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Science, Technology and Education News from Australia, April 2019

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1. Science and Technology Developments

ANU finds 530,000 potential pumped-hydro sites worldwide

The Australian National University (ANU) has completed a global audit of 530,000 potential sites for pumped-hydro energy storage that can be used to support low-cost, secure, 100 per cent renewable electricity grids. The zero-emission grids would mainly rely on solar photovoltaic (PV) and wind technology, with support from pumped-hydro storage and extra high voltage transmission between regions. The prospective short-term off-river pumped-hydro energy storage (STORES) sites combined had a global potential storage capacity of 22 million Gigawatt-hours (GWh) - which is hundreds of times more than the amount needed to support a global 100 per cent renewable electricity grid. The audit of these STORES sites and the team's analysis relies on geographic information system (GIS) algorithms, which were peer reviewed recently as part of a publication in the international journal Applied Energy.

Click here to read the article.

Queensland researchers join international search for new antibiotics

In an Australian-first, The University of Queensland (UQ) will join forces with the Global Antibiotic Research and Development Partnership (GARDP) to tackle the growing problem of drug-resistant infections. GARDP, a not-for-profit research and development group initiated by the World Health Organization, develops new or improved antibiotic treatments. Dr Mark Blaskovich from UQ's Community for Open Antimicrobial Drug Discovery (CO-ADD) said about 700,000 people died of drug-resistant infections every year. CO-ADD will have access to libraries of chemical compounds from the US Calibr translational research institute and natural products from Germany's Helmholtz-Institute for Pharmaceutical Research Saarland. The partnership announcement coincided with the European Society of Clinical Microbiology and Infectious Diseases' annual conference, where experts presented their latest findings.

Click here to read the article.

Pain researchers find antidote to deadly box jellyfish sting

CRISPR genome editing uncovers clues to deadly venom. Researchers at the University of Sydney have discovered an antidote to the deadly sting delivered by the most venomous creature on earth – the Australian box jellyfish. They uncovered a medicine that blocks the symptoms of a box jellyfish sting if administered to the skin within 15 minutes after contact. The antidote was shown to work on human cells outside the body and then tested effectively on live mice. Researchers now hope to develop a topical application for humans. The Australian box jellyfish (Chironex fleckeri) has about 60 tentacles that can grow up to three metres long. Each tentacle has millions of microscopic hooks filled with venom. Each box jellyfish carries enough venom to kill more than 60 humans. A single sting to a human will cause necrosis of the skin, excruciating pain and, if the dose of venom is large enough, cardiac arrest and death within minutes.

Click here to read the article.

Bleaching has struck the southernmost coral reef in the world

This month corals in Lord Howe Island Marine Park began showing signs of bleaching. The 145,000 hectare marine park contains the most southerly coral reef in the world, in one of the most isolated ecosystems on the planet. Following early reports of bleaching in the area, researchers from three Australian universities and two government agencies have worked together throughout March to investigate and document the bleaching. Sustained heat stress has seen 90% of some reefs bleached, although other parts of the marine park have escaped largely unscathed. The bleaching was caused by high seawater temperature from a persistent summer marine heatwave off southeastern Australia. Temperature in January was a full degree Celsius warmer than usual, and from the end of January to mid-February temperatures remained above the local bleaching threshold. Lord Howe Island was named a UNESCO World Heritage site in 1982. It is the coral reef closest to a pole, and contains many species found nowhere else in the world.

Click here to read the article.

Microscopic worms could provide key to repairing injured nerves

A tiny worm's ability to repair damaged nerves could one day help people with nerve injuries such as paralysis, according to University of Queensland research. A team led by Professor Massimo Hilliard, Dr Rosina Giordano-Santini and Dr Casey Linton from UQ's Queensland Brain Institute and Dr Brent Neumann from Monash University has discovered key information on how the microscopic roundworm species C. elegans spontaneously reconnects severed nerves. Professor Hilliard said rejoining nerves could be a treatment for people with nervous system injuries, which often cause life-long disabilities. The research has been published in Journal of Neuroscience and was supported by organisations including the National Health and Medical Research Council of Australia, the Australian Research Council and the Human Frontier Science Program.

Click here to read the article.

2. Education and Science Policy

Australia launches consultation on Artificial Intelligence ethics

The Australian government has launched a national consultation to gather feedback on proposals for an ethical framework to guide the use of artificial intelligence (AI) in the coming years. The consultation centres around a discussion paper, "Artificial Intelligence: Australia's Ethics Framework", by the Commonwealth Scientific and Industrial Research Organisation's (CSIRO) digital innovation wing, Data61. In it, CSIRO identifies key principles and measures that can be put in place during the development of AI systems to retain "the well-being of Australians as the top priority." The CSIRO report asks for feedback on eight core principles which it says will mitigate the risks that accompany AI's "enormous potential to improve society." The eight key principles identified are: the generation of net benefits; doing no harm; regulatory and legal compliance; privacy protection; fairness; transparency and explainability; contestability; and accountability.

Click here to read the article.
Click here to consult the discussion paper.

New report explores blockchain's future beyond bitcoin

A new report released by the Australian Computer Society (ACS) and authored by the Commonwealth Scientific and Industrial Research Organisation's (CSIRO) Data61 agency, and titled "Blockchain 2030: A look at the future of Blockchain in Australia", explores eight scenarios for future adoption of blockchain technology in Australia. The scenarios are designed to challenge current perspectives, define and explore key uncertainties, and provide a common set of shared narratives for industry, government and community stakeholders. As of April 2019, CSIRO's Data61 is among the top blockchain research organisations in the world, and the author of five of the 30 most-cited blockchain research papers globally. The report outlines Australia's competitive advantage, already home to world-first blockchain applications in bonds operations, smart programmable money and international standards, as well as industry-specific trials in energy, agriculture and the public sector.

