

The wonderful legacy of Ann Moyal

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Abstract

Dr Ann Moyal AM FRSN FAHA lived a long and productive life. Her legacy endures in three areas. First, and most obviously, we must be grateful for her extraordinary body of published work. It includes landmark studies that set new standards for scholarly analysis of the history of science and technology. Secondly, she was a pioneer in this broad field and largely responsible for its acceptance as a reputable discipline in our universities. Thirdly, as a proudly independent scholar for four decades, she was the prime mover in the establishment of ISAA. As its founding President and an outstanding contributor to its work up to and including this year, she put the organisation on a sound footing for the future.

Introduction

It is an honour and a delight to have been invited to deliver the 2019 ISAA Lecture. I will be discussing the life and work of an extraordinarily productive scholar. I have to make a disclaimer at the outset: I am not in any sense a historian. I took one short course in history as part of the compulsory humanities program as a student at University of New South Wales, where I also played cricket with the then professor of history before he ran off to New Zealand with Malcolm Turnbull's mother, but that is the total extent of my history studies. I did make one brief excursion into the field nearly fifty years ago near the end of my doctoral studies at the University of York. In their college system, I was a member of Goodricke College, named for an 18th century astronomer who lived in York and studied variable stars through its murky atmosphere. My parting gift to thank the college was a public lecture summarising John Goodricke's outstanding contribution to our understanding of the universe.

I am adopting a chronological approach, describing Dr Moyal's career and the great importance of her work from the 1950s to this year. I have drawn heavily on her second memoir, *A Woman of Influence*, which she said was inspired by the thoughts of Carolyn Heilbrun: 'For me, the stories of youth are tired stories. But the story of age, of maturity before infirmity, before meaningless old age, has never been told except by Shakespeare who told everything, provided he could tell it of men.' The second memoir is indeed a 'story of age, of maturity before infirmity' and tells of a life truly well lived¹.

The budding historian

Ann Veronica Helen Hurley grew up in Sydney, but completed her schooling with a final year in Canberra, beginning a life-long love affair with the bush capital. She won a scholarship to Sydney University, where she was awarded first-class honours in history. With another scholarship for post-graduate study at the Institute of Historical Research at the University of London, Ann left for the UK. After two years she dropped out of that program to become a research assistant at the Royal Institute of International Affairs, Chatham House. She was then recruited by the Canadian press baron, Lord Beaverbrook, to help him write a memoir about his experiences during World War I.

Ann worked productively with Beaverbrook, drafting chapters of his book, *Men and Power*; she was also expected by him to help entertain his famous guests and he bought her the elegant dress she is wearing in an early portrait, recently used for the cover of her last book, *A Woman of Influence*. Ann's 1951 marriage to Michael Cousins had ended, but Beaverbrook was apparently incensed when Ann met and married Colonel Everest Mozley. When that relationship foundered, Beaverbrook forgave Ann and re-employed her².

She returned to Australia to take up a research fellowship in history at ANU. There she worked with Keith Hancock to bring into being the *Australian Dictionary of Biography*, which remains a major reference source to this day. She was associated with an outstanding group of historians like John Mulvaney, Geoffrey Bolton and Manning Clark. In 1962, her career took a different direction after being asked by the Academy of Science to help establish an archive of scientific manuscripts. The outcome was a 1966 publication, *A Guide to the Manuscript Records of Australian Science*, a foundation source³ for further study in what she called a 'rich and untapped field'.

A period in the USA followed after she met the Israeli mathematician Dr Joe Moyal at University House. They married in 1963 and moved together to the Chicago area when he was head-hunted by Argonne National Laboratory. Ann became science editor at University of Chicago Press and then wrote a landmark study of the Argonne laboratory⁴. Her critique led to wide-ranging changes in that institution, the leading US centre for nuclear science.

