

# EMERITUS

*The Australian National University Emeritus Faculty e-magazine*

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## Seismic ‘ping-pong’ takes ANU team to the core of Earth’s matter

Seismologists at the Australian National University have found new evidence that there is a distinct central core within the Earth — an “innermost inner core”, a solid “metallic ball” that sits at the centre of the inner core.

Scientists say the findings are significant because the research method used provides a way of probing the innermost workings of the Earth, and may shed light on the planet’s formation. It might also help us to understand how the Earth’s magnetic field was formed, and how life can survive here and on other planets.

Until recent times it was believed that the Earth's structure comprised four distinct layers: the crust, the mantle, the outer core and the inner core. The ANU findings, published in February in the journal *Nature Communications*, confirm there is a fifth element.

“The existence of an internal metallic ball within the inner core, the innermost inner core, was hypothesised about 20 years ago,” said lead author Dr Thanh-Son Phạm of the ANU’s Research School of Earth Sciences. “We now provide another line of evidence to prove the hypothesis.”

The researchers used data captured from seismic waves caused by earthquakes to examine the deepest parts of Earth's inner core. By measuring the different speeds at which these waves penetrated and passed through the inner core, the researchers believe they've documented evidence of a distinct central core.

Professor Hrvoje Tkalčić, Head of Geophysics at the Research School of Earth Sciences, said studying the inner core can tell us more about our planet's past and evolution.

“This inner core is like a time capsule of Earth's evolutionary history,” he said. It's a fossilised record that serves as a gateway into the events of our planet's past, events that happened on Earth hundreds of millions to billions of years ago.”

The researchers analysed seismic waves that travel directly through the Earth's centre and “spit out” at the opposite side of the globe from where the earthquake was triggered. The waves then travel back to the source of the quake.

The ANU team describe this process as similar to a ping-pong ball bouncing back and forth.

One earthquake they studied originated in Alaska. The seismic waves it triggered “bounced off” somewhere in the South Atlantic Ocean before travelling back to Alaska.

The researchers studied the anisotropy of the iron-nickel alloy that comprises the inside of the Earth's inner core. Anisotropy is used to describe how seismic waves speed up or slow down through the Earth's inner core depending on the direction of travel. It could be caused by different arrangement of iron atoms at high temperatures and pressures or preferred alignment of growing crystals.

They found the bouncing seismic waves repeatedly probed spots near the Earth's centre from different angles. By analysing the variation in travel times of seismic waves for different earthquakes, the scientists infer that the crystallised structure within the inner core's innermost region is likely to be different from the outer layer. They say this might explain why the waves speed up or slow down depending on their angle of entry as they penetrate the innermost inner core.

The ANU team say the findings suggest that there could have been a major global event at some point during Earth's evolutionary timeline that led to a significant change in the crystal structure or texture of the Earth's inner core.

“There are still many unanswered questions about the Earth's innermost inner core, which could hold the secrets to piecing together the mystery of our planet's formation,” Professor Tkalčić said.

John Tarduno, Professor of Geophysics at the University of Rochester, told the *Washington Post* that learning the origins of the inner core layers can help scientists to understand more about how the Earth's magnetic field formed.

“The formation of the inner core was extremely important for creating a long-term habitable planet because the inner core powered the magnetic field, which powered magnetic shielding,” Professor Tarduno said. “Without that, we would have gradually lost water from the planet.”

Learning more about the inner core “in turn can help teach us more about how other planets might or might not be habitable.”

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## Scientists find ‘blind’ quake faultline

Scientists at the Australian National University have found that a previously unknown faultline caused Victoria's largest earthquake since record-keeping began two centuries ago.

The 5.9-magnitude Woods Point earthquake in September 2021 started 15 kilometres deep, and was caused when an unknown or “blind” fault ruptured. The fault likely lies deep within the earth's crust, without any surface exposure.

The Woods Point quake was larger than the 5.6-magnitude Newcastle earthquake in 1989, which killed 13 people and caused some \$4 billion worth of damage. It caused only relatively minor damage, however, because its epicentre was about 130 kilometres from Melbourne.

“We’re quite lucky that the earthquake didn’t happen near a more populated area,” said lead researcher Dr Sima Mousavi, a seismologist at the ANU Research School of Earth Sciences.

“One can imagine the scale of the disaster if an earthquake similar in size to the 5.9-magnitude tremor that hit Woods Point were to strike directly beneath Melbourne.”

Tremors from blind faults are relatively common. Blind faults caused the 7.4-magnitude Tabas earthquake in eastern Iran in 1978, which killed more than 15,000 people, and the 6.7-magnitude Northridge, California, quake in 1994.

The discovery of this new fault will be used in seismic hazard assessments in Victoria, which are important tools for land-use planning, emergency response, and the design of building codes.

“Blind faults can pose a significant threat as they can generate large earthquakes, but they are hidden from us,” Dr Mousavi said. “This can make it difficult to identify areas that are at risk from earthquakes, which can be dangerous for communities living nearby.”

The data behind the discovery was gathered primarily from equipment installed in schools as part of the ANU Australian Seismometers in Schools (AuSIS) program, which is funded by AuScope.

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## Record surplus for universities in 2021

Australian universities made a record \$5.3 billion surplus during the Covid pandemic at the same time as costs and employee benefits were cut, *The Guardian* reported on 3 March.

The report cited finance data released by the federal Department of Education, which showed \$38.9 billion in revenue across the tertiary education sector in 2021, with all but three universities reporting a net surplus.

The surplus has been between \$1 billion to \$2 billion in the past decade. The sector barely broke even in 2020. The 2021 results were a substantial improvement from 2020, when 16 universities recorded deficits.

However, the report said that universities continued to cut their budgets as revenues rose. Expenses across the sector were \$33.6 billion in 2021, down from \$33.9 billion in 2020 and \$34.2 billion in 2019.

Employment was seriously affected, the report said, with expenses down by 5 per cent, including 4.6 percent for academic staff and 6.7 per cent for professional staff.

International student fees were down by 5.4 per cent but still contributed \$8.7 billion to university revenue, the most substantial income stream after federal government funding, which contributed \$20.2 billion.

The national president of the National Tertiary Education Union, Dr Alison Barnes, told *The Guardian* that spending on staff as a proportion of income was at “almost historic lows”.

# Accord discussion paper asks: what future for higher education?

The structure of Commonwealth funding needed to sustain the higher education sector over the next two decades is one of 47 questions posed to potential contributors by the Australian Universities Accord Panel in the discussion paper issued in February.

