

# EMERITUS

*The Australian National University Emeritus Faculty e-magazine*

## New Dean is appointed

The Australian National University (ANU) has announced the appointment of Professor Aaron Quigley as the new Dean of the ANU College of Systems and Society.

Professor Quigley is an internationally respected academic leader whose career spans more than two decades across Australia, Europe, Asia and North America. He has led major initiatives in research, strategic innovation and cross-disciplinary collaboration in both academia and industry.

Read more at [anu.edu.au/news](https://anu.edu.au/news).

## Diary dates

### ANU Meet the Author events

**ANU/Canberra Times Meet the Author events are held in association with Harry Hartog Bookshop. Unless otherwise stated all events are free and at 6pm in the Lowitja O'Donoghue Cultural Centre, formerly known as the Kambri Cultural Centre. 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/meet-the-author-series](https://anu.edu.au/events/meet-the-author-series). 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). The Symposium by University House wine bar (Shop 13, 152 University Avenue, Acton, next to the cultural centre) will be open for dining after the events. No bookings necessary. Food and wine details at <https://unihouse.anu.edu.au/eat/symposium/>.**

**October 27:** Greg Haddrick will be in conversation on his new book *The Mushroom Murders*.

**November 3:** Hugh Mackay will be in conversation on his new book *Just Saying* with Alex Sloan. Vote of thanks by Frank Bongiorno.

**November 6:** Sofie Laguna will be in conversation on her new novel *The Underworld* with Karen Viggers. Vote of thanks by Sally Pryor.

**November 10:** Julianne Schultz will be in conversation with Allan Behm on the updated version of her book *The Idea of Australia. A search for the soul of the nation*. Vote of thanks by Kate Fullagar. Cinema ANU.

**November 12:** Robert Wellington will be in conversation on his new book *Versailles Mirrored. The Power of Luxury, Louis XIV to Donald Trump* with Matthew Trinca. Vote of thanks by Helen Musa.

**November 17:** Ita Buttrose will be in conversation on her new book *Unapologetically Ita*.

**November 19:** Helen Garner, Chloe Hooper and Sarah Krasnostein will be in conversation with Beejay Silcox on their new book *The Mushroom Tapes. Conversations on a Triple Murder Trial*. Cinema ANU.

**November 21:** Bryan Brown will be in conversation on his new novel *The Hidden* with Alex Sloan.

**November 25:** Sean Kelly will be in conversation on the 100th *Quarterly Essay: On belief in politics*.

**December 2:** At 6.15pm, Niki Savva will be in conversation on her new book *Earthquake: Signposts to the election that shook Australia* with Kerry-Anne Walsh. Vote of thanks by Virginia Haussegger.

## **2026**

**February 26:** Andrew Leigh will be in conversation on his new book *The Shortest History of Innovation*.

**April 1:** Patricia O'Brien will be in conversation with Frank Bongiorno on her new book on *Errol Flynn. The True Story of Australia's Hollywood Icon*. Cinema ANU.

**April 21:** Susan Lever will be in conversation on her new biography of A. D. Hope.

## **William Compston**

**February 19, 1931-May 16, 2025**

William (Bill) Compston was a physicist/isotope geochemist/geochronologist who made pioneering developments in the dating of minerals and rocks from the ancient Archean rocks of Australia and later in establishing the chronology of the lunar basalts collected by the Apollo return missions. He is best known for the revolutionary development and construction of the Sensitive High Resolution Ion Micro Probe (SHRIMP), which made in situ U-Pb dating of the resilient mineral zircon possible, providing new insights into the formation and evolution of the Earth's upper crust.

Bill grew up and was educated in Perth, where he lived with his family at their butcher shop. After his father died in 1943, the shop was sold and the family went to visit relatives in Melbourne, becoming trapped there by wartime restrictions on travel to Perth. While in Melbourne, Bill was introduced to geology by his older brother, who was stationed there in the army and had a science degree in Geology from the University of Western Australia (UWA).

After returning to Western Australia, Bill continued his studies and in 1951 he obtained a BSc from UWA, which included Geology as one of his subjects. There, Bill met his wife Elizabeth, who was also studying geology and who became a steadfast source of support throughout his career.