That foray into nuclear science was the platform for her next significant publication, after returning to Australia to take up a lectureship in the history of science at the University of Technology, Sydney. Her paper, which she said examined 'the culture and national significance' of the Australian Atomic Energy Commission, pulled no punches⁵. It noted that the organisation was established in the 1950s to lay the foundation for nuclear power to be developed in Australia, observing that there had been no progress towards that goal. She was critical of the complete absence of public scrutiny of the organisation and the privileged role of its chairman, Professor Philip Baxter, as the sole source of advice to government on nuclear issues. Professor Baxter was Vice-Chancellor of University of NSW as well, with a determined agenda of dramatically increasing the number of graduate engineers in Australia and some very controversial views, including a wish for Australia to expand our defence capability by developing nuclear weapons. The critique of AAEC, which was later re-badged as the Australian Nuclear Science and Technology Organisation (ANSTO), implied it had become a cosy sheltered workshop for arcane science, with little connection to national needs. Since that time, the organisation's role as a producer of radioactive isotopes for medical use gave it sufficient political support for it to have the ageing HIFAR reactor replaced when it reached the end of its life.

In 1976, Ann published *Scientists in Nineteenth Century Australia: A Documentary History*⁶. This firmly established her reputation in the field of the history of science. As Sybil Jack has observed, the academic discipline of history of science had concentrated on the global grand ideas, such as the overthrow of the Ptolemaic Earth-centred worldview by the ideas of Copernicus and the debate between creation and evolution. By contrast, Ann Moyal began serious study of the work of local scientists in the social and intellectual context of their times.

The Griffith University incident

She was then appointed to an academic post at Griffith University. There are various accounts of what one report called her 'tumultuous time' at that university. One said 'Ann's all-round cleverness and acerbic manner did not endear her to the academic fraternity' — certainly true but by no means the whole story — while an entry about Ann's career in the encyclopaedia of women said she was the foundation director of the Science Policy Research Centre, but had problems with a vice-chancellor who was hostile to women, leading to a controversy about academic freedom which led

her to resign⁷. From my observation, that comment is just wrong. What I saw unfold had all the hallmarks of a classical Greek tragedy. Since I was involved in the prologue, observed Act One and was the unwitting beneficiary of the final Act, I will give my account of the sad story.

When the School of Science was set up as one of the four original schools at Griffith, its implementation of the university's inter-disciplinary ethos was to require all students to undertake a common first year program⁸. It consisted of an integrated introduction to the physical, chemical and biological sciences, with a supporting mathematics course and a contextualising unit called 'Science, Technology and Society'. That course included the history and philosophy of science, the sociology of the scientific community, the role of science and technology in economic development and public policy issues. As well as that compulsory component of the first year program, there were electives in the STS field in later years. An Irish chemist working in the UK, Dr Jarlath Ronanyne, was appointed as Senior Lecturer in STS and in 1975 he persuaded the university to establish a Science Policy Research Centre, of which he was Director. He also began a Master's program in STS by coursework and dissertation. In 1976, he successfully applied for a position as Professor of History and Philosophy and Science at University of NSW. Griffith University advertised for a replacement, and decided to fill the gap in its capacity to teach STS courses in 1977 by using a visiting fellowship. It had become the university's turn to benefit from a fellowship endowed by a London guild, the Worshipful Company of Drapers, so a decision was made to advertise in the UK for a visiting fellow in STS. I was at the time lecturing in the Faculty of Technology at the UK Open University. I was appointed and spent the first half of 1977 at Griffith University as the Draper Visiting Fellow. As well as teaching in the undergraduate course and the Master's program, because I had some expertise in nuclear science I got involved in the public discussion of the Fox Report, the inquiry into the proposed Ranger uranium mine⁹, which broadened into an exploration of the benefits and risks of uranium exports.

Ann Moyal arrived to take up her academic appointment a few weeks before I left to return to my post in the UK. I immediately detected some worrying signs that suggested she might not have a smooth run in the School of Science. Until her appointment, every senior academic in the school was a male with a doctorate; she was a female without that formal qualification. There also appeared to be an air of condescension from some of the scientists, those who believe that the experimental sciences have an intrinsic superiority over areas of inquiry such as history. Dr Ronanyne and I were treated with respect because we had earned doctorates in science before moving into what those folk regarded as 'fluffy' areas, but Ann's formal qualifications and work experience were in history. There was also a serious misunderstanding about the appointment. It was advertised as a Senior Lecturer in Science, Technology and Society, and Director of the Science Policy Research Centre. Ann saw her role as being Director of the SPRC, with the status of a senior lecturer. The rest of the School of Science thought the role was Senior Lecturer in STS, having a primary responsibility of providing academic leadership in that area, with a subsidiary duty as director of the centre. That misunderstanding had consequences that, in retrospect, had an air of inevitability.