In its wide-ranging paper, the panel also asks how an Accord might be structured to meet the challenges facing the higher education system, and what is needed to overcome limitations in the current approach. In addition, it asks what major national challenges and opportunities the higher education sector should focus on meeting, looking forward to 2040. Do the current structures of institutions, regulation and funding help or hinder Australia's ability to meet these challenges, it asks, and what needs to change?

As well, the panel seeks comment on determining the best ways to achieve and sustain growth in Australian higher education, given the changing needs of the population and the current pressures on public funding.

The panel was appointed in November by the Minister for Education, Jason Clare, to move forward with the government's ambition to build a long-term plan for the higher education sector.

"It is the first broad review of the higher education system since the Bradley Review," he said at that time, calling it "an opportunity to look at everything from funding and access, to affordability, transparency, regulation, employment conditions and how higher education and vocational education and training can and should work together."

He appointed Professor Mary O'Kane, AC, a former Vice-Chancellor of the University of Adelaide and NSW's first Chief Scientist, to lead the panel, which includes Professor Barney Glover AO, Vice-Chancellor of Western Sydney University; Ms Shemara Wikramanayake, Managing Director and Chief Executive Officer of Macquarie Group; Jenny Macklin, former federal Minister for Families, Community Services and Indigenous Affairs; Distinguished Professor Larissa Behrendt AO, Director of Research at the Jumbunna Indigenous House of Learning at the University of Technology, Sydney; and Fiona Nash, Regional Education Commissioner and former federal Minister for Regional Development, Regional Communications and Local Government and Territories.

The terms of reference for the review touch seven main themes:

- Meeting Australia's knowledge and skills needs now and in the future
- Access and opportunity
- Investment and affordability
- Governance, accountability and community
- The connection between the vocational education and training and higher education systems
- Quality and sustainability, and

- Delivering new knowledge, innovation and capability.

The introduction to the discussion paper notes that the panel had been asked to be “bold in recommendations that will enable the system to meet Australia’s priorities and needs, now and in the future”.

“The task includes identifying achievement targets for the future system and making recommendations on how an Accord process should be structured and focused to achieve effective change, build stronger working relationships across the system, and strengthen the system’s ability to meet future challenges,” it continues.

The paper says that panel has already had many discussions with stakeholders, experts and sector leaders, and received over 180 submissions and 1,900 survey responses to the consultation request on the terms of reference.

In calling for input, the panel asks the community to consider the context of the current standing and quality of Australian institutions and the major changes under way in our society, economy and environment.

It will provide an interim report to the minister in June in which it expects to articulate priorities and directions for the system, and present options for how those priorities can be met to create enduring reforms for the long-term benefit of Australian higher education and the community.

Submissions are open until 11 April and can be made at [https://submit.dese.gov.au/jfe/form/SV\\_eeTGe7Siz5qBEcm](https://submit.dese.gov.au/jfe/form/SV_eeTGe7Siz5qBEcm) until 11 April 2023.

The discussion paper can be found at <https://www.education.gov.au/about-us/consultations/consultation-discussion-paper>.

Submissions received by the panel in developing the Discussion Paper can be found at <https://www.education.gov.au/australian-universities-accord/consultations/higher-education-review>.

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## **Universities have ‘crucial’ role in defence transformation**

Australian universities “are a crucial partner of government in Australia’s defence transformation” and would have a central role in training the workforce needed to deliver the nation’s AUKUS nuclear submarine plan, Universities Australia has said.

Most of the 20,000 jobs that the project are expected to create will require university qualifications. “AUKUS looms as one of the greatest industrial challenges in our history,” said Universities Australia Chief Executive Catriona Jackson.

“Universities have a critical role to play in providing the highly educated workers required for its success,” she said. “The knowledge and skills needed at every stage of the plan are taught in our institutions.

“We’ve been in close discussion with our government, including through the Defence Strategic Review, and AUKUS partner governments at the highest levels, on how universities can boost the flow of highly educated workers needed to boost our capability in the interests of all.”

# Academy medals for ANU science ‘stars’

Four researchers from the Australian National University have been honoured with medals from the Australian Academy of Science, part of the academy's annual program to recognise Australia's “stars of science”.

Distinguished Professor Susan Scott, Professor Si Ming Man, Professor Yuerui (Larry) Lu and Distinguished Professor Richard Hartley have received the awards for outstanding contributions to science and career accomplishments.

Distinguished Professor Scott was awarded the Thomas Ranken Lyle Medal for her work to advance understanding of gravitational waves and the fabric of space-time. Her discoveries probe the existence and nature of singularities and the structure of space-time, as well as cosmological models representing the beginning and end of the universe. She also played a leading role in Australia's participation in the first direct detection of gravitational waves in 2015.

Professor Man received the Gottschalk Medal for research that has significantly advanced understanding of inflammation as an underlying mechanism of health and disease. His work on the human immune system and infectious disease has improved health outcomes and could shape the way inflammatory diseases and cancers are treated.

The Pawsey Medal for outstanding research in physics was awarded to Professor Lu for discoveries that could lead to advances ranging from 3D cameras for smartphones to more efficient satellite electronics and space missions. His team at ANU has developed new types of atomically thin 2D materials and devices with peculiar optical and electronic properties, enabling new applications in electronics, photonics and space.

Distinguished Professor Hartley received the Hannan Medal for pioneering work on multiview geometry, which establishes the construction of 3D models from sets of images or videos. This technology allows the construction of models of cultural or archaeological sites, as well as city and anatomical models. It also facilitates robot navigation in complex environments, and production of real models of objects through scanning and 3D printing.

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## Assessing present and future in the Middle East

Emeritus Faculty member Professor Amin Saikal, Adjunct Professor at the University of Western Australia, will examine current and emerging tensions in the Middle East in his presentation ‘Stability and Threat in the Middle East’ at the ANU Emeritus Faculty Collegiate Lunch and Lunchtime Talk on Wednesday, 5 April.

The strategically important region has been an arena of regional and major-power rivalry since World War II. The presentation focuses on two questions: How stable is the Middle East today compared with its turbulent past, and what are the main sources of threat that could affect its future direction?

The session, in the Molony Room, 24 Balmain Crescent, will begin at noon for the presentation to start at 12.30.

