

[View](#) this email in your browser**MACQUARIE**
University**FACULTY OF SCIENCE
AND ENGINEERING**

May 2018

Suggest a story >

From the Dean

NEWSLETTER | MAY ISSUE

Dear Suzannah

I'm acting Executive Dean while Barbara is travelling overseas for much of this month. She is currently in the UK with Emma Bowen and James Downes, travelling around the country to look at the latest ideas in classroom and building design to support higher education. They're going behind the scenes at some inspiring places, and I'm sure will be bringing back some great ideas that we can apply at Macquarie.

And they're not the only ones travelling it seems. This newsletter includes stories about: early-career researchers from the Department of Chiropractic taking part in an intensive research and leadership program in Canada; research led by Biology's Rachael Dudaniec on how damselflies are responding to climate change in Sweden; and the Optus Macquarie University Cyber Security Hub's Dali Kaafar talking about user privacy at The Web Conference in France.

Speaking of France, Physics and Astronomy's Darren Hudson got a selfie with the French President last week, who as part of his Australian visit witnessed the signing of the renewal agreement for the Associated Laboratory for Photonics between France and Australia, which is managed by Macquarie in Australia.

Closer to home, you can read about the super mum that might be living in your eucalyptus tree and how Port Jackson sharks are acquiring a taste for jazz. Or take a trip into space where Macquarie-led research has detected a burst of newborn stars in a young star cluster that is puzzling astronomers.

A Macquarie PhD student has developed an advanced sensor that might help us unlock the secrets of the brain, and a Macquarie start-up is working to make drug discovery faster, cheaper and safer. They've been able to accelerate the identification of how a drug works from years to weeks.

If you want to know more about what's happening across the Faculty, follow our Faculty Twitter account [@MQSciEng](#) and Barbara's personal account [@BarbaraMesserle](#). If you've got news to share, please tweet about it and include our Faculty handle so we can see it and retweet. If you're not on Twitter, then email us at fse.execdean@mq.edu.au and we'll share the news.

Regards,

Bernard

In this bulletin

- [Are damselflies in distress?](#)
- [Protecting users' privacy online](#)
- [The super mum living in your eucalyptus tree](#)
- [Advanced sensor to unlock the secrets of the brain](#)
- [Burst of newborns in young star cluster puzzles astronomers](#)
- [Making drug discovery faster, cheaper and safer](#)
- [Sharks can acquire a taste for jazz](#)
- [Would electric cars crash the grid?](#)
- [Politicians approve of photonics collaboration](#)
- [Bringing industry into the university.](#)
- [Killing it in bioscience](#)
- [Chiro researchers in Canada](#)
- [Research in tweets](#)
- [Faculty news and notices](#)

Are damselflies in distress?



Damselflies are evolving rapidly as they expand their range in response to a warming climate, according to new research led by the Department of Biological Sciences.

“Genes that influence heat tolerance, physiology, and even vision are giving them evolutionary options to help them cope with climate change. Other insects may not be so lucky,” says Biology’s Rachael Dudaniec, lead author of the paper.

The study, published in *Molecular Ecology* last month, investigated the genetics of an insect’s capacity to adapt and survive in a changing world by looking at the blue-tailed damselfly (*Ischnura elegans*) in Sweden.

“Damselflies, like other aquatic insects, are faced with a dilemma given the current and unprecedented rate of global warming,” says Rachael.

“Either they perish, move elsewhere or adapt to the new environmental conditions. It’s a classic case of fight or flight.”

The researchers tracked the frequency of particular genes in the damselfly population as environmental conditions—such as temperature, rainfall, wind speed and tree cover—changed over their range.

They found that the species’ genes strongly responded to changes in the environment as you moved from the southern core of the species’ distribution to the northern edge of their current range.

[Find out more](#)

Photo by Rachael Dudaniec.

Protecting users’ privacy online



Ten internet searches can be enough to reveal your identity online, according to research from Macquarie University and CSIRO’s Data61 that was presented at The Web Conference 2018 last month.