A complicating factor was the approach the School of Science had to teaching loads. While it was common in older universities for more senior staff to give fewer lectures, Griffith believed that new lecturers needed help to establish their research careers, so a complicated formula was used to equalise loads. Whether you were a professor, a new lecturer or a senior lecturer and centre director, you had the same number of hours teaching, averaged over the semester. Ann Moyal published one occasional paper in the Centre's series that had begun before her arrival: *Science, Technology and Society in Australia: A Bibliography*. But she chafed against what she saw as a heavy teaching load that limited the time she could devote to the Centre. In 1978, she felt she had to make a stand, so she refused to mark her share of the final examination papers from the First Year course. Her colleagues offered to mark them to defuse the situation, but she was determined to use the issue to negotiate relief from teaching that would allow her to devote more time to what she saw as her primary responsibility, directing the Science Policy Research Centre. Unfortunately, the head of school was

an equally determined individual who felt his authority was being undermined. He formally ordered Ann Moyal to mark the papers. When she refused, he took the nuclear option of escalating the dispute to the university disciplinary committee. That body met and heard from both parties. Its decision pleased neither of them; it decided that Ann Moyal was formally in breach of her employment conditions, having refused to carry out her allocated teaching duties, but that the issue was so minor that it would be inappropriate to impose any sanctions. It also said that the whole question should have been resolved locally rather than being referred to the university disciplinary body. By now the atmosphere in the School of Science was very tense, with some of the academics supporting Ann Moyal and others siding with the head of school. Finding the dynamics of the Common Room quite hostile, Ann took to collecting her coffee and retreating to her office to work. One fateful day, she saw the head of school on the stair and angrily threw her coffee over him, then marched to her office and wrote a letter of resignation. Some of the hard-line scientists saw this incident as confirming their view that it was a waste of resources to employ academics in the STS area and urged the school to redirect the funds. After a protracted debate, the school decided to persist with STS. The position was advertised and I was appointed to fill the vacancy. It was made very clear to me that I was appointed as a senior lecturer in STS, with directing the SPRC as a minor role.

Independent in Canberra

Returning to Canberra, Ann set herself on a course of being an independent scholar, ‘with one foot in the cloister and one foot unfettered outside the walls’ as she put it¹⁰. With Don Lamberton, a professor of economics at University of Queensland with a keen interest in technological change, and his colleague Stuart Macdonald, she co-founded the academic journal *Prometheus*, for refereed publications in the broad field of science and technology policy. I have published in *Prometheus*, which has consistently been a lively journal. It moved to the UK in 2000. After a dispute with publishers Taylor and Francis in 2018, it will be published by Pluto from 2020. Dr Macdonald, involved with the journal from its early days and now living in the UK, remains its editor¹¹.

In 1984, Ann Moyal published what she called her ‘magnum opus’, *Clear Across Australia: A history of Telecommunications*¹². She had been funded for two-and-a-half years by Telecom, the communications arm of what had previously been the Postmaster-General’s Department before postal services were split off. This book was a massive achievement, a mighty tome of more than 450 pages documenting the achievement of providing communications systems across this vast continent, following the history from the days of copper wires to coaxial cables and the introduction of microwave links in the late 1960s. The book was a reminder of previous epochs in which governments had played a positive role in nation-building, investing taxpayers’ funds in infrastructure which provided social and economic benefits for future generations. It had also been regarded as axiomatic that government should provide communications services to all citizens, regardless of where they lived. Re-reading it is a lesson in how much has been lost by the late 20th-century obsession with short-term economics in general and the neo-liberal economic agenda in particular, justifying the unravelling of decades of public investment. Had Ann Moyal never written anything else, she would have been correctly regarded as a major scholar in the new field of the history of modern technology.

Of course, she did not stop at that point and rest on her laurels; she was already working on another major book. Only two years later, *a bright and savage land* was published, appropriately subtitled *scientists in colonial australia*¹³. It made a huge impression. Robyn Williams, presenter of the ABC’s Science Show, wrote that ‘Nothing can convey the gorgeous presentation, the famous pictures of kangaroos, fish, flowers and such like from the historical archives, and the paintings of the famous cast’. He went on to say that the book could be used at several levels: ‘to skim and admire; to select and focus; or, indeed, to read right through and be edified by Moyal’s considerable

achievements as a historian of Australian science¹⁴. Deakin University's Dr Wade Chambers praised the lavish illustrations and the locating of the science in the social and intellectual contexts of the times, saying he found the book both interesting and 'an aesthetic joy'¹⁵. A major achievement of the book was its exploration of the critical role of our colonial science in the 19th-century revolution of thinking, moving the human species from the summit of creation in the centre of the universe to the temporarily dominant predator species on a small planet circling an undistinguished star in an outer arm of an ordinary galaxy.