## **John Stewart Turner**

**11 January 1930 – 3 July 2022**

Professor J. S. (Stewart) Turner died in Canberra on 3 July 2022, aged 92. Professor Turner was an eminent figure in fluid dynamics and the physics of atmospheric, oceanic and geological flow phenomena. He came to ANU in 1975, in his mid-career, and established the new discipline of geophysical fluid dynamics in the Research School of Earth Sciences.

Stewart completed his undergraduate degree in physics at the University of Sydney, followed by a Masters thesis in theoretical nuclear scattering. He began his research career in the Cloud Physics group of the CSIRO Division of Radiophysics, a job that included trips to the summit of Mauna Loa, Hawai'i, to measure the size of raindrops. He always fondly remembered this formative experience. In 1954 Stewart commenced a PhD at the University of Cambridge, where he worked in the Department of Applied Mathematics and Theoretical Physics with Sir G. I. Taylor, one of the most influential scientists of the 20th century in fluid dynamics and wave theory. Thus began the most notable and influential period of Stewart's career, in which he contributed to a golden age of developments in turbulence, convection and processes that govern the dynamics of the atmosphere and ocean.

Stewart's first major scientific contribution provided a simple, insightful way to describe the extremely widespread and complex process of turbulent mixing or entrainment. He was initially interested in buoyant atmospheric plumes, which entrain surrounding air and expand with height, changing their density relative to their surroundings. He showed that the rate of entrainment is directly proportional to the velocity difference between plume and surrounding air at each height (a principle known as Taylor's hypothesis), and the coefficient of proportionality became known as the "entrainment constant". His work also showed that behaviour of convection and turbulence at scales from a few centimetres in the laboratory to tens of kilometres in the atmosphere were dynamically similar, or equivalent, and that the bulk flows are predictable.

After completing his PhD, Stewart worked as a postdoctoral research fellow at the University of Manchester's Department of Mechanics of Fluids, where he worked on the problem of methane layers and ventilation in coal mines. In 1960 Stewart returned to his position at CSIRO but in 1961 he accepted a position at Woods Hole Oceanographic Institution on Cape Cod, USA, as Rossby Fellow, and then as Associate Scientist in the Theoretical Oceanography Department. There he described how the depth of the surface layer of the oceans (a layer that is generally well mixed by turbulent motions generated by convection and surface wind stress) varies as a result of the interactions of turbulence with the underlying gravitationally stable density stratification. He also became deeply interested in convection driven by competing effects of temperature and salt gradients. This process was termed "double-diffusive convection" and over the following decades was found to occur throughout large tracts of the oceans, as

well as in many lake and industrial settings. Stewart became the world's principal expert on the phenomenon.

In 1966 Stewart moved back across the Atlantic to Cambridge as Assistant Director of Research in the Department of Applied Mathematics and Theoretical Physics, but regularly spent time back at Woods Hole as Visiting Investigator. During this period he wrote the influential Cambridge University Press monograph, *Buoyancy Effects in Fluids*, published in 1973. The book cemented his leadership position in density-driven flow and geophysical flow problems and today remains a treasure trove of insights for students and established researchers alike.

In 1975 Stewart was enticed by the first Director of RSES, Professor Anton Hales, to accept a position as Foundation Professor of Geophysical Fluid Dynamics at the ANU's new Research School of Earth Sciences. The school aimed to establish atmosphere or ocean research and the new professor rapidly developed a well-known research group that has now grown to include global ocean modelling for the ocean's role in climate change. Stewart's own research at ANU continued in a range of oceanic problems, including the melting of icebergs (which depends on mixing of the released freshwater into the surrounding saline ocean), processes that transport heat laterally across fronts between warm, salty water and cooler, slightly fresher water in the oceans, and explaining an anomalous vertical heat transport measured in the Arctic Ocean. However, much of his research effort was soon diverted to geological fluid flow processes. At ANU Stewart was surrounded by people drawn from a different range of disciplines and working in a range of more "geological" areas of earth sciences. He immediately saw fluid mechanics problems everywhere.

In a casual conversation over morning tea soon after Stewart's arrival at ANU a Professor of Economic Geology appointed at the same time as Stewart, L. Gustafson, asked him what happens when hot, salty water flowed from an ocean floor vent. Stewart pointed out that mixing between the hot brine and seawater was non-linear and under some conditions the mixture could be denser than both seawater and the brine, so the mixture might pond in depressions in the sea floor, where it would then lose heat through a double-diffusive density interface bounded by convection. The dissolved metals could then precipitate to form ore deposits. Stewart explored the possibilities, through laboratory experiments, and the subsequent paper was arguably the beginning of a surge in developments in an area that became known as "geological fluid mechanics". The fluid dynamics of black smokers (chimney stacks of crystallised minerals rich in metals such as copper, zinc and gold found on the sea floor) continued to interest Stewart for many years. In collaboration with Dr I. H. Campbell of RSES, he successfully modelled black smoker chimneys and showed that most of the metals, produced during turbulent entrainment of vast quantities of seawater into the jet or plume of brine, are dispersed into the ocean rather than deposited at the seafloor, as had previously been thought. Efficient metal deposition only occurs at the seafloor if non-linear mixing produces a mixture that is denser than seawater, and they established the conditions under which this happens.

Another major area in which Stewart Turner led a revolution in established ideas is the cooling and crystallisation of melts in magma chambers within the



earth's crust. His interest was again stimulated by conversations with geologists. With visiting collaborators such as volcanologist R. S. J. Sparkes and fellow fluid dynamicist H. E. Huppert, Stewart showed that fractional crystallisation of some of the chemical components can lead to convection as a series of horizontal convection layers separated by stable double-diffusive density interfaces. This is another manifestation of the layered "double-diffusive convection" Stewart had studied in the ocean. Previously it had been assumed by geologists that convection would lead to homogenisation of the magma in a chamber rather than zoning. Stewart was amused when some geologists nicknamed the process "doubly-confusing convection". Working with Ian Campbell for many years, Stewart explored the implications of coupled crystallisation and convection for chemical differentiation, recharge, mixing and cooling in magma chambers, as well as for the composition of erupted volcanic rocks and even as the cause of explosive eruptions.

Stewart was elected Fellow of the Australian Academy of Science in 1979 and Fellow of the Royal Society in 1982 for his pioneering work on turbulent convection, entrainment in stably stratified flows, and mixing across density interfaces.