After a year's break, in 1953 Bill commenced PhD studies in the Department of Physics at UWA, supervised by Peter Jeffery. This was a pivotal time, as following the suggestion of Sir Marcus Oliphant from the newly established Australian National University (ANU), Jeffery was attempting, with limited resources, to complete the building of a mass spectrometer for isotope ratio studies. With the arrival of Bill and shortly afterwards several other students (including then-Honours student John de Laeter), and with perseverance and much ingenuity, Jeffery and his group completed the building of Australia's first operational mass spectrometer.

In 1955 Jeffery, together with his students, published the results of an extensive survey of  $^{13}\text{C}/^{12}\text{C}$  ( $\delta^{13}\text{C}$ ) ratios in fossil carbonates and coal deposits, where Bill's expertise in geology and in the new field of isotope geochemistry was already becoming evident.

Bill was thus introduced to the techniques of gas source ( $\text{CO}_2$ ) mass spectrometry at the very beginning of his career, with responsibility for solving practical technical problems, such as repairing vacuum leaks and improving the electronics.

Bill's PhD thesis focused on species-level  $\delta^{13}\text{C}$  studies of Permian and Devonian marine carbonates with oxygen isotope ( $\delta^{18}\text{O}$ ) measurements from the same samples being an additional aim.

He and PhD student Steve Clement designed and built a new generation higher-sensitivity TIMS, known as the MSZ. In addition to improving the ion transmission, in collaboration with Pieter Arriens, rapid peak switching of the magnet and digital output to a centralised computer system was also implemented. These latter developments enabled real-time assessment of the data, with high precision and accuracy being routinely assured.

Due to intrinsic technical limitations of the in-house constructed instrument, the reliability and accuracy of his  $\delta^{18}\text{O}$  was in question, and in 1957 Bill was awarded a Fulbright travel scholarship to the Californian Institute of Technology (Caltech) for a year. There, he continued his work on stable isotopes with Sam Epstein and was able to measure more accurately oxygen isotopes in some of his thesis samples, which provided some of the best constraints on palaeo seawater temperatures.

While at Caltech, although having family responsibilities, Bill showed his dedication by finishing his thesis, with his PhD being awarded by UWA in the same year. While working in the aptly named Mudd Building at Caltech, Bill would also have been made aware of the work of Claire Patterson, who had just completed the now famous study of the "Age of the Earth" based on Pb isotopes in meteorites.

Bill then went on to spend three months in Washington at the Carnegie Institute Department of Terrestrial Magnetism (DTM). There he was instructed by leading scientists such as Tom Aldrich and George Wetherill in isotope dilution procedures and associated mass spectrometric techniques for dating Rb-rich minerals using the Rb-Sr decay scheme.

Bill returned to UWA in 1958 as a lecturer in Physics. Supported by a small grant to Peter Jeffery from the Carnegie Institution, which included a gift from DTM of a factory-produced flight tube, they constructed an improved (and safer) solid source mass spectrometer. Here purified Sr samples were dried down on a rhenium filament and then thermally ionized in what is now known as a TIMS mass spectrometer.

Bill led this program with the analyses of Rb-rich minerals (biotite, muscovite) from local rocks. When the ages measured proved to be much younger than expected from the geology, he decided to analyse whole rocks (the first to do so), showing for the first time that minerals can gain or lose radiogenic Sr and hence give younger metamorphic ages.

By contrast, whole-rocks can remain as closed isotopic systems and, with a sufficient range in Rb/Sr, give the primary magmatic age. Using this approach, Bill was able to demonstrate the presence of ancient Archaean rocks in Western Australia and to use the mineral ages to resolve the younger metamorphic events, with two letters in *Nature* being the result.

Bill also undertook Rb-Sr dating of mica in a unique class of rocks from the Kimberley known as lamproites, which were being studied by Geology Professor Rex Prider. Bill showed that these intrusions were very young ( $145 \pm 10$  million years). They were subsequently found to be diamond bearing, with an unusual mantle composition.