The book also contained many documents of great historical interest. In the light of later events, it is salutary to read the instructions of the Earl of Morton, then President of the Royal Society, to Cook, Banks and Solander as they set out on their 1770 expedition¹⁶. He urged them to 'exercise the utmost patience and forbearance with respect to the Natives', observing that 'they are the natural and, in the strictest sense of the word, the legal possessors of the several Regions they inhabit', adding that 'shedding the blood of these people is a crime of the highest nature'. It remains a critical issue for this country to undo the damage of the later arrivals who denied the legal possession of the original Australians and shed their blood on an industrial scale.

On the strength of those two outstanding books, Ann Moyal was by the late 1980s a justly celebrated scholar. Her 1989 publication, *Women and the telephone in Australia*, was spurred by discussion of a proposal for time-charging of local phone calls¹⁷. It analysed the significant gender differences in use of the technology; to simplify her conclusion, men are most likely to use the telephone for short calls to transact business, whereas women often make longer calls to catch up with family or friends. So charging for the time taken on local calls would have much more impact on women than men. It was a very significant contribution to the debate. As well as publishing, reviewing and continuing 'to perform as an academic scholar', Ann received regular invitations to take up visiting appointments at universities. She held honorary visiting fellowships in economics at University of Queensland, in government at University of Sydney, in history at ANU and in media studies at Macquarie University. She said that she felt 'a sense of legitimacy that I had at last arrived' when Robyn Williams included her life and work with those of various distinguished scientists in his TV series, *The Uncertainty Principle*¹⁸.

Independent scholarship formalised¹⁹

In 1993, Ann was invited to join the committee of a Canberra-based institution, the Centre for Australian Cultural Studies, then run by the social historian David Headon. There she met Patricia Clarke, author of many books on Australia's early literary women, as well as a range of other notable scholars such as Bill Gammage, Dymphna Clark and Dorothy Green. Ann wrote that she 'put forward the idea of forming an association of independent scholars' and found immediate support. The then director of the National Library of Australia, Warren Horton, agreed to contribute \$1000 a year and use of the NLA conference room for an initial meeting. So *Against the Grain* was convened in August 1995, tapping into what Ann saw as 'widespread unease' about the managerial trends in universities and research institutions. About a hundred people assembled and the gathering decided to form the Independent Scholars Association of Australia, which she described as 'the first association of its kind in the world'. Ann Moyal was the obvious choice as first president of the new organisation.

Its foundation was indeed timely. At the second annual conference in 1996, Professor Max Charlesworth reflected on the recent election of the Howard government and expressed his fear that we would see 'a reversion to the grey values of the Menzies era'. Lamenting the 'politicisation of the bureaucracy', 'nobbling of the universities', 'globalisation of the media', 'emasculatation of the ABC' and what he saw as a curious attack on what the newly elected Prime Minister saw as 'political correctness', he foresaw that independent scholarship would be 'enormously important'. Much later analysis of the Howard period by Hamilton and Maddison showed that these were indeed prescient

comments. At the third conference in 1997, as Max Moore-Wilton took the axe to the Canberra public service, Professor Sol Encel gave a paper 'Downsizing, Rightsizing and Capsizing', while Barry Jones reflected on the retreat from reason in politics. In 1999, *ISAA Review* was launched as a communication vehicle which then evolved into the refereed journal it remains to this day. Michael McKernan celebrated the ISAA as 'a large common room with the rigour of a university-trained membership but the ability to spot bullshit at fifty paces'. Ann Moyal continued to be, as Dr Irmgard Heidler put it in 2002, 'the motor behind many co-operations, presenting her ideas in numerous papers, providing for the flow of information between organisations and members, and offering encouragement to members' with her most important role seen to have been 'that of gaining members and keeping them'.

