said the figures were a reminder to Australian educational institutions of the importance of diversifying their marketing efforts across a range of countries. Australian international education is highly exposed to China, with Chinese students making up nearly 30 per cent of the 527,000 international students in Australia. However Australia fared better than competitor countries – such as the United States, Britain and Canada – in winning Chinese students last year. The number of Chinese students commencing study in Australia rose 6.4 per cent to more than 78,000 in 2013, the first increase since 2009 when Chinese student numbers dropped after bad publicity about student safety in Australia and sub-standard vocational colleges.



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

University of Melbourne launches updated strategy

(March, 17, 2014)

The University of Melbourne is going into its third four-year strategic plan since Glyn Davis took over as vice-chancellor in 2005 and it is shaping to be a very consequential one. In a discussion paper released last week, the university puts the big issues on the table: meet the digital challenge, make itself relevant to industry, fund high-quality research, keep up with rapidly improving Asian universities and decide how to remodel its university campuses. Melbourne's headline plan is its push to market fee-paying, online postgraduate degree courses which will be aimed at professionals wanting to upgrade their qualifications. In parallel, the university will offer non-degree executive education courses online as well. It is the first effort by one of the elite Group of Eight universities to turn online education into major revenue stream. Professor Davis says one of the most significant parts of the paper is the proposal to offer work placements or internships to every student in the postgraduate phase of their education. "The idea is to provide the opportunity to every student doing a professional graduate program in Melbourne," he said. He says it will take the university a couple of years to implement and admits that Group of Eight universities, including Melbourne, have not performed so well in this area up to now.

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

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