Stewart always strongly promoted the skill of identifying key ingredients that govern a problem, whether it was in engineering or global circulation. He demonstrated throughout his career the power of formulating simple mathematical analyses along with artful experimentation in providing a deeper understanding of the physics. Although Stewart was occasionally involved in field experiments and even observed thermohaline convection layers in the North Atlantic from a two-person submersible, he particularly liked laboratory experiments and designed most of his work around their power to test theoretical hypotheses. In order to predict geophysical behaviour and to test those predictions using small, laboratory scale experiments he was a master of using the principles of dynamical similarity – meaning that the actual size of a flow is not relevant, as it is the relative contributions of forces that are important in determining the dominant physics. At the same time one of his favourite sayings was that "the best laboratory experiments are the ones that give unexpected results". Another of his sayings along the same lines (but likely thinking of rigid formulae for research proposals) was: "If I knew the outcome of my research there would be no point in doing it."

After his "retirement" in 1995 Stewart was appointed Emeritus Professor at ANU, where he continued to be engaged in research for over a decade. One of his final published articles, on the occurrence of white-caps in the wave field approaching surf beaches, pleased him especially as it was the result of collaboration with his youngest son, Ian. Stewart was always a remarkably generous and wise colleague and supervisor. He never put his name on publications by his students or postdoctoral researchers. Graduate students in the research group sometimes referred to him as "Yoda", referring to the holder of wisdom. He maintained a cohesive, collaborative and friendly research group while also collaborating internationally and across disciplines with experts in volcanology and geochemistry. He always maintained his hands-on involvement in experiments in the laboratory. Overall Stewart contributed enormously to fluid dynamics, atmospheric physics, oceanography and geological sciences globally, and he added enormously to the strength of fluid

dynamics in Australia. He was awarded the Australian Academy of Science's Mathew Flinders Medal and Lecture by the Academy in 1990. He has left a legacy of truly amazing insights and set a superb example for all of us lucky enough to have worked beside him. Stewart is survived by his wife, Sheila, and three children, Bruce, Sandra and Ian.

— Ross Griffiths



## **Ralph Gerard Ward**

**20 May 1933 - 16 January 2023**

Ralph Gerard Ward, known widely as Gerry, came to the ANU in December 1971 as the Foundation Professor of Human Geography in the Research School of Pacific Studies. The new department was created by the separation of the Department of Geography into the Department of Human Geography and the Department of Geomorphology and Biogeography. In 1980 he became the Director of the Research School of Pacific Studies and remained in that position until 1993. When he resigned from that position he returned to the Department of Human Geography, where he was Head of Department and Professor until his retirement in 1998.

Gerry Ward was born on 20 May 1933, in Taupo, a small town on the shores of the large volcanic lake in the centre of the North Island of New Zealand. Gerry's father, Ralph Ward, had been gassed in France in 1918 and settled in Taupo for the climate. He had studied law before the war and, despite periods of illness, became involved in local government and newspapers. He published newspaper articles on local Māori history and the Taupo landscape, and owned a launch that was used for fishing trips, to carry freight across the lake and for family camping trips. The lake, the Taupo landscape and the Māori community played an important part in Gerry's childhood and led to his lifelong interest in land and society. He attended Taupo Primary School and Kings College in Auckland.

From Kings College, Gerry entered Auckland University College and was awarded a BA in 1954 with the prize in geography. He then completed a two-year Masters degree with First Class Honours in 1956 that included a thesis on development of land around Lake Taupo that was published in the *New Zealand Geographer*. He became a Junior Lecturer in Geography at the University of Auckland. During this period, he also fulfilled his compulsory military training in the Royal New Zealand Artillery Regiment. The Auckland Geography Department had a research project in Western Samoa led by Professor Ken Cumberland and Gerry offered to fill the need for a field assistant and so was introduced to the Pacific, where he was to work for the rest of his life. From this work he published a paper on Samoa's banana industry and three chapters on village agriculture in J. W. Fox and K. B. Cumberland, *Western Samoa: Land, Life and Agriculture in Tropical Polynesia* published in 1962.

In 1957 Clifford Darby, Professor of Geography at University College London, visited Auckland and read Gerry's Masters thesis. He offered Gerry a year-long research assistant post at UCL that was used to provide promising graduates with the opportunity to undertake research. Gerry took leave from his

lectureship at Auckland to take up a year of postgraduate studies at University College London in 1958. The Samoan work on village population and land use influenced him to apply for a Colonial Social Science Research Grant to go to the British colony of Fiji, where he completed an outstanding fieldwork-based study of the distribution of the Fijian and Indian populations and their occupation and use of land. He presented a thesis to the University of London which was published by Her Majesty's Stationary Office as *Land Use and Population in Fiji: a Geographical Study*, in 1965. This work anticipated the conditions in Fiji that ultimately led to the military coup of May 1987. Gerry maintained a strong research interest in Fiji until his retirement and published on the contrasts between the Fijian and Indian rural economies, the leasehold system for Fijian land and the way in which land tenure influenced the sugar and copra industries. A two-sheet 1:250,000 land use map of Fiji published by the Directorate of Overseas Surveys was another outcome of this work. Both maps were reprinted in 1976.

Gerry stayed on as a lecturer at the University College London from 1961 to 1967. During this period his recognition of the importance of historical change that he had developed as a young man at Taupo, where pre-European Māori settlement remained accessible, led him to become the editor of the eight-volume *American Activities in the Central Pacific between 1790-1870*, published by Gregg Press in the USA, in which the contacts between islanders and the crews of whaling and trading ships were documented in detail. This work is available for those interested in the spread of diseases, the emigration of islanders and early change in the Pacific. From London he visited the Department of Geography at the University of Minnesota in 1964 and the University of Victoria in Canada in 1966.

Gerry met Marion Solly at Auckland University in 1952 and again in 1958 in Singapore, where she was doing postgraduate fieldwork from the University of Minnesota and where Gerry was on his way to London. They married in Minnesota in 1959, spent time in Fiji where Gerry was on fieldwork, and returned to Auckland where Marion had been appointed as a lecturer in geography and Gerry had been promoted. So began joint careers in which they juggled their individual academic appointments, fieldwork and consultancies, around raising their family. Together they co-authored one book, a book chapter, two peer-reviewed journal papers and two consultancy reports.