In the early 1960s, Bill was persuaded by Professor John Jaeger to join the Department of Geophysics at the ANU. Bill was keen to take up the invitation as it represented a unique opportunity to undertake well-supported full-time research in the newly established department. His mother was also residing in Canberra.

With other members of Jeffery's group also departing UWA, geochronological work that had been pioneered in its Physics department effectively ceased. Peter Jeffery pursued his prime interest of noble gas isotope research, and John de Laeter later undertook PhD studies on tin isotopes in meteorites.

In the early 1960s, Bill set about establishing at ANU the sample processing, chemical laboratory and mass spectrometry facilities necessary for isotope dating. Using a converted gas machine, Bill and his group undertook an Australia-wide program using Rb-Sr to date rocks, the ages of which were little known at the time.

In collaboration with the Bureau of Mineral Resources, Geology and Geophysics (BMR), a second larger mass spectrometer was purchased and the geochronological program was expanded. Bill, however, maintained his strong interest in improving the still relatively rudimentary mass spectrometric systems, especially for higher precision Sr isotopes, as there was growing interest in determining the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios of the sources of crustal rocks, as well as changes in the oceans over time.

He was also aware of the planned Apollo lunar sampling missions for the Moon, and he and PhD student Steve Clement designed and built a new generation higher-sensitivity TIMS, known as the MSZ. This improved the ion transmission. Working in collaboration with Pieter Arriens, they also implemented rapid peak switching of the magnet and digital output to a centralised computer system. These latter developments enabled real-time assessment of the data, with high precision and accuracy being routinely assured.

With the success of the Apollo 11 mission to the Moon in 1969, Bill was one of the few international researchers chosen by NASA to receive rocks for dating, whilst ANU colleagues Ted Ringwood and Ross Taylor worked on related aspects of petrology and geochemistry. These mainly basaltic lunar samples posed special challenges for dating, having exceptionally low Rb contents and, unlike most terrestrial rocks, no obvious mineral phases with sufficiently high Rb/Sr ratios to define precise ages.

Bill, however, was well prepared, having built a specialised lunar laboratory for high purity mineral separations, as well as having completed the MSZ with its high sensitivity small sample analytical capabilities.

He identified a phase in the samples that he called mesostasis, the high Rb content of which improved the accuracy of the dating. Ironically, many of the other more conventional Rb-Sr laboratories involved in the lunar program failed by continuing to use the whole-rock methods that Bill had first established at UWA for granitic rocks. The exception was the Wasserburg group at Caltech who had also built a new generation of sensitive TIMS mass spectrometers, as well as having dedicated mineral separation facilities and clean rooms.

Inevitably, there was close competition between the groups with both obtaining precise mineral ages on the Mare basalts, but with a small systematic offset in ages later becoming

apparent. This was resolved when John de Laeter, then a visiting Fellow at ANU's Research School of Earth Sciences (RSES), recalibrated the Rb/Sr spikes and found a small <1% offset.

Bill's success in the lunar program clearly distinguished ANU's RSES as the best of the international labs, giving him increased confidence in his innovative approach.

At the first lunar science conference, Bill heard that dating had also been attempted by using a small commercial ion microprobe to analyse U-Pb in-situ on a very small scale. The process was analogous to electron probe analysis, but instead utilised a focused ion beam to remove material from the sample surface for isotopic analyses. The results were severely compromised, however, by the presence of molecular interferences and the method was generally discounted.

Working with Steve Clement, Bill decided that RSES should build an ion microprobe for geological work, but with much higher mass resolution and with the sensitivity required for trace element isotopic analyses. Modelling by Clement showed that the instrument would need to be at least three times the size of existing mass spectrometers. The undertaking was a huge risk (an expert committee advised against it), only made possible by block funding to RSES and the strong support of the then director, Anton Hales.

Clement designed the ion optics, and construction of SHRIMP began in 1974, with much of the hardware and electronics being built in-house in the RSES workshops. By 1979 the instrument was under test, by 1980 a duoplasmatron oxygen primary ion source was fitted, and in 1981 the first experiments were started, jointly with Ian Williams, dating U-Pb in zircon. The first results were announced in the 1981 RSES Annual Report.

