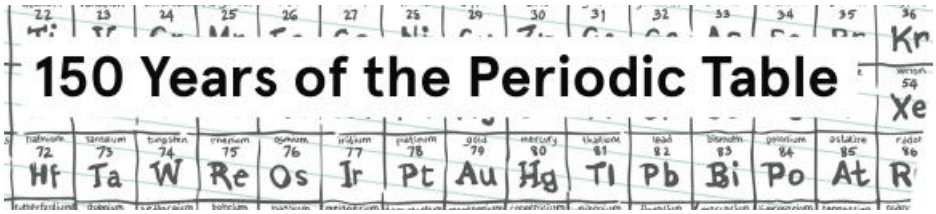
THE UNIVERSITY OF SYDNEY

Faculty of Science

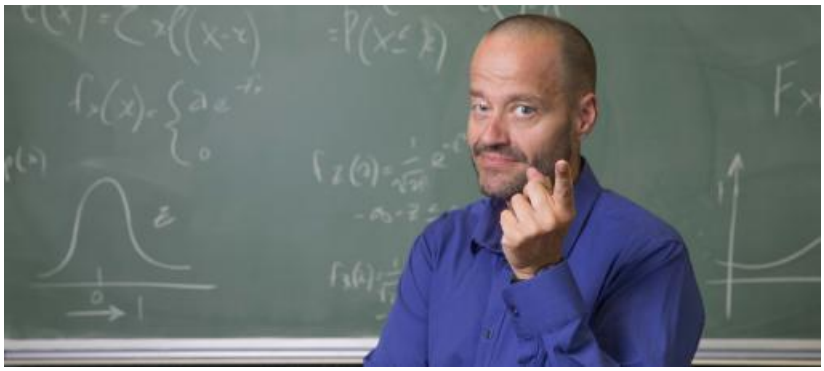
July 2019

Science Alliance Newsletter

2019: Edition 2



Welcome to the second edition of Science Alliance news for 2019! We aim to keep you up-to-date with the latest science happenings as well as to inform you about science programs and events at the University of Sydney.



Introduction by Adam Spencer

This time of year means different things to different people. The encroaching cold of what we in Australia consider winter, or the mid-season blues where you realise your footy team isn't going to win ... again. For those of us who write, it means the crushing deadline you have to hit to get that book out 'just in time for Christmas'.

I've been penning my annual popular mathematics tome and one of the points I made this year was to dwell on the incredible achievement that is The Periodic Table of the Elements. From Mendelev's first brilliant scrawlings in the 1860s, with gaps and predictions that proved so insightful, perhaps even before that as far back as Lavoisier in 1789, through to today, it has been a wonderful catalogue of our knowledge.

Read more >

Dr Karl Kruszelnicki

Banana Equivalent Dose (of Radioactive Potassium)
They're yellow, radioactive and high in potassium. (Spoiler Alert – part of that sentence is wrong.)

Yellow?
Bananas come in many colours. When ripe, they can be green, red, brown or even purple. But the bananas which Westerners mostly see are yellow – mainly Cavendish and Gros Michel.

Indeed, the yellow colour we see is actually more intense than "natural", thanks to the artificial ripening process. Many bananas are picked while immature, and then stored and transported at around 13-15 degrees celsius. Once they arrive close to their final destination, they are held at 17 degrees celsius, and exposed to the ripening gas, ethylene.

Radioactive?
Yes, bananas are slightly radioactive.

Read more >

Dr Alice Motion

We are made of star-stuff
2019 marks 150 years since the Russian Chemist Dimitri Mendeleev proposed the first version of our modern periodic table. Today, the periodic table is adorned with 118 elements each ascending in atomic mass. But in 1869 Mendeleev's table featured only 60 elements; those that had been discovered and were known to scientists at the time.

For me, the true beauty of Mendeleev's table was not just its recognition of patterns in the chemical properties displayed by the elements known at the time, but also the empty spaces that Mendeleev confidentially left for 'new' elements. Elements that have now been discovered or created by people and now fill the gaps in both his table and our knowledge of the building blocks of the Universe.

While the periodic table has been around for 150 years, the celebration of the elements extends back much further in our Universe's history.

Read more >

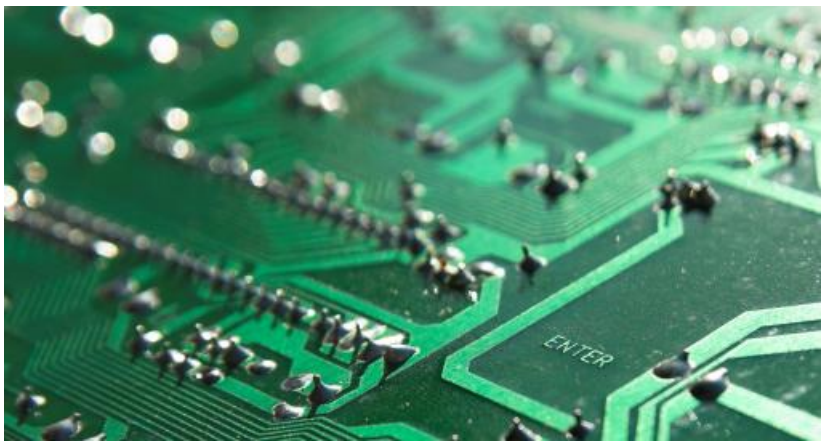
Embedded in the mud: Chemicals, contaminants and continuous culture