In 1963, at Minister Hasluck's request, Oskar Spate, then Professor of Geography at ANU, joined George Currie, former Vice-Chancellor at the Universities of Western Australia and New Zealand, and John Gunther, Assistant Administrator of Papua and New Guinea, to determine whether a university should be established in Papua New Guinea. The University of Papua New Guinea (UPNG) accepted its first students in 1966. Aware of Gerry's Fijian research through his own work there and his association with University College London, Oskar Spate recommended Gerry's appointment as the foundation Professor of Geography at UPNG in August 1967. The UPNG Department of Geography became staffed with outstanding academics who were committed to the creation of an educated cadre of teachers and public servants in the new nation. Included were: Bill Jonas, later to become the Aboriginal and Torres Strait Islander Social Justice Commissioner as well as Race Discrimination Commissioner in Australia; David Lea, an ANU graduate

and later a professor at the University of New England; William Clarke, to become a professor at Monash University and the University of the South Pacific; and Richard Jackson, to become a professor at James Cook University and an expert on mining in developing countries. Field trips and training in how to do research in rural areas were a feature of the department begun under Gerry's leadership.

UPNG had very close relations with ANU. ANU Vice-Chancellors Sir John Crawford and Peter Karmel were both Chancellors of UPNG, a number of the teaching staff were ANU postgraduates, and the ANU's New Guinea Research Unit, where Marion Ward was the director, was adjacent to the UPNG campus. When the ANU Research School of Pacific Studies' Department of Geography was divided in two in 1971, Oskar Spate was the Director of the school. At the age of 37, Gerry Ward was appointed the first Professor of Human Geography. He was awarded the PNG Silver Jubilee Medal for his services to UPNG. He retained strong formal connections with that university as a member of the UPNG Council from 1985 to 1996. Gerry began to supervise ANU postgraduate students while still at UPNG. During his time as Head of Human Geography, 24 students graduated with PhDs, many of whom Gerry supervised directly. He has been described as a "genial and supportive" supervisor.

Between 1971 and 1998 Gerry wrote (and edited) 16 books and monographs, 35 papers in peer-reviewed journals and 34 chapters in edited books. Included are the first atlas of PNG with David Lea and two monographs on Port Moresby. In retirement he wrote another three books, 20 papers and book chapters and eight other papers and conference presentations. In this work Gerry maintained his Pacific focus, often revisited his earlier studies to document change, and covered a broad range of subjects: population change, migration, rural-urban movement, agricultural change, rural development and markets, land tenure and the development of towns, and the settlement history of the Pacific, including the use of computer simulations to assess whether Pacific Island voyages between islands and to New Zealand were deliberate or were accidental drift voyages. He also applied this method to enquire into whether coconuts could have drifted across the Pacific or were carried by people.

Gerry carried out a number of consultancies in the Pacific, Fiji and Samoa. Notable was the 1978-79 South Pacific Agricultural Survey for the Asian Development Bank, the final report published as a book co-authored with Andrew Proctor in 1980, *South Pacific Agriculture: Choices and Constraints*. He led two studies of growth centres and markets in the PNG highlands, carried out a Special Study on Food Supply and Distribution Systems in the South Pacific in 1981 with his wife Marion Ward, and with her in 1986 reported on the development of the social sciences at the National University of Western Samoa. In 1989 he wrote a report on tourism opportunities in the Pacific, and was a member of the Group of Eminent Persons that reviewed the inter-governmental structure of the Economic and Social Commission for Asia and the Pacific (ESCAP). In 1991 Gerry reported to the South Pacific Forum Secretariat on the subsistence sector of Western Samoa, and was a member of the committee that reviewed the University of the South Pacific for the Commonwealth Fund for Technical Cooperation. In 2003 and 2004 he wrote two further reports on the same university.

Over the same period, Gerry served on numerous scholarly bodies in the Pacific, Australia and internationally. In 1974, while still in PNG, he was made a Fellow of the Academy of Social Sciences in Australia. He greatly valued the academy's multi-disciplinary character and through it widened his range of scholarly contacts across Australia. Between 1983 and 1986 he was particularly involved in the multi-disciplinary Australia and the South-West Pacific Project. The project brought together Australian and Pacific Islands administrators, academics and private individuals to consider basic questions underlying social, economic and political issues and tension in the Pacific. He was also Chair of Panel A of the Academy from 1997 to 2000. Between 1991 and 1995 he was Chair of the Australia-China Exchange Committee, and between 1993 and 2001 was a member of the International Relations Committee of the academy.

Gerry was also President and Vice-President of the Pacific Science Association, President and Vice-President of the Institute of Australian Geographers, and was awarded the Institute's Australian-International Medal in 2016. He was a member of the councils of the University of Samoa and the University of Papua New Guinea. He participated in 20 reviews of departments of the ANU, in addition to reviews of university departments at Sydney University, Victoria University of Wellington and the University of Auckland.

Relatively late in life Gerry obtained a private pilot's licence and, with Sue Serjeantson, edited *And Then the Engines Stopped*, a collection of personal accounts of flying in light aircraft in Papua New Guinea, which all had happy endings. With Marion Ward, he also edited a collection of his father's articles on Taupo, *Taupouui a Tia: Tales of the Taupo Country*, for the Lake Taupo Museum and Art Gallery.

I first met Gerry in Port Moresby in 1970 at the ANZAAS conference held at UPNG. When I returned in 1971 as an ANU postgraduate scholar, he was still at UPNG but had been appointed Professor of Human Geography and was my supervisor. He and Marion were warmly hospitable to my family and me, and in 1972 Gerry and daughter Lesley visited us in our village house near Dreikikir in East Sepik Province to review my PhD fieldwork. Gerry slung his large South American hammock across our house but woke in the night to find himself lying on the floor. The walls of our bush materials house had moved inwards and lowered him gently to the floor. Back in Canberra, Gerry and Marion's hospitality continued and Gerry's management of slow thesis-writing and fractured grammar was continually good-humoured and sympathetic.

Gerry died on 16 January 2023 in Adelaide, where he and Marion had moved to be near their two daughters, Lesley, a mathematician and Alison, a senior physician. Son Derek lives in Denmark.

— Bryant Allen

## Diary dates

### *Romantic masters at Canberra festival*

Ukrainian-born Australian pianist Alexander Gavrylyuk will present a program of Beethoven, Schumann, Liszt, Chopin, Brahms and Saint-Saens on 3 May as part of the Canberra International Music Festival. Gavrylyuk has performed widely in solo recitals and as a soloist with orchestras across Europe. He was awarded first prize and Gold Medal at the 1999 Horowitz International Piano Competition and the following year took first prize in the Hamamatsu International Piano Competition in Japan. In 2005 he received the Gold Medal at the Arthur Rubinstein International Piano Masters Competition in Tel Aviv. The Canberra festival, which will run from Thursday, 27 April till Sunday 7 May, also features three performances by the renowned Brodsky Quartet, which is celebrating a half-century of music-making. The festival will be held at several venues across Canberra. More information can be found at [cimf.org.au](http://cimf.org.au).