Portraits in Science

In 1967, Ann Moyal had published a paper explaining the importance of oral history. So it was appropriate that she be approached in 1994 to participate in the NLA Oral History project. She was invited to interview twelve distinguished figures in the broad field of science. The taped interviews are lodged in the National Library as part of the project. Edited versions were gathered together into a handsome volume, *Portraits in Science*. Moyal's introduction sets out her aim in the volume: 'to shed light on a crucial aspect of Australian culture' through the mechanism of recording 'the intimate reflection of individuals'. The introduction also sets out a persuasive explanation of the particular importance of oral history in the sciences:

The oral record is now widely accepted as a significant means of recovering the past. In the arena of science, its value is evident. Few scientists are given to autobiographical writing; few keep personal diaries and a significant part of the history of the last fifty years of science is in the memory of living scientists. Since a scientist's work is often complex involving unfamiliar terms, explanation afforded by oral discussion can assist in conveying and clarifying many themes.

The collection includes two outstanding science communicators, ABC broadcaster Robyn Williams and Questacon founder Michael Gore, as well as a galaxy of famous scientists: Sir Mark Oliphant, Dr Paul Wild, Dr Helen Newton Turner, Sir Gustav Nossal, Dr Elizabeth Truswell, Prof Harry Messel, Prof Peter Bishop, Prof Ted Ringwood, Prof Ralph Slatyer and Prof Susan Serjeantson. As the introduction promises, the reader finds out a wealth of interesting detail about the backgrounds of these famous scientific workers, but is also given an insight into way science works. It should be required reading for young people considering a career in science²⁰.

A first memoir

1995 saw the publication of Ann Moyal's first memoir, *Breakfast with Beaverbrook*, appropriately subtitled *Memoirs of an Independent Woman*²¹. She later noted that almost all the contemporary autobiographies she had read were written by men, with women appearing only as 'mistresses or wives'. Her book was, she said, written from an explicitly feminist perspective 'mainly for a professional women's audience'. It was a publishing success and the proud author found herself 'soon swept along on a current of media interviews'. She made a point in those interviews of pointing out 'the continuing prevalence in Australia of a patriarchy in professional and public affairs that had contributed to a significant devaluation of women in this country'. The book was re-published in paperback in 1996 and its success led to an ABC documentary in its series, *Life Stories*. As Ann recollected, 'it told of my happy family childhood; my graduation in history from Sydney University; my years in England and abroad working and travelling with Lord Beaverbrook; my two short English marriages; and, returning as an academic to the Australian National University and my marriage to the Israeli mathematician J E (Joe) Moyal'. She later wrote that she had published the memoir at a time when, in her mid-sixties, she believed she had 'done it all'. So she saw the book as

the summing up of her productive professional life, at a time when she did not envisage tackling further big projects²².

More portraits of science

Other people had other ideas. Still in 1996, she was invited by the National Library to curate a portrait exhibition ‘to celebrate the achievements of Australian scientists’. Her later memoir spells out in fascinating detail the process of putting together the amazing exhibition that was displayed in the Old Parliament House as *The Clever Country: Scientists in Australia*²³. The collection traced the entire period of recorded Australian scientific history since the establishment of the British colony at Farm Cove. From the early colonial period it included ‘a short, top-hatted, sartorially elegant John Gould – complete with birds and gun’, ‘a thoughtful portrait of the young botanist Robert Brown’ and ‘long in years at seventy-eight, wearing his clerical robes, the father of Australian geology, the Rev W B Clarke’. From the 20th century, she collected a cluster of knighted scientists — Sirs Douglas Mawson, Mark Oliphant, Ian Clunies Ross, Philip Baxter and Leonard Huxley — as well as such other notables as Frank Fenner, Gus Nossal, Harry Messel, Dorothy Hill, Adrienne Clarke and Nancy Millis. ‘Expertly hung in the spacious exhibition rooms of Old Parliament House’, she recalls, ‘the collected canvases shone with life and colour’ to constitute ‘a tapestry of Australian science’. Ann was delighted that about 28,000 people passed through the exhibition, which she saw as ‘an innovative blending of science and art’. Her expressed hope was that those who visited ‘would perceive the men and women of Australian science less as elite, “nerd”-like figures in laboratory coats, but as an active and talented company, seen together in a fresh and dynamic light’.