By Shannon Foster D'harawal Saltwater Knowledge Keeper

There is something so unique about walking into a mangrove forest. It's not just the strange pneumatophores standing sentinel in the mud or the twisted and contorted branches of the mangrove trees throwing eerie shadows across your path. The mangrove environment has an otherworldly atmosphere, a beauty that just isn't captured in the same ways in other environments.

Widely considered mosquito infested wastelands, Sydney's mangrove forests have been neglected, destroyed and reclaimed for decades but we are starting to realise their value and importance now especially as fish nurseries, environmental buffer zones between the aquatic and terrestrial worlds, as well as their vital role in the filtration of the planet's water.

Read more >



Quantum computing: just a (qu)bit too good to be true?

It's one of the most buzzing areas in Physics, but is quantum computing worth it? | **Clare Birch**

Good science begins with asking the right questions. In a month or so, I start my Honours research into quantum computing for chemistry—I'm super excited to be asking "*What if?*" and "*How?*" and "*Where'd all my free time go?*" for a whole year. For something based on tiny things, quantum computing makes some huge promises, but it also comes at a pretty major price tag: because of that, I think

it's equally important to ask the big one: *"Why?"*

Wait, what's a quantum computer?

Where a classical computer encodes information in *bits* that can take the value 0 *or* 1, a quantum computer uses *qubits*. You can make a qubit out of any quirky quantum material that has two possible *states*. The University of Sydney's quantum computing unit uses trapped ytterbium ions (Yb+) that can be manipulated using lasers, but there are qubits based on electrons (which have spin up or down) and photons (which can be polarised horizontally or vertically), even yet-to-be-found subatomic particles.

Qubits differ from classical bits because their quirky quantum-ness means that they exist in a *quantum superposition* of both of their states: a qubit can be both 0 *and* 1/up *and* down/horizontal *and* vertical at the same time, only taking one of the values when observed.

Read more >

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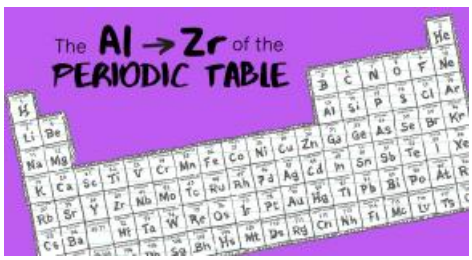
What's On - National Science Week

Sydney Science Festival

We're shining light on the wonderful world of science once again as University of Sydney researchers get involved in a range of public events for this year's festival in honour of National Science Week 2019! From musical mathematics to optical illusions, from insects to medical cannabis, we're sure to have something for everyone.

The Al – Zr of the Periodic Table



Join us for National Science Week with our ensemble cast of scientists – Dr Alice Motion, Dr Karl Kruszelnicki and Adam Spencer.

Read more >

Operation Earth: A Conservation Mission

The University of Sydney and Taronga Zoo Sydney invite you to their conservation hands-on science challenges to learn about the conservation strategies in place to ensure a future for Earth's magnificent wildlife.

Read more >

Get involved in the annual

celebration of science

National Science Week is just around the corner! *Destination Moon: more missions, more science* is this year's schools' theme and you can download a free resource book to get ideas on how to engage students with current and future space programs. See www.scienceweek.net.au for more details.

Robots: the farmer's friend, the country kid's teacher

All welcome to join **Science at the Local** in **Springwood** at this FREE family event at Blue Mountains Theatre and Community Hub from 2:30-4pm on Sunday 4 August to launch National Science Week in New South Wales.

Read more >

Our top picks for National Science Week:

- *Why music is Maths*, a free lunchtime event on Wednesday 7 August at City Recital Hall where mathematician Professor Geordie Williamson will delve into the shape of sound and sound waves to explore the fascinating world of timbre, overtones, modes and frequencies.
- *Science in the Swamp*, a much loved event sure to welcome thousands of community members to experience science presentations from diverse presenters in Centennial Park on 18 August. In a separate event at the Park on 17 August, Sydney Youth Orchestras will present an outdoor evening performance of *The Planets* by Gustav Holst accompanied by an opportunity to stargaze through telescopes and learn about the night sky from astronomy experts.
- *Science in the Wild – Dinosaurs vs Superpowers,* a chance for community members to enjoy free outdoor family and community activities at The Australian Botanic Garden Mount Annan on 11 August with a focus on science superpowers.
- **The Ambidextrous Brain: The Neuroscience of Imagination & Creativity,** two talks at the Art Gallery of NSW and Sydney Startup Hub by University of Sydney Psychology Professor David Alais that explore the artistic brain.
- **Powerhouse Museum** will be the *Apollo 11* exhibition commemorating the 50th anniversary of the Moon landing, a *Big Science Day* featuring a *Hidden Mathematics* talk with Festival Ambassador Eddie Woo and a panel of leading female scientists who will discuss Australia's unique opportunities in the new space race.