### *Meet the Author events*

**March 28, 6pm:** MacArthur award winning inventor and engineer Saul Griffith will discuss his Quarterly Essay, *The Wires that Bind: Electrification and Community Renewal*, with Emma Aisbitt. The essay offers a compelling vision of green energy at a local level. Cinema, Kambri Cultural Centre.

**April 3, 6pm:** Editors Brendan McCaffrey, Michelle Grattan and Chris Wallace will discuss their book *The Morrison Government. Governing through Crisis, 2019–2022*, with Mark Kenny. In this book, contributors assess the policies and leadership of the Morrison government. In a period defined by the Covid-19 pandemic, how did the Morrison government perform from its surprise 2019 election win to the 2022 poll? How did policy and administration fare during this tumultuous political period? Was Australia's national government resilient in the face of the pandemic challenge, and how were its operations reshaped? Leading journalists and scholars, including Karen Middleton, Michelle Grattan, Chris Wallace, Julianne Schultz, Katharine Murphy, Stephen Duckett, Brendan McCaffrie, Stan Grant, Geoffrey Watson and Renée Leon attempt to answer these questions. Michelle Grattan is a professorial fellow at the University of Canberra and chief political correspondent for *The Conversation*. Brendan McCaffrie is senior research fellow at the Centre for Change Governance, University of Canberra. Dr Chris Wallace is a professor at the Faculty of Business Government and Law, University of Canberra, and author of *Political Lives. Australian Prime Minister's and their Biographers*. The vote of thanks will be given by John Warhurst, Emeritus Professor of Political Science at ANU. Cinema, Kambri Cultural Centre.

**April 11, 6pm:** Pip Williams will talk about her new novel, *The Bookbinder of Jericho*, with Karen Viggers. In this companion to the international bestseller *The Dictionary of Lost Words*, Pip Williams explores a slice of history seen through women's eyes. In 1914, when war draws the young men of Britain away to fight, it is the women who must keep Britain running. Two of them are Peggy

and Maude, twins who work in the bindery at Oxford University Press in Jericho. Peggy is intelligent, ambitious and dreams of studying at Oxford University, but for most of her life she has been told her job is to bind the books, not read them. Maude, meanwhile, wants nothing more than what she has. She is extraordinary but vulnerable. The arrival of refugees from Belgium sends ripples through the community. Peggy begins to see the possibility of a future where she can use her intellect and not just her hands, but as war and illness reshape her world, it is love, and the responsibility that comes with it, that threaten to hold her back. *The Bookbinder of Jericho* is a story about knowledge, who gets to make it, who gets to access it, and what is lost when it is withheld. Pip Williams was born in London, grew up in Sydney, and lives in the Adelaide Hills. She has spent most of her working life as a social researcher. She is the author of *One Italian Summer*, a memoir of her family's travels in search of the good life, and *The Dictionary of Lost Words*, based on her research in the Oxford English Dictionary archives, and which has sold over 260,000 print copies. Canberra veterinarian Karen Viggers is the international best-selling author of four novels: *The Stranding*, *The Lightkeeper's Wife*, *The Grass Castle* and *The Orchardist's Daughter*. Associate Professor Amanda Laugesen, Director of the Australian National Dictionary Centre, ANU, will give the vote of thanks. Cinema, Kambri Cultural Centre.

**April 18, 6pm:** Michelle Arrow will moderate a conversation on *Women and Whitlam: Revisiting the Revolution*, with three of the book's contributors, Marie Coleman, Elizabeth Reid and Marian Sawer. This volume examines the contribution of the Whitlam government to advancing women's rights and asks why the scope and scale of the reforms are often overlooked. The Whitlam administration appointed a women's advisor to national government — a world first — and reopened the equal pay case. It extended the minimum wage for women, introduced the single mother's benefit and paid maternity leave in the public service, ensured cheap and accessible contraception, funded women's refuges and women's health centres, introduced accessible, no-fault divorce and the Family Court, and much more. Margaret Jolly will give the vote of thanks. Kambri Cultural Centre.

**May 4, 6pm:** Tracey Spicer will discuss her new book, *Man-Made: How the Bias of the Past is Being Built into the Future*, with Michelle Ryan. Kambri Cultural Centre.

**May 10, 6pm:** Robyn Cadwallader will be in conversation with Nigel Featherstone about her new novel, *The Fire and the Rose*, a story set in medieval Lincoln. Vote of thanks by Sally Pryor. T2, Kambri Cultural Centre.

**May 17, 6pm:** John Blaxland and Clare Birgin will talk about their book *Revealing Secrets: An Unofficial History of Australian Signals Intelligence and the Advent of Cyber*. Cinema, Kambri Cultural Centre.

**May 23, 6pm:** Journalist Stan Grant will discuss his new book *The Queen is Dead*, with Mark Kenny. *The Queen is Dead* looks at the legacy of colonialism for indigenous people and calls for an end to monarchy in Australia, the need for a republic, and what needs to be done—through the Voice to Parliament and beyond—to deal with the past. Manning Clark Theatre, Kambri Cultural Centre.



**June 7, 6pm:** Karen Middleton will talk with Christine Helliwell and Mark Willacy about their books *Semut* and *Rogue Forces*, winners of the 2022 Prime Minister's Awards for Australian History and Non-Fiction, respectively.

ANU/*Canberra Times* Meet the Author events are held in association with Harry Hartog Bookshop. Books are available for purchase before and after each event. Pre-event book signings will be available from 5.30pm and again after the event. Registration is required and can be made at Registrations at [anu.edu.au/events](http://anu.edu.au/events). In line with ANU's Covid policy, masks are no longer required. Enquiries to the convenor, Colin Steele, at [colin.steele@anu.edu.au](mailto:colin.steele@anu.edu.au).

## *Exploring identity through portraiture*

*Portrait 23: Identity*, an exhibition at the National Portrait Gallery that opened on 10 March, will run till August. The exhibition brings together new work from 23 artists and collectives taking ambitious approaches exploring who they are and what it means to represent themselves, their communities, histories and contemporary society. Street art, textiles, performance, photography, ceramics, painting, drawing, soft sculpture and bronze works challenge the boundaries of portraiture.