Platypus²⁴

Five years later, Ann Moyal published *Platypus*, subtitled ‘the extraordinary story of how a curious creature baffled the world’. As the back cover of my 2002 paperback edition says, ‘When the first specimen of a platypus arrived in England in 1799 it was greeted with astonishment and disbelief. What was this strange creature from the new colony of Australia? It defied rational explanation, with its webbed feet and duck’s beak attached to what seemed to be a mammal’s body – surely it was a hoax...?’ It quotes a short poem by the biologist Ron Strahan, elaborating on that theme:

The first *Ornithorhynchus*
Confused early thinkers,
They said, ‘Oh good lord,
It’s an obvious fraud!
Someone has stuck
The front end of a duck
(With the skill of a weaver)
To part of a beaver.
It’s no less a fake
Than the mermaids they make
From a fish and an ape –
A ridiculous jape!’

We now know it’s real
Though I can’t help but feel
That from tail tip to muzzle,
It still is a puzzle.

The book spells out the story of ‘a biological riddle that confounded scientists for nearly ninety years’. The emergence of what was eventually recognised as an egg-laying mammal was a fundamental challenge to the conventional classification of species, which held that there were birds and reptiles that laid eggs and mammals which suckled their live-born young. The debate inevitably became entangled in the controversy which followed the publication of Darwin’s *The Origin of Species* and the overthrow of the theory that all creatures had been created by a superhuman designer. The book is, as Robyn Williams expressed it, ‘spectacularly wonderful’ in its discussion of the science, the history and the politics of the long struggle to unveil the truth about this fascinating creature. It also contains some wonderful anecdotes, like the story that Winston Churchill demanded at the height of World War II that live specimens be brought to England for him. A determined effort was made to take one platypus in a tank on board a ship. When a German submarine was detected nearby, the ship successfully repelled it with a depth charge, but unfortunately the shock wave killed the special passenger. It was later observed that the stuffed body had pride of place on Churchill’s desk at Number 10, Downing Street.

The book was a dramatic success. It was short-listed for several national prizes, published in paperback, re-issued in the USA by the Smithsonian Institute and Johns Hopkins University Press, translated into Italian and Chinese, and was said to have ‘stirred international attention’. The story was not over; an international conference led to a revised 2010 edition including new genetic findings, showing that there was ‘a clear fork in the evolutionary road some 166 million year ago’ when the two monotremes, platypus and echidna, went one way and the placental mammals form which we have descended went the other²⁵.

I was delighted to read in her later memoir that Ann had spent ‘long, sunny weeks’ while writing *Platypus*, away from the Canberra winter at Peregian Beach²⁶, ‘with its stretching span of camel-coloured sand’, working in ‘a neat apartment that looked out on a brilliant sea’, enjoying ‘the old-fashioned village’ and ‘beach walks at sunset along the colouring shore’. I can relate to all of that, having relocated some fifteen years ago to the Sunshine Coast where I live at Marcoola Beach, about 15 kilometres south of Peregian, and enjoy all of the features mentioned by Ann.

The Web of Science

The Reverend William Branwhite Clarke studied for the cloth at Cambridge University but, while a student, had attended the early lectures of the geologist Adam Sedgwick. As a result, he combined his clerical work with amateur geology and became a Fellow of the London Geological Society before he was invited to a church appointment in the small Sydney colony. He arrived in 1839 with his wife, two children and his geological hammers, determined to explore the rocks of the new land. Chapter 13 of Ann Moyal’s second memoir tells the enthralling story of her gaining access to the papers left by the Rev W B Clarke, as he was universally known: some 2,700 letters and papers, the treasure trove of his lengthy correspondence with European colleagues. He concluded quite quickly that the supposedly young land was in fact very old. Ann enlisted the help of Dymphna Clark to translate the huge body of exchanges with a renowned Belgian palaeontologist Prof Laurent-Guillaume de Koninck, recalling that Dymphna rejoiced in referring to this body of work ‘the French Letters of the Rev Clarke’. The product of this research was a truly massive two-volume 2004 publication, *The Web of Science: The Scientific Correspondence of the Rev W B Clarke, Australia’s Pioneer Geologist*, running to 1240 pages. It documented Clarke’s amazing career, culminating in his election as a Fellow of the Royal Society at the age of 78, putting his literally ground-breaking work in the context of the 19th-century revolution in scientific thinking²⁷.