But the researchers have developed a new method—called Incognito—to better protect users’ online privacy through obfuscating the web data they leave behind.

“Every time we go online to surf the web or share information, we leave behind a trail of our personal data, interests and intentions,” explains Dali Kaafar, Scientific Director of the Optus Macquarie University Cyber Security Hub.

“This data could be used to reveal private or sensitive information about us, even if our identities are not known and we’re not sharing personally identifiable information.”

Current methods to improve the privacy of our online data fail because they are not comprehensive enough, cannot be applied to all Web data (for example our activity on social media sites) and are not effective against adversarial attacks.

The method Dali's team has proposed addresses these shortcomings by first better predicting the privacy risk of specific data, and then minimising that risk by obscuring it with lower risk data that carries similar meanings (known as semantically similar data).

The method is particularly powerful as it is also resistant to potential attackers who know everything about the data and the algorithms and parameters in use.

[Find out more](#)

The super mum living in your eucalyptus tree



An Aussie beetle's social life supports a link between monogamy and complex societies.

A female ambrosia beetle (*Austroplatypus incompertus*) mates with one male, founds a colony in tunnels she excavates deep within a eucalyptus tree, and then lays eggs for 30 to 40 years.

When her first batch of eggs hatch some of her daughters commit to a lifetime of helping her maintain her colony while the others fly away to find a mate and start their own colonies.

But for both the queen and her worker daughters, living within tunnels comes at the cost of mobility, as they lose their claws and some further leg segments. While still able to move around inside their home, they are unable to leave, and in the case of workers, unable to ever mate.

This is just part of the complex social and sex lives of ambrosia beetles reported by researchers from Macquarie University and Western Sydney University in *Nature Ecology & Evolution*.

"We know that bees, ants and termites have castes, with particular roles they might carry out for life," says Shannon Smith, Honorary Postdoctoral Associate in the Department of Biological Sciences, Visiting Fellow at the Hawkesbury Institute for the Environment, Western Sydney University, and first author of the study.

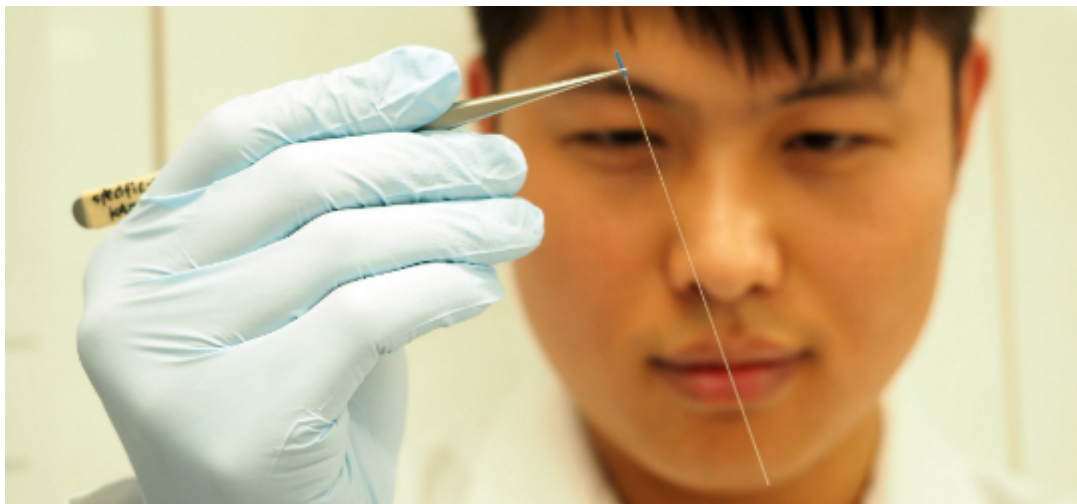
"In the most extreme case, we see individuals give up the chance to reproduce to serve the colony.

