ADVERTISEMENT FEATURE

SWINBURNE UNIVERSITY OF TECHNOLOGY

The more we know, the more we realize we do not know. Meanwhile, new ideas often inspire applications unintended by the researcher who came up with them.

We are the beneficiaries of a steady stream of interlinked technological evolution.

This notion underpins our strategy at Swinburne; research-led innovation must drive impact.

At Swinburne, we look for impact. We build bridges to encourage it. We connect our innovation capabilities across the university. We work with industry to solve problems. And, we foster collaboration in a way that inspires and multiplies individual efforts, because of a deep understanding of how innovation occurs.

I want to share four examples that illustrate not only Swinburne's approach, but the magic of research and discovery.

Professor Aleksandar Subic
Deputy Vice-Chancellor (Research and Development)

Read more about Swinburne's innovative world of research in our new magazine
www.swinburne.edu.au/research/research-impact

Andrew Wood (right) is helping set gobal safety standards for 5G.

GOOD CONNECTIONS

Swinburne's strong research networks make an impact on everything from 5G policy to understanding galactic lifespans.

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GALACTIC GHOSTS

Until recently, astronomers thought they had a pretty good handle on how galaxies form, grow, and eventually die. But a couple of years ago, Ivo Labbé, an Associate Professor in Swinburne's Centre of Astrophysics and Supercomputing, and his colleagues discovered that some galaxies raced through life at an astonishing speed, and died when the cosmos had barely aged beyond its first billion years.

When Labbé trained the Magellan optical telescope on a galaxy from the first billion years of our universe's existence, he was quite sure that he'd be viewing a young galaxy. But the 'young' galaxy had already grown to an enormous size and had stopped forming stars. "It was really quite unexpected," says Labbé, "It's like seeing a 200lb baby who is already old and grey, with a beard."

To confirm his confusing finding, Labbé needed access to state-of-the-art equipment. A spectrograph brought Labbé to Australia; Swinburne astronomers have privileged access to the MOSFIRE spectrograph, which sits on one of the W. M. Keck Observatory's telescopes in Hawaii. Confirmation by Labbé and his colleagues that these prematurely dead galaxies are real was published in *Nature*.

Labbé and his colleagues are now pushing two NASA space telescopes to their limits for more information. And they're keenly anticipating NASA's James Webb Space Telescope, scheduled to launch in March 2021, which will carry a spectrograph.

"James Webb will go a long way towards answering the question of how we got here in the beginning, from the first stars to the first galaxies," says Labbé. "We're on the brink of filling in that final chapter of our cosmic history."

RECONCILIATION IN THE SEA'S BOUNTY

A Research Fellow at Swinburne, Dr Emma Lee, says building a culturally-based fishery could enable Tasmanian indigenous communities to prosper economically, while maintaining traditional knowledge of sea country.

She points to a New Zealand model in which a significant proportion of commercial fishery licences are allocated to indigenous people. New Zealand has one of the world's most sustainable fisheries, worth about $1.6 billion in exports.

Lee, a *trawlwulwuy* woman from Tasmania, used an indigenous research methodology to build relationships through wide-ranging stakeholder workshops. Last year this included a seafood and indigenous storytelling event held at the annual Dark Mofo festival in Hobart. "I am a firm believer that on a full and satisfied belly we can come to understand each other as people with cultural strengths and assets," she says.

Lee's next step is to compare global examples of commercializing indigenous foods and to look at developing a specialized training centre for future indigenous fisheries.

WHAT 5G MEANS FOR OUR HEALTH

Much to the excitement of Australians, plans to roll out fast, high frequency 5G mobile communication technology were announced in 2018. Behind the scenes, studies modelling the absorption patterns of 5G electromagnetic energy in human tissue, authored by Professor Andrew Wood's Swinburne team, helped form the basis for international discussions on safety regulation and design.

"We believe the main biological effect of the electromagnetic radiation from mobile phones is a rise in temperature," Wood explains. "There are also concerns that there could be more subtle effects, such as links between long-term exposure and types of cancer. But, while there is some evidence from epidemiological and animal studies, these remain controversial."

Wood's team are yet to see red flags at, or below, the accepted electromagnetic radiation limit in current international standards on mobile technologies.

"As the frequency goes up, the depth of penetration into tissues goes down, so the skin and eyes, rather than the brain, become the main organs of concern," Wood notes.

Their plans for future work range from building skin models to biomolecular work on cells using fluorescent dye.

GETTING TO THE HEART OF ANOREXIA

Associate Professor Elisabeth Lambert (right), from Swinburne's Iverson Health Innovation Research Institute, is working to identify those most at risk of organ failure as a result of severe anorexia nervosa. An expert in neurophysiology and cardiology, Lambert uses a slightly invasive technique known as microneurography, which requires an electrode to be inserted directly into the peroneal nerve behind the knee. This allows researchers to monitor the sympathetic nervous system (SNS), which controls many of our body's base functions and activates the neuronal and hormonal stress reaction to risk known as the 'fight-of-flight' response.

Previous work had shown an elevated level of activity of nerves in the SNS of overweight, but healthy, young adults. This in turn was associated with subtle damage to the kidneys and heart.

The link for Lambert is those people with anorexia develop metabolic abnormalities that resemble that of overweight people. This includes the way lipids show up in blood tests, she says. It may be counterintuitive to think there are similarities between the impact of overeating and undereating. "But eating too much or not eating enough may put pressure on the body and impact similarly on kidney or heart function," says Lambert.

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