Rediscovering Alan Moorehead

Moorehead left Australia for London as a young reporter in the mid-1930s and became foreign correspondent for the *Daily Express*. Ann Moyal recounts that she actually met him on a 1965 visit to Canberra. After dinner with Manning and Dymphna Clark, she drove him back to his hotel, where he invited her to spend the night with him. Having recently married for the third time, she declined the proposition, and writes that she later found Moorehead had a reputation for one-night stands²⁸. In 2002, the National Library invited Ann to contribute to its series of publications under the umbrella heading *An Australian Life*. Having chosen to write about Moorehead, she was given access to forty boxes of papers in the NLA. While Moorehead's work had been mostly forgotten in his home country, he had produced what was described at the time as 'a flood of best-sellers' about Australian historical events, most notably *Gallipoli*, *Cooper's Creek* and *The Fatal Impact*. Her 2005 book, *Alan Moorehead: A Rediscovery*,²⁹ was described by Prof Richard Holmes, the doyen of British biography, as 'Ann Moyal's fine biographical monograph'. He noted that Moorehead's books 'marked a significant type of collective biography' which had been 'decisive in changing public attitudes'. They had, he wrote, 'alerted the world to a different Australian cultural perspective and helped to establish a new post-war Australian identity'³⁰. Moyal's book brought Moorehead's work to the attention of younger Australian readers, who would not have been aware of its historical importance.

An affectionate tribute

Ann had a long and sometimes turbulent third marriage with the distinguished Israeli mathematician Prof J E (Joe) Moyal. He grew up in Paris, where he studied theoretical physics and statistics in the 1930. He fled to the UK when war was imminent and stayed there until his appointment as Reader in statistics at ANU in 1958. Joe Moyal was a critical mentor to a whole generation of future professors of mathematics and statistics around the Australian university system. He met Ann at University House in Canberra and they married in 1963. He was recruited soon after by the major US nuclear science institution, Argonne National Laboratory. As discussed earlier, they moved to the Chicago area where Ann became science editor at University of Chicago Press and wrote an important study of the Argonne Lab. When they returned to Australia, he became a professor at Macquarie University, where a colleague commented that they had 'a giant among us'. He spent his retirement years in Canberra and passed away after a long illness in 1998. The following year, Macquarie University instituted an annual Moyal Medal and Lecture, which circulates between the disciplines of mathematics, statistics and physics. Ann's book, *Maverick Mathematician: the life and science of J E Moyal*, is a touching and affectionate tribute to an outstanding scholar and her soul-mate³¹. She subsequently wrote an important paper, summarising the correspondence between her late husband and the great Paul Dirac, a Nobel Laureate and one of the seminal thinkers in the field of quantum mechanics, showing that Joe Moyal made a major contribution to this area of physics³².

Koala³³

Ann has written that she was reluctant to undertake a second sortie into Australia's unique wildlife after the success of *Platypus*, but was persuaded to tackle 'the benign if quizzical koala'. She later lamented that her 2008 book, *Koala: A Historical Biography*, 'never received the plaudits' of the earlier book, but Richard Holmes chose it as one of his favourite books of the year for *Australian Book Review*, describing it as 'a miniature witty gem of a book, which somehow gives us a compressed history of the entire country as seen from tree-top, leaf-nibbling level'³⁴. It has a grand sweep, from Robert Brown's 1803 description in Latin 'translated here for the first time' to recent science, showing that the 'advent of the eucalyptus began with the onset of drier climates ... about 34 million years ago' when the 'koala began to shape its evolutionary responses'. It recounts the evolution of the koala from immense extinct herbivore browsers, the *Diprotodonta*, with the fossil

record revealing ‘koala-type relics’ dating from 25 million years ago: Preikoala, Litokoala, Madakoala and Nimiokoala. The book gloomily concludes that the iconic animal is in trouble, with development destroying its habitat and fierce bushfires having critical impacts. The koala was formally listed as ‘vulnerable’ in Victoria and New South Wales in 2012, and populations in south-east Queensland are also declining rapidly. The book quotes the naturalist David Fleay’s urging Australians to remember ‘that their survival depends entirely on us’. It emphasises the ‘need for Aboriginal participation’ to protect the remaining population, citing ‘universal agreement that we must seek dialogue with traditional knowledge’, especially using low-intensity burning to reduce the likelihood of catastrophic bushfires³⁵.