"This is the first time we've described the details of this advanced form of sociality in a beetle, despite there being close to 400,000 species of beetles in the world."

[Find out more](#)

Photos courtesy of Shannon Smith and Deborah Kent.

Advanced sensor to unlock the secrets of the brain



Researchers have developed a state-of-the-art sensor that can for the first time detect signalling molecules, called cytokines, which operate in the living brain.

Cytokines in the brain are secreted by glia cells that make up nearly 90 per cent of all brain cells.

They play a central role in controlling mood and cognition and may also contribute to a number of mental health disorders.

The research was published in *Brain, Behavior, and Immunity* last month.

"What we've developed is the first sensor capable of monitoring the release of these cytokines in the brain," says lead researcher Kaixin Zhang from Physics and Astronomy, who is a PhD candidate at the ARC Centre of Excellence for Nanoscale BioPhotonics.

"Critically, there is mounting evidence that these glial-released cytokines play a central role in regulating a range of brain functions. In particular they are responsible for affecting mood, cognition and behaviour."

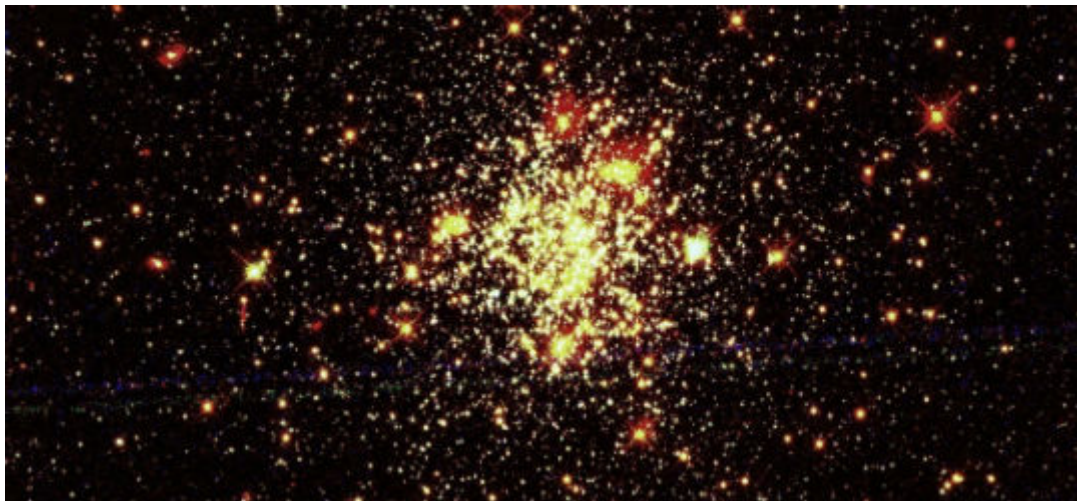
"Our innovative new sensor has the potential to increase our knowledge not only of how the brain works, but may be able to shed light on conditions such as depression, stress, anxiety and even schizophrenia," he says.

The sensor consists of a modified optical fibre which has had its surface treated with a capture protein. The protein reacts to the presence of cytokine molecules and is

capable of monitoring local cytokine release in discrete and targeted parts of the brain.

[Find out more](#)

Burst of newborns in young star cluster puzzles astronomers



An international team of astronomers have detected an unexpected population of more than 20 blue straggler stars of similar age in young globular cluster NGC 2173.

Star clusters have long been thought of as ‘infertile’ stellar systems that cannot form new stars, since all the gas from their birth environment has long been used up.

Only collisions or mergers of stars can rejuvenate old stars, in much the same way as a human might get a facelift. Such stars are known as blue stragglers because they appear to straggle behind their neighbours; they still resemble extremely hot (and therefore blue) young stars.

“In principle, stellar collisions or binary mergers should not take place at the same time. They will happen randomly in star clusters and produce blue straggler stars that seem to have different ages,” says Physics and Astronomy’s Chengyuan Li, who led the research team.