SHRIMP revolutionised U-Pb geochronology, highlighted by the discovery by PhD student Derek Froude of >4.0 Ga zircons from the Mt Narryer sediments in WA in a sample provided by Bob Pidgeon (also a former student). This marked the start of the field of what is now known as Hadean (>4.0 Ga) geoscience with the discovery at Jack Hills, Western Australia, of even older ~4.4 Ga detrital zircons, and the dating, by Ian Williams and Samuel Bowring of >4.0 Ga zircons in igneous rocks from Canada.

International visitors flocked to the lab, building links between Bill, RSES, and the leading geochronology labs throughout the world. Multiple other successes followed, chief amongst them the refinement of the geological time scale and dating of rare lunar zircons.

Bill's strong ties with John de Laeter continued, with the first commercially available SHRIMP II being provided to Curtin University. More recently Bill's research came full circle with the building of the SHRIMP SI, which has enabled high precision in-situ measurements of oxygen isotopes in minerals.

Despite the more recent development of the LA-ICPMS, the SHRIMP-type ion probe remains the only non-destructive method for dating minerals, and now measuring  $\delta^{18}\text{O}$ , accurately in-situ on a ~20  $\mu\text{m}$  scale.

In an interview conducted by the Australian Academy of Science in 2005, Bill reflected on the unique opportunities that working at RSES had afforded to him, the importance of block

funding in supporting risky scientific endeavours, and the essential support provided by the RSES mechanical and electrical workshops.

SHRIMP went on to be a commercial success —the last of 21 instruments built by the ANU was installed in China in 2023.

William Compston FAA FTSE FRS died peacefully, in the presence of family members, at the age of 94.

**Malcolm T. McCulloch and Ian S. Williams**

This obituary was originally published in the *Journal of The Royal Society of Western Australia*, 108. <https://doi.org/10.70880/001c.140863>. It is republished here, reformatted and lightly edited, with the permission of the JRSWA and of Malcolm McCulloch and Ian Williams.

## Items of interest

### **Billions in private cash is flooding into fusion power. Will it pay off?**

**By: Matthew Hole, Professor, Mathematical Sciences Institute and School of Computing, Australian National University**

Over the past five years, private-sector funding for fusion energy has exploded. The total invested is approaching US\$10 billion (A\$15 billion), from a combination of venture capital, deep-tech investors, energy corporations and sovereign governments.

Most of the companies involved (and the cash) are in the United States, though activity is also increasing in China and Europe.

Why has this happened? There are several drivers: increasing urgency for carbon-free power, advances in technology and understanding such as new materials and control methods using artificial intelligence (AI), a growing ecosystem of private-sector companies, and a wave of capital from tech billionaires. This comes on the back of demonstrated progress in theory and experiments in fusion science.

Read more at [theconversation.edu.au](https://theconversation.edu.au).

### **Human ancestors were exposed to lead millions of years ago, and it shaped our evolution**

**By: Renaud Joannes-Boyau, Professor in Geochronology and Geochemistry, Southern Cross University; Alysson R. Muotri, Professor of Pediatrics and Cellular and Molecular Medicine, University of California, San Diego; and**

**Manish Arora Professor, Environmental Medicine, Icahn School of Medicine at Mount Sinai**

When we think of lead poisoning, most of us imagine modern human-made pollution, paint, old pipes, or exhaust fumes.

But our new study, published today in *Science Advances*, reveals something far more surprising: our ancestors were exposed to lead for millions of years, and it may have helped shape the evolution of the human brain.

This discovery reveals the toxic substance we battle today has been intertwined with the human evolution story from its very beginning.

It reshapes our understanding of both past and present, tracing a continuous thread between ancient environments, genetic adaptation, and the unfolding evolution of human intelligence.

Read more at [theconversation.edu.au](http://theconversation.edu.au).