## *Feminine power in the world's cultures*

More than 160 objects drawn from the collections of the British Museum are featured in *Feared and Revered: Feminine Power through the Ages*, the major exhibition at the National Museum of Australia. The exhibition explores the power and diversity of female spiritual beings in cultural traditions and beliefs around the world and shows how goddesses, demons, witches, spirits and saints have shaped understanding in a variety of cultures. Exhibits span six continents and 5,000 years, from 2800 BCE to the present. The exhibition closes in August.

## Items of note

### *ANU professor first Indigenous CSIRO board member*

Professor Alex Brown, Professor of Indigenous Genomics at the Telethon Kids Institute and the Australian National University, has been appointed by the Australian Government as a part-time member of the Board of the Commonwealth Scientific and Industrial Research Organisation.

Professor Brown, a member of the Yuin nation, is the first Indigenous scientist appointed to the CSIRO Board. Professor Brown is an internationally recognised clinician and researcher who has worked in Aboriginal and Torres Strait Islander health for his entire career.

The CSIRO Board is responsible to the government for the overall strategy, governance and performance of CSIRO. Professor Brown's experience in working with Aboriginal communities and bridging connections across science ecosystems would strengthen the CSIRO's leadership, the Minister for Industry and Science, Ed Husic said when announcing the appointment.



Mr Husic said Professor Brown's appointment would bring a wealth of experience to CSIRO and signalled generational change on the board. "Professor Brown has dedicated his research career to understanding and overcoming health inequalities experienced by Aboriginal and Torres Strait Islander Australians, particularly the burden of chronic conditions," Mr Husic said. "While he is the first Indigenous scientist appointed to the CSIRO board, I know he won't be the last."

## *Universities Australia welcomes closer India links*

Universities Australia has welcomed the Federal Government strengthening Australian and Indian economic and cultural ties, following the visit by the Prime Minister, Anthony Albanese, and senior ministers to India in early March.

"Universities share the government's enthusiasm for supercharging Australia's relationship with India, a key strategic and economic partner," Universities Australia Chief Executive Catriona Jackson said.

"The government gave a clear signal that education is central to our relationship, both its strength and potential," she said.

"We already educate hundreds of thousands of Indian students, and we are well-positioned to do more to support India's hugely ambitious education reforms. Our governments, working together, are providing the settings to make that possible."

She said UA applauded the Prime Minister's commitment to the efficient and timely processing of visa applications for Indian students, as well as a new Migration and Mobility Partnership Arrangement.

"Increased research collaboration is also on the table, boosting prospects to build on the 450 formal partnerships our universities share," Ms Jackson said.

"This will be key to addressing the challenges and opportunities facing our region, particularly around climate change, security, and in maintaining the good health of our people."

UA also welcomed the announcement that Deakin University would be the first international campus on Indian soil. This, with the University of Melbourne's new blended Bachelor of Science degree, were "more signs of the innovative ways we can work with India for the benefit of both nations," Ms Jackson said.

"We're very pleased to see mutual qualification recognition locked in and look forward to working with both governments to flesh out the details. This is so important to getting highly educated Indians and Australians working together in critical skills areas."

## *'Metasurfaces' light way to better displays*

Researchers from the Australian National University, UNSW Canberra and Nottingham Trent University in England have developed technology that could usher in a new generation of thinner, higher-resolution and more energy-efficient screens and electronic devices.

The international team has created nanoparticles called “metasurfaces” that perform better than current displays like LCDs and LEDs, which rely on liquid crystal cells to create a screen display.

The research team's metasurfaces are 100 times thinner than liquid crystal cells, offer a tenfold greater resolution and consume 50 per cent less energy.

The researchers believe their technology is compatible with modern electronic displays. “We have paved the way to break a technology barrier by replacing the liquid crystal layer in current displays with a metasurface, enabling us to make affordable flat screens liquid crystal-free,” said lead researcher Mohsen Rahmani, Professor of Engineering at Nottingham Trent University.

“Most importantly, our new technology can lead to a huge reduction of energy consumption. This is excellent news given the number of monitors and TV sets being used in households and businesses every single day. We believe it is time for LCD and LED displays to be phased out in the same way as former cathode ray tube (CRT) TVs over the past ten to 20 years.”

Professor Dragomir Neshev, Director of the ARC Centre for Excellence in Transformative Meta-Optical Systems (TMOS) and ANU Professor in Physics, said the capability of conventional displays had reached its peak and was unlikely to significantly improve.

“Today there is a quest for fully solid-state flat display technology with a high-resolution and fast refresh rate. We have designed and developed metasurface pixels that can be ideal for the next-generation display.

“Unlike liquid crystals, our pixels do not require polarised lights for functioning, which will halve screens' energy consumption.”

Khosro Zangeneh Kamali, a PhD scholar at ANU and the first author of the study, said metasurfaces had exhibited extraordinary optical behaviour.

“However, inventing an effective way to control them is still a subject of heavy research,” he said. “We have proposed electrically programmable silicon metasurfaces, which is a versatile platform for programmable metasurfaces.”

Professor Andrey Miroshnichenko, a team member from UNSW Canberra, said the pixels were made of silicon, which offered a long lifespan in contrast with organic materials required for existing alternatives. “Moreover, silicon is widely available, CMOS (complementary metal-oxide semiconductor) compatible with mature technology, and cheap to produce,” he said.

He said the team hoped their development could generate a frontier technology in new flat displays with a global market value of about \$117 billion in 2020 .

## *Poor sleep found to affect mental health*

Poor sleep in middle age can have a negative affect on brain health and may influence the onset of dementia, according to a new study by ANU researchers published in *Scientific Reports*.

The study looked at the sleep habits of over 29,000 people aged between 37 and 73. Its findings might provide a basis for helping to combat major diseases like dementia, which is among the leading causes of death worldwide.

According to lead author and PhD candidate Dr Tergel Namsrai, it's not just lack of sleep that can impair brain health.

“Getting more than nine hours of sleep a day or less than six hours were both associated with lower brain volume and cognitive measures—crucial for things like reaction time and memory,” she said. Daytime dozing was also associated with some indicators of impaired brain health.

Dr Namsrai said there needed to be greater focus on the links between sleep and brain health, as well as more research into ways to improve sleep.

“The mechanisms underlying the link between sleep and brain health are not well understood; there's a lot of work to be done,” she said.

## *Collaboration reduces fees for ANU, Macquarie alumni*

Alumni of the Australian National University and Macquarie University are now eligible for reduced fees on postgraduate study at either institution thanks to an Australia-first collaboration.