However, the team detected a well-defined burst of blue straggler stars in this cluster, despite NGC 2173 being a relatively sprightly one-to-two billion years old.

Previously, astronomers have only found such bursts of blue stragglers in globular clusters 10 billion years old or older that had undergone a catastrophic core-collapse event, where the core of the cluster collapses under the gravity of all the stars in that small volume of space.

“This could suddenly trigger lots of stellar collisions, producing many blue straggler stars at the same time,” explains co-author and Macquarie colleague Richard de Grijs.

“However, we did not find any evidence that NGC 2173 had experienced such a collapse event. In addition, the cluster isn’t dense enough for many stellar collisions to occur,” says Chengyuan.

“We suspect that there must be some hidden physics which suddenly produces so many blue straggler stars at roughly the same time.”

[Find out more](#)

Photo of the Large Magellanic Cloud cluster NGC 2173 by Dr Licai Deng, HST/NASA/ESA.

Making drug discovery faster, cheaper and safer



A Macquarie University start-up that created a new way to develop drugs faster and more cheaply than current methods, has won a CSIRO innovation award.

Currently it takes over a decade and \$2 billion to develop a new drug. Of these, four out of five will never be launched.

If we want everyone in need to have access to affordable and effective medications, we must reduce the time and cost associated with drug development, argues Molecular Sciences' Peter Karuso.

And that's what the start-up he founded—[Hyperdrive Science](#)—is attempting to do.

In the late 1990s, Peter was trying to understand how chemicals isolated from sponges, such as palau'amine, were able to selectively kill cancer cells.

He developed a technique called 'reverse chemical proteomics', which rapidly identifies the protein in your body that a drug targets to achieve its effect.

In late 2016, Peter realised his technology could better identify drug targets than what was currently being used by pharmaceutical companies, and so the company was born.

“We're able to accelerate the identification of how a drug works from years to weeks,” explains Peter.

“Our platform can also be used to repurpose existing drugs, and to understand the basis of side effects.

“But the real power of our technology is to identify new drug targets, and address diseases that have no known cure, like multiple sclerosis.”

With Molecular Sciences colleagues Paul Jaschke, Kavita Ragini and Fei Liu, Peter has successfully completed both of CSIRO's ON programs—Prime and Accelerate—and last month, the team won the People's Choice 'Innovation IMPACT' Award at the CSIRO ON Demo Night.

This award recognises the team with the greatest potential to create positive social, economic, or environmental impact for Australia as voted by an audience of investors, entrepreneurs, industry and government experts.

Their next step will be turning Hyperdrive Science into a fully-fledged start-up.

They are currently looking for co-founders and investors with expertise in pharmaceutical management, finance and marketing who share their vision of better, safer and more affordable medicines for everyone.

[Find out more](#)

[Watch Peter's presentation at CSIRO's ON Demo Night](#) (presentation starts at ~36:00).

Photo courtesy of ON – CSIRO.

Sharks can acquire a taste for jazz



While for many people sharks bring to mind the *Jaws* theme music, it seems sharks themselves prefer jazz.

Far from mindless eating machines, new research from the Macquarie University Fish Lab has shown sharks are much more sophisticated than most people imagine.

Researchers trained baby Port Jackson sharks to associate music with a food reward. When played a jazz song, the sharks learnt to go to a feeding station for a tasty treat.

“Sound is really important for aquatic animals, it travels well under water and fish use it to find food, hiding places and even to communicate,” says lead author Catarina Vila-Pouca from the Department of Biological Sciences.

Anecdotal reports have suggested that sharks can learn to associate the sounds of boat engines with food, for example as part of shark cage-diving activities. The study, published last month in *Animal Cognition*, provides evidence that sharks can learn the association relatively quickly.

But when it came to differentiating between jazz and classical music the sharks struggled.