Visit Sydney Science Festival to browse the full program or find an event near you on the National Science week events directory.

2019 National Science Week in schools

'Destination Moon: more missions, more science' is the Australian Science Teachers Association (ASTA) 2019 theme for National Science Week! This theme hopes to inspire teachers and their students to learn about space science and discover past, present and future space missions, programs and operations. **Find out more >**

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Sydney Science Forum - Not Guilty: the psychology of crime investigations

Date: Wednesday 18 September 2019
Time: 5:45PM – 7PM
Venue: Charles Perkins Centre Auditorium
John Hopkins Drive, University of Sydney

Read more >

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News & Opinion

Sydney scientists named on Periodic Table of younger chemists

The International Union of Pure and Applied Chemistry has created the "Periodic table of younger chemists" to profile chemists from around the world. Associate Professor Elizabeth New and Professor Richard Payne have been dubbed honorary elements, "selenium" and "iron". **Read more**

Timor-Leste aims to become world's first plastics-neutral country

University spin-out company Licella will use catalytic technology developed by Professor Thomas Maschmeyer as part of global consortium to donate plastics recycling plant to the people of Timor-Leste. **Read more**

If sea levels rise and Pacific nations go under water — what happens to maritime boundaries?

Scientists have long predicted climate change could pose an existential threat to the tiny island nations which dot the Pacific. 63 officials and experts from around the Pacific gather at The University of Sydney to discuss the political geography. **Read more**

Australian Academy of Science honours our researchers

Four scientists University have won medals from the Australian Academy of Science, in recognition of their outstanding contribution to human understanding of the scientific world: Professor Dietmar Müller, Professor

Geordie Williamson, Associate Professor Liz New and Professor Steven Flammia.
Read more

Dementia research finds its perfect match online

Similar to popular dating apps, the new online matching service StepUp for Dementia Research will match volunteers with researchers carrying out studies in dementia prevention, diagnosis, treatment, care and cure. This service is fast-tracking more effective and inclusive dementia research across Australia.
Read more

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Resources for teachers

Tea Composition Program

Suitability: High school classes, stages 3-6
Register by: Friday 5 July, end of Term 2 or
email science.alliance@sydney.edu.au over the school holidays
Dates: Tea bag planting from September – December
Cost: $0

You are invited to participate in this real-world research project that evaluates decomposition and local soil health by using tea bags. A free program complete with all materials and tailored lesson plans for Stages 3-6.

More info

Year 10-12 study and essay skills

Date: Various in July, September,
Venue: Camperdown campus
Cost: $315 - $473 (inc GST)

The University's Centre for Continuing Education presents this two-day study methods course where students focus on time management, learning and memory, critical thinking and the examination period. Coming up in July, modules Study Methods and Essay Writing. Enrol now

Girls in Physics

Date: 19 August 2019
Venue: School of Physics, Camperdown Campus
Cost: $20 (inc GST) per student
Suitability: Year 11 female physics students
Contact: vicky.tzioumis@sydney.edu.au

Read more >

Unearthing Science

Dates: runs once a Term
Suitability: Years 9 & 10, rural schools in NSW

Cost: $0

Energise the budding scientist in your students with this all-materials-included teaching package introducing independent scientific investigation, focusing on ecological and environmental science. Includes portable lab equipment, flexible teaching plans and assessment criteria, virtual Q&A with a current science researcher, and more! Unearthing Science is exclusively available for high schools from rural regions of New South Wales, is free and available throughout the year.

More info

Project Management Camp (Spring)

Date: 3-4 October 2019
Register by: 9am, 2 September 2019.
Suitability: Years 10-12
Contact: engineering.outreach@sydney.edu.au

A two-day intensive workshop offering an introduction to project management and where this dynamic field can take you. Hear about degrees and careers, join a visit to an industry partner, and work on authentic case studies. Enrol now

Spectacular Science

Date: Wednesday 20 November (Year 7-8) and Thursday 21 November (Year 9-10)
Venue: Camperdown campus
Suitability: Year 7-8 and Year 9-10
Cost: $24.20 (inc GST)

Read more >

Life, Health and Radiation MOOC

Suitability: high school science teachers and students, medical and health professionals, open to all

This free MOOC (Massive Open Online Courses) explores the benefits and risks of radiation for decision-making in everyday life. Four modules featuring 30 short videos. Developed by the University of Sydney's Faculty of Health Sciences for all to use. Enrol now

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