Both universities offers alumni postgraduate support schemes to help their graduates return to study and improve their skills. This 10 per cent fee waiver has now been extended to be available on a reciprocal basis.

The new fee waiver is the first step in a partnership between ANU and Macquarie, which also includes the opportunity for international students at either university to study on exchange at the other to broaden their experience of Australia.

“ANU and Macquarie are such complementary institutions,” the Vice-Chancellor of ANU, Professor Brian Schmidt, said. “When we combine our areas of expertise in teaching and research and the diverse experiences of our two cities, we can give students an incredible experience.”

Macquarie University’s Vice-Chancellor, Professor S. Bruce Downton, said the arrangement would “encourage lifelong learning for alumni of two great Australian universities”.

Applications for the exchange program open 1 May, for commencement on exchange in Semester 1, 2024.

## Bookshelf

### *The Australian Embassy in Tokyo and Australia–Japan Relations*

Edited by Kate Darian-Smith and David Lowe

ISBN (print): 9781760465391

ISBN (online): 9781760465407

March 2023

ANU Press. DOI: <http://doi.org/10.22459/AETAJR.2022>

Relations between Australia and Japan have undergone both testing and celebrated times since 1952, when Australia’s ambassadorial representation in

Tokyo began. Over the years, interactions have deepened beyond mutual trade objectives to encompass economic, defence and strategic interests within the Indo-Pacific region and beyond. This “special relationship” has been characterised by the high volume of people moving between Australia and Japan for education, tourism, business, science and research. Cultural ties, from artists-in-residence to sister-city agreements, have flourished. Australia has supported Japan in times of need, including the aftermath of the 2011 Tohoku earthquake.

This book shows how the Australian embassy in Tokyo, through its programs and people, has been central to these developments. The embassy’s buildings, its gardens and grounds, and, above all, its people are the focus of this multidimensional study by former diplomats and expert observers of Australia’s engagement with Japan.

### *China Now*

*East Asia Forum Quarterly*, Vol. 15 No. 1, 2023

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ANU Press. DOI: <http://doi.org/10.22459/EAFQ.15.01.2023>

While many rejoice in something like “normality” after the years of disruption caused by the global COVID-19 pandemic, the world will not resume its former shape. Nowhere is this more evident than in China. After the disastrous economic performance of 2022, a recalibration of China’s policies was essential—including by retreating from zero-COVID and, under the banner of “Chinese-style modernisation”, relaxing restrictions on the free market. China’s greatest post-pandemic challenge, however, will be the terms of its engagement with the outside world. Its claims to both developing-nation status and global leadership define China, some say, as an “anxious adolescent superpower”.

This issue of *East Asia Forum Quarterly* canvasses a range of shifts in Chinese society and daily life as well as policy direction: describing women’s leading role in the calls for social change, explaining how China’s demographic crunch is unlikely to affect its economic modernisation over the coming two decades, examining the difficulties faced by rural migrants and in investing in the education of the rural young, and detailing the public response to the poorly understood social credit system.

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## *Administration*

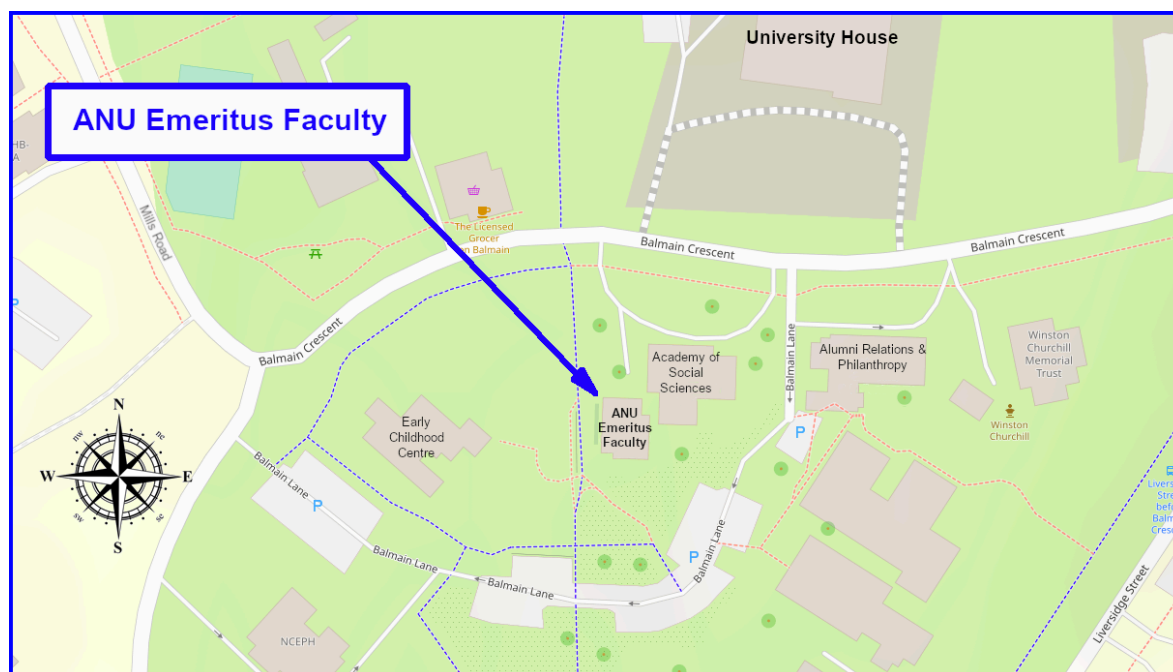
### **Arrangements for ANUEF room bookings**

Requests to book the Molony Room should be addressed to the Secretary of the ANU Emeritus Faculty, Jan O’Connor, at [jantancress@gmail.com](mailto:jantancress@gmail.com) or 6247 3341.

## Finding the Molony Room

The Molony Room is at 24 Balmain Crescent, on the south side of Balmain Crescent almost opposite University House.

It is Building 1c on <https://tinyurl.com/yckuknbj>, set back between 22 Balmain Crescent (the Acton Early Childhood Centre) and 26 Balmain Crescent (the Academy of the Social Sciences). Four free car parking spaces reserved for ANUEF members visiting the Molony Room in the Balmain Lane Car Park immediately south of the Molony Room. The room is marked on: <https://tinyurl.com/y7gsyqgh>



## Editorial

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*The next issue of the Emeritus Faculty newsletter will be published in April.*