"It was obvious that the sharks knew that they had to do something when the classical music was played, but they couldn't figure out that they had to go to a different location," says Biology's Culum Brown, who co-authored the research.

[Find out more](#)

Would electric cars crash the grid?



Widespread adoption of electric cars in New South Wales would increase demand on the power grid by an average of eight per cent, according to new research from the School of Engineering.

Sohaib Rafique and Graham Town used data from the New South Wales Household Travel Survey to determine the demand that electric cars would place on the grid if they were used in 82 per cent of weekday and 81 per cent of weekend commutes, with trips less than 35km in length.

They found that the increase in electricity demand was higher than 10 per cent in only nine out of 35 local government areas (LGAs) surveyed.

However, if these electric cars were recharged nightly the majority would have a substantial excess of electrical energy stored in their batteries.

This surplus energy could feed more than 50 megawatt hours (MWh) of power back into the grid in 46 out of 50 LGAs, thereby meeting the higher demand without increasing the load on the grid.

The study was published in the [Australian Journal of Electrical and Electronics Engineering](#) earlier this month.

Photo by [Simon sees](#).

Politicians approve of photonics collaboration



Physics and Astronomy's Darren Hudson was in the presence of world leaders last week.

Prime Minister Malcolm Turnbull and visiting French President Emmanuel Macron witnessed the signing of the renewal agreement for the Associated Laboratory for Photonics between France and Australia (ALPhFA).

ALPhFA is a collaboration between five Australian universities—Macquarie, ANU, RMIT, Sydney and Swinburne—and the Centre National de la Recherche Scientifique (CNRS) in France. Macquarie manages the laboratory in Australia.

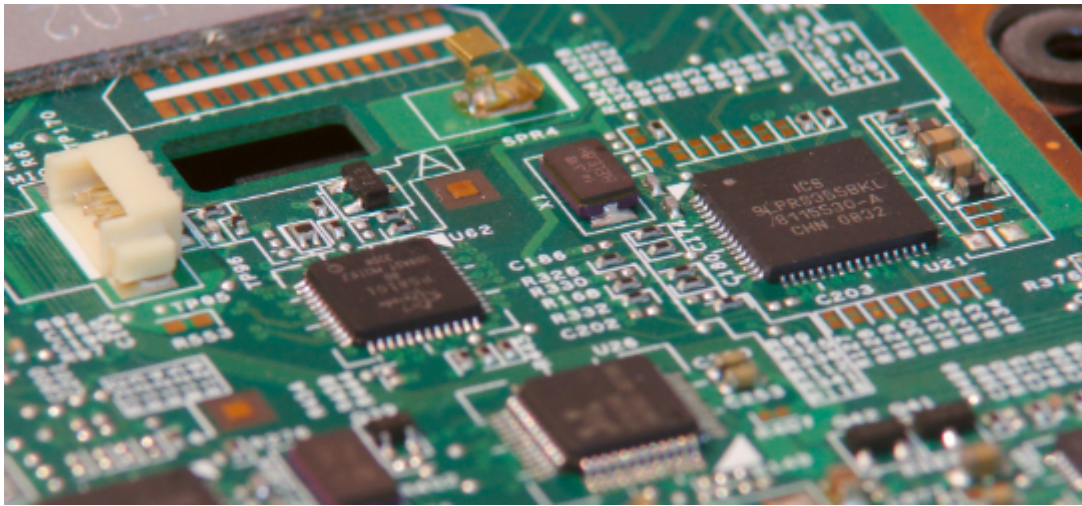
The renewal provides a further four years of funding for students and early-career researchers to travel between French and Australian laboratories to undertake collaborative work in the field of optics and photonics.

As part of the initiative, there will also be two workshops aimed at forged stronger research ties between French and Australian scientists.

"It's great to see world leaders such as Prime Minister Turnbull and President Macron acknowledging the importance of strong scientific links between our two countries," says Darren, who is also the Vice President of ALPhFA.