**On an Arctic archipelago, frozen soil may preserve a hidden history of viruses**

**By: Kai Kupferschmidt, a contributing correspondent for *Science* magazine based in Berlin**

As you drive from the airport into Longyearbyen, the largest town on the Norwegian archipelago of Svalbard, a concrete structure juts from a sandstone mountain on the right. It's the entrance to the Svalbard Global Seed Vault, where more than 1 million samples of wheat, rice, maize, and other crops are stored underground as a hedge against global disaster.

The vault is located here because even if the cooling system that keeps the seeds refrigerated at  $-18^{\circ}\text{C}$  fails, the frozen ground should ensure the seeds' preservation for hundreds of years. Here, about 1300 kilometres from the North Pole, the earth itself functions as a freezer.

Read more at [science.org](http://science.org).

## Bookshelf

**ANU Press maintains several academic journals you can read and download for free at**

<https://press.anu.edu.au/publications/journals>. Some of them are listed below.

*ANU Historical Journal II*: This is an open-access, peer-reviewed academic history journal of the ANU College of Arts and Social Sciences and the ANU College of Asia and the Pacific.

*Human Ecology Review*: This is a semi-annual journal that publishes peer-reviewed interdisciplinary research on all aspects of human–environment interactions (Research in Human Ecology) and reviews relevant books.

*International Review of Environmental History*: This journal takes an interdisciplinary and global approach to environmental history. It publishes on all thematic and geographical topics of environmental history, but especially encourages articles with perspectives focused on or developed from the southern hemisphere and the ‘Global South’. This includes but is not limited to Australasia, East and South East Asia, Africa and South America.

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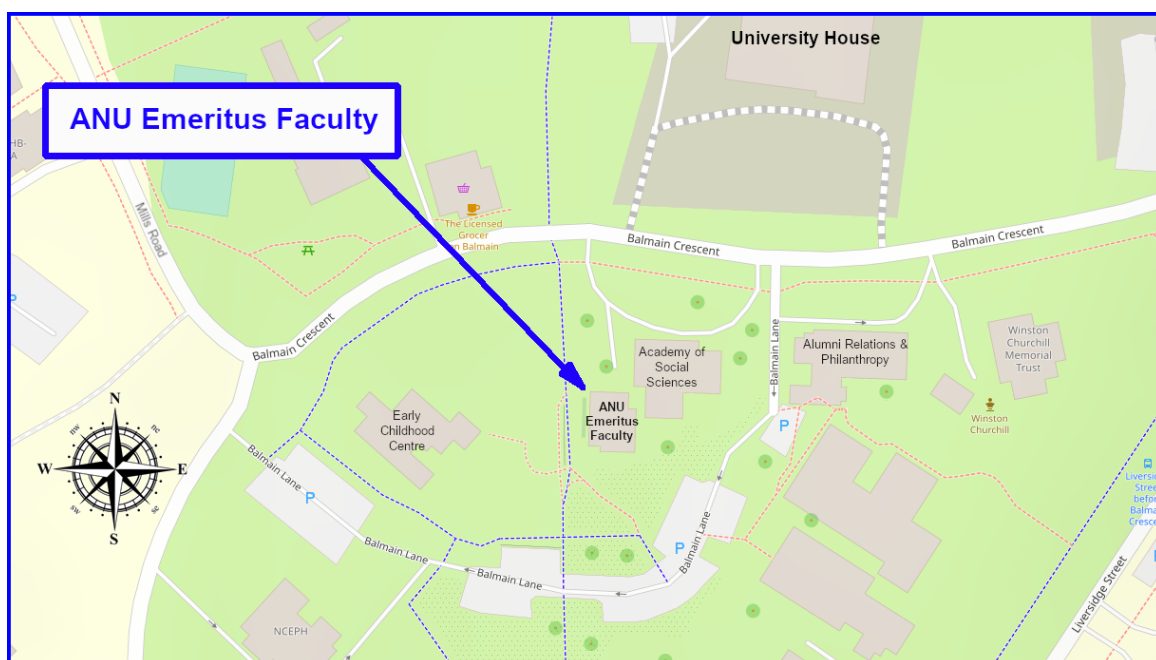
## Administration

### 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 October.*