Click here to read the article.
Click here to consult the report.

State of the Data and Digital Nation

The new cross-jurisdictional Australian Digital Council has published a report highlighting the main data and digital transformation initiatives taking place across the country. The State of the Data and Digital Nation report provides case studies of projects at the Commonwealth level and in different states, which the government hopes will facilitate cross-jurisdictional collaboration. Since the formation of the Australian Digital Council last year, work on a range of cross-jurisdictional projects has already begun. For example, South Australia and the Commonwealth agreed in December to collaborate on the development of a digital identity solution. The agreement will ensure interoperability of both state and federal systems and significantly reduce development costs.

Click here to read the article.
Click here to consult the report.

$50m grant to keep Tasmania at forefront of Antarctic research

The Australian Government announced that the University of Tasmania will receive $50 million funding over the next 10 years for ongoing Antarctic research. The University is working with core partners the Australian Antarctic Division, CSIRO and the Bureau of Meteorology to create the Australian Antarctic Program Partnership (AAPP), which will be funded through the Antarctic Science Collaboration Initiative. The AAPP will also include contributions from Geoscience Australia, the Tasmanian Government, and Australia's Integrated Marine Observing System (IMOS). In announcing the grant, the Minister for Industry, Science and Technology, Karen Andrews, said more than 1200 people are employed in Antarctic and climate research, contributing more than $180 million to the Tasmanian economy each year.

Click here to read the article.

$329m research partnership to transform Australia's blue economy

The University of Tasmania will lead the largest ever Cooperative Research Centre (CRC), bringing together expertise in seafood, renewable energy and offshore engineering to transform Australia's blue economy. The Blue Economy CRC will aim to drive an evolution in marine-based industries, unlocking enormous economic, environmental and technological benefits. The $329 million research project is a 10-year collaboration between 45 national and international partners from industry, research and government, underpinned by a $70 million cash investment from the Federal Government. The Tasmanian Government is also a supporting partner, which has been a key factor in gaining local industry involvement. The Blue Economy CRC head office will be hosted at the University of Tasmania's Launceston campus, supporting a research community of 50 PhD students and 50 postdoctoral research fellows throughout Tasmania and with partner organisations nationally and internationally.

Click here to read the article.

$110M SmartSat CRC launched

A new $110 million smart satellites Cooperative Research Centre (CRC) will be the "engine room" for the Australian space sector and help local companies take on the world, its CEO designate said. The federal government unveiled the SmartSat CRC on Monday morning, with $110 million in cash funding - $55 million from participants matched by the government - and another $130 million-plus in in-kind investments, including people, infrastructure and satellite time. The SmartSat CRC will feature a consortium of industry and research organisations including UniSA, Airbus, Bae Systems, UNSW and a range of space startups including Myriota and Fleet. The CRC will be based on the same floor as the Australian Space Agency in Adelaide, but will be launching nodes in states and territories around the country, with the ACT and Western Australia already putting money on the table.

Click here to read the article.

OECD spotlights CSIRO's Data61 as global blueprint for digital innovation

CSIRO's Data61, the digital innovation arm of Australia's national science agency, has been recognised in a country case study by the Organisation for Economic Co-operation and Development (OECD) as a global blueprint for digital and open innovation. The case study highlights CSIRO Data61's unique capabilities, ambitions and network model at a time of deep structural change for Australia in the global networked economy. Data61 is Australia's leading digital innovation network, with internationally recognised expertise in artificial intelligence, robotics, cybersecurity, data analytics and blockchain, among other areas. The case study is part of OECD's Digital and Open Innovation project. The initiative analyses how digital transformation is affecting innovation across the economy and identifies the most appropriate instruments to foster vibrant innovation ecosystems.

Click here to read the article.
Click here to consult the case study.

Budget concerns for science leaders

While the Coalition budget's science announcements hold one marquee boost to the Medical Research Future Fund (MRFF), there was precious little to impress science leaders in other areas and cuts continued in areas including ARC research funding and the abolition of the $3.9B Education Investment Fund. The MRFF was established in 2015 to support health and medical research with a long-term $20 billion funding goal – with $9.5 billion funded to date. The new injection adds $5 billion across a range of initiatives that all fit the remit of pushing medical research toward breakthroughs that could improve Australian health outcomes while also creating commercialisation opportunities. Beyond the MRFF funding, the budget figures around the sciences stick to smaller numbers. Professor John Shine AC, President of the Academy of Science, felt there was more cause for concern than celebration. "While the Academy applauds the range of new initiatives, it was hoped that there would be more focus on science and innovation in the budget given the Government's emphasis on knowledge and skills," Professor Shine said.

Click here to read the article.

Budget addresses skills shortages

Under the Delivering Skills for Today and Tomorrow package, the government set out plans to establish a National Skills Commission to work with states and territories to deliver a nation-wide approach to skills development, focused on the needs of both students and industry. The federal government says its $525.3 million vocational education and training skills package investment delivered as part of the 2019-20 Budget will equip Australians with “better skills”. As part of the total investment, $41.7 million over four years would be dedicated to a pilot of skills organisations across the country. According to government, these organisations would develop training packages for skills in high demand, including information and communications technology, advanced manufacturing, and cyber security, and would help to foster links with industry.

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