"This signing ceremony will be followed by a more formal agreement, which will be signed later this year. Then we plan to hold our first workshop before Christmas, so stay tuned for more details!"

Bringing industry into the university



A new teaching and research lab will bring industrial experience into the university, to better prepare the next generation of engineers.

The School of Engineering has partnered with semiconductor company Analog Devices, and launched the Macquarie and Analog Devices Teaching and Research Laboratory (MADTRL) last week.

“Traditionally, undergraduate engineering education has been structured around classroom theory, laboratory exercises, and a relatively disconnected industry-placement or internship system,” explains Engineering’s Michael Heimlich.

“Similarly, Masters and PhD work is typically done in an academic setting with inputs and arms-length interactions with the ‘real world’ at best.”

This new lab aims to address this mismatch between existing educational pathways and industry needs, by reversing the tradition of sending students out to industry. Instead industry is being invited into the university.

“Half a dozen or more engineers with industry experience will be embedded within MADTRL, and provide mentoring to dozens of students across the entire degree spectrum,” says Michael.

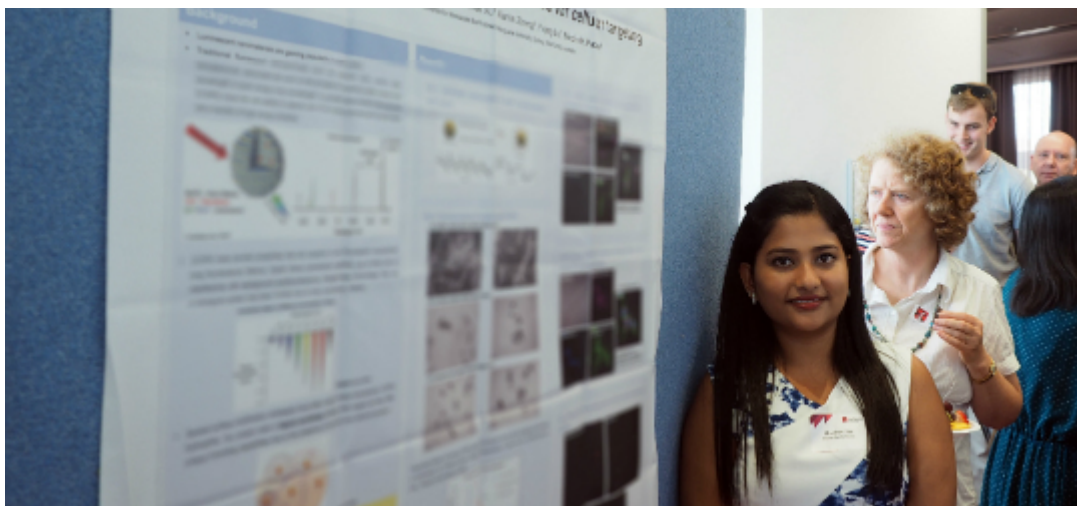
“And Macquarie University researchers will be providing cutting-edge CAD (computer-aided design), modelling and measurement technology to continually push the circuit design capability forward.”

Analog Devices hope this will help address the current shortage of microwave integrated circuit designers.

MADTRL will be augmented by additional research from other partners and also undertake foundational teaching in electronics, to create a self-sustaining critical mass of university-industry engineering activity.

Photo by [Bruce Guenter](#).

Killing it in bioscience



The first annual BioNetwork symposium—aiming to foster multidisciplinary interactions and collaborations amongst the bioscience researchers community at Macquarie—was a huge success.

The event, held last month, was attended by more than 150 people from 13 departments across the Faculties of Science and Engineering, and Medicine and Health Sciences.

The day included a unique career-building panel session moderated by Lesley Hughes, all day poster sessions, and an interactive group discussion session in the afternoon where groups of 10 to 15 multidisciplinary scientists were encouraged to find overlapping research aims, technologies and challenges.

Molecular Sciences' Dominic Kopp and Physics and Astronomy's Piotr Wargocki won the two poster prizes, with Biomedical Sciences' Michael Udoh and Molecular Sciences' Dennis Diaz close runners-up.

Co-conveners Annemarie Nadort from Physics and Astronomy, and Jennifer Fifita from Biomedical Sciences, were very happy with the roll-out of the event: "There was so much positive feedback from participants on the day."

"We've kickstarted a great many conversations and discussions, which will hopefully build new research relationships and lead to even more innovative science taking place."

Anyone with feedback on the event should contact the organising team at bionetwork@mq.edu.au.

Photo by Tony Crawshaw.

Chiro researchers in Canada



Three early-career researchers from the Department of Chiropractic took part in an intensive week-long research and leadership program at the University of Alberta last month.

Katie de Luca, Michael Swain and Matthew Fernandez are all Fellows of the [Chiropractic Academy for Research Leadership](#) (CARL), a program aiming to develop a global network of successful early-career chiropractic researchers under the mentorship of three senior academics from Australia, Canada, and Denmark; and build a mature and sustainable chiropractic research culture.

Katie, Michael and Matthew are part of the first cohort of 13 researchers from seven different countries taking part in the program.

It consists of a series of one-week residencies, bringing together the CARL Fellows in a supportive and productive environment to work on research and leadership initiatives.

In between the residential programs the Fellows work on self-initiated research projects.

"CARL has provided me with an incredible opportunity to gain additional skills in research collaboration and leadership," says Katie.

"It is a program that will undoubtedly foster future leaders. I am very fortunate to be a part of such a strong group working towards progressing chiropractic research."

[Find out more](#)

Follow the CARL Fellows on Twitter [@CarlFellows2017](#).

Research in tweets

We've been sharing snippets of our recently published research and Faculty members being mentioned in the media on Twitter.

Here are some recent highlights from [@MQSciEng](#).

RT @MQMathsStats: Read the latest @careerswithSTEM feature article on our own star @sophluidynamics as she encourages to "do as much #maths as possible," and why this will make your career matter! #careersinMaths #womeninSTEM #womeninMaths #appliedmaths QT @careerswithSTEM: See why @sophluidynamics career in fluid mechanics affects super-fast jets of the future. How will #maths make your career matter? [Read the article](#)

RT @CulumBrown: Why is it that people refuse to accept that fish feel pain? @FishLab_MQ @MQBiology @MQSciEng Fish sentence denial: Muddying the waters [Read the paper](#) #fishsci #fishwelfare

"Our data show that, even for advanced social insects, sociability is a developmental phenomenon & experience dependent." QT @MQBiology: Did you know that honey bee (*Apis mellifera*) sociability and nestmate affiliation are dependent on the social environment experienced post-eclosion? [Read the paper](#) @MQSciEng @Macquarie_Uni

RT @MQBiology: New paper - The capacity of oysters to regulate energy metabolism-related processes may be key to their resilience against ocean acidification @WileyGlobal @MQSciEng @Macquarie_Uni [Read the paper](#)

Will flying cars become a reality? We hope so! @MQEngineering's [Sammy Diasinos explains](#)

Can I get the flu from holding one of the poles on a busy bus or train? There is more evidence that flu viruses are spread mainly by aerosol droplets (through sneezing & coughing) says @MQBiology's @Jemma_Geoghegan [Read the article](#)

In a nutshell, my job is to "think about how stars live & die, & teach students about it" says @MQPhysAstro's @OrsolaDeMarco1 [Read the article](#)

With the right conversations & research focus Australia could shape the way the world approaches corporate #dataprivacy, says @computing_mq & @Data61news's Dali Kaafar #data #cybersecurity QT @CIO_Australia: How can businesses protect their customers as well as the value of data? [Read his article](#)

Faculty bulletin

New staff | Current vacancies | Flu vaccinations | Networking opportunities | Astronomy Open Night volunteers| Chiropractic clinics

Welcome to new Faculty staff

A warm welcome to all the new staff who have joined the Faculty within the past month.

Please join me in welcoming **Paritosh Giri** who has joined Physics and Astronomy as a Photonics research associate from Western Sydney University.

David Payne is a lecturer in Electrical/Energy with Engineering and joins Macquarie from UNSW.

Walid Ben Mansour joins Earth and Planetary Sciences as a postdoctoral fellow in Geophysics from the University of Leicester.

And Molecular Sciences have two new appointments.

Sinead Keaveney is a Macquarie University research fellow, joining us from RWTH Aachen University.

And **John Kalaitzis** is a postdoctoral research fellow in Natural Products Chemistry. He was previously with Microbial Screening Technologies.

Current vacancies

We're looking for a [lecturer in Computer Games](#) to contribute to research and teaching in the broad areas of video games and interactivity.

And applications are now open for [Macquarie University Research Fellowships](#), commencing in January 2019. The purpose of the scheme is to support researchers up to three years post-PhD who have an outstanding track record and show evidence of excellent research potential.

Free flu vaccinations

Don't forget all Macquarie staff are entitled to a free flu vaccination between 30 April to 1 June.

Protect yourself, your family and your colleagues from the highly contagious influenza virus by taking part in Macquarie's 2018 flu shot program.

[Book your flu shot.](#)

Opportunities for building networks with industry and government

Macquarie will be sending delegations to two events in May—the first in the area of manufacturing and the second in business technology.

Faculty researchers who are interested in building networks with industry and government are invited to either join the delegation or arrange for the Faculty Engagement Manager, [Louise McDonald](#), to speak with any exhibiting companies on the researcher's behalf.

[National Manufacturing Week](#) 9-11 May (Sydney Olympic Park)

Australia's largest manufacturing trade show and conference with over 150 exhibitors showcasing the latest products and services across all industry sectors. The exhibition is free to attend, as are the Futuremap Workshops on digital manufacturing.

[CeBIT Australia](#) 15-17 May 2018 (International Convention Centre, Sydney)

CeBIT is one of the leading business technology events in the Asia Pacific region, attracting thousands of technology professionals from industry, Government,

enterprise, SMEs and start-ups. The CeBIT technology exhibition is free (with over 300 companies exhibiting). An exhibition pass also enables access to keynote speakers and seminars on topics such as the future of AI and Machine Learning and IoT and FinTech.

Callout for volunteers at Astronomy Open Night

The Department of Physics and Astronomy are looking for Faculty staff and students to help out at their annual [Astronomy Open Night](#) on Saturday, May 19. There is the usual payment of a t-shirt and food voucher, and the added bonus of the joy of helping out. You will need to attend one or two compulsory briefing sessions before the event and arrive early on May 19 to help set up. Please email [Kelly Sharpless](#) if you wish to volunteer, detailing any previous experience you have of the event.

Chiropractic Clinics

Our [Chiropractic Clinics](#) provide a range of services for a wide cross-section of the community in Summer Hill, Macquarie Park and Eastwood. Our chiropractic interns provide a service to over 25,000 patients per year. At all times, our interns are supervised by registered senior chiropractors who have access to cutting-edge research to facilitate the development of a patient-specific Chiropractic Care Plan. Booked appointments and walk-ins are welcome!

Connect with us

If you have comments, questions or research news you think might be of interest to the rest of Faculty, I'd love to hear from you. Drop me a line at fse.execdean@mq.edu.au.

Connect with your Faculty online:

- Website: science.mq.edu.au
- Faculty on Twitter: [@MQSciEng](#)
- Barbara on Twitter: [@BarbaraMesserle](#)

Got a story?

Macquarie University NSW 2109 Australia
T: +61 2 9850 7111 / F: +61 2 9850 7433

Disclaimer: Information given is correct at the time of distribution but is subject to change without notice. The University has the right to alter the content or impose terms and conditions at any time.

[Unsubscribe](#) from this list