Recognition and awards

Late in life, Ann Moyal’s extraordinary body of published work finally received the recognition it deserved. In 1993, she was made a Member of the Order of Australia (AM) for her ‘contribution to the history of Australian science and technology, especially the writing of its history’ and received a Centenary Medal for her contribution to society and the humanities in the study of Australian science. In 2003, the ANU conferred the higher doctorate of Doctor of Letters (Litt.D) in recognition of her published work. In 2007, Sydney University marked the sixtieth anniversary of her original graduation with an honorary doctorate, D.Litt.

As mentioned earlier, she published a second memoir, *A Woman of Influence*, subtitled *Science, Men and History*, in 2014. In its introduction, she wrote ‘I wished to gather together those buoyant passages and components; my chequered engagement as a historian; the richly unfolding interconnections and tapestry of people who have influenced and shaped me; love and loss; and the experience of vastly increasing age’. In its concluding pages³⁶, she expressed a wish for the ‘values and knowledge’ of the humanities and social sciences to be melded with science to tackle the wicked problems our civilisation now faces. Who could disagree with that sentiment? Finally, she echoed Simone de Beauvoir, who wrote ‘I wished to put myself in question before all questions are silenced’.

Conclusion

Ann Moyal was still actively contributing in her 94th year. She gave a presentation to the ACT Chapter of ISAA in May 2019, arguing for the appointment of a Chief Social Scientist to complement the advice to government of the Chief Scientist. Her paper, *The scientists and Darwin’s The Origin of Species in nineteenth-century Australia: A re-evaluation*, was published by the Royal Society of NSW in 2019.

She wrote in her second memoir³⁷, ‘For as long as I can remember, which is now very long, I have been a historian. Writing history has been my beacon, my daily course, my anchor against the currents of life, my career’. She reflected that Manning Clark had once argued that the etymology of the word ‘historian’ was the ‘istor’, the person who told the story about the past but, he insisted, ‘no mere photographer: each must create a time a people, a place’. In attempting to do that, she wrote, she always had her eye ‘on a spanning spectrum of history’.

Ann Moyal was a prime mover in the establishment of ISAA and put it on a sound footing to continue as a valuable organisation. She produced an enormous body of published work, setting the standard for scholarly analysis of the history of science and technology. As a pioneer in the field, she helped to make it a reputable academic discipline. That will be an enduring legacy.

- ¹ A Moyal, *A Woman of Influence: Science, Men and History*, UWA Publishing, Crawley, 2014, p ix.
- ² A Moyal, *Breakfast with Beaverbrook: Memoirs of an Independent Woman*, Hale and Iremonger, Sydney, 1995.
- ³ A Moyal, *A Guide to the Records of Australian Science*, Australian Academy of Science and ANU Press, 1966.
- ⁴ A Moyal, 'Change in Argonne National Laboratory [of atomic science]: A Case Study', *Science* **174**, 30-38 [1971].
- ⁵ A Moyal, 'The Australian Atomic Energy Commission: A Case Study in Australian Science and Government', *Search* **6**, 365-380, 1975.
- ⁶ A Moyal, *Scientists in 19th Century Australia: A Documentary History*, Cassell Australia, Sydney, 1976.
- ⁷ Susan Foley and Charles Sowerwine, Ann Moyal, *The Encyclopaedia of Women & Leadership in Twentieth-Century Australia*, 2014, available at: <https://www.womenaustralia.info/leaders/biogs/WLE0419b.htm>
- ⁸ N Quirke, *Preparing for the Future: A History of Griffith University 1971-1996*, Boolarong Press, 1996.
- ⁹ R W Fox, G G Kelleher & C B Kerr, *Ranger Uranium Environmental Inquiry First Report*, Australian Government Publishing Service, Canberra, 1976.
- ¹⁰ *A Woman of Influence*, p ix.
- ¹¹ see www.prometheusjournal.co.uk
- ¹² A Moyal, *Clear Across Australia: A History of Telecommunications*, Thomas Nelson, Melbourne, 1984.
- ¹³ A Moyal, *A Bright and Savage Land: Scientists in Colonial Australia*, Collins, Sydney, 1986, Penguin Books, 1993.
- ¹⁴ *A Woman of Influence*, p 21.
- ¹⁵ *A Woman of Influence*, p 22.
- ¹⁶ A Moyal, *A Bright and Savage Land: Scientists in Colonial Australia*, op cit.
- ¹⁷ A Moyal, *Women and the telephone in Australia: a study prepared for Telecom Australia*, Telecom, Melbourne 1989; see also A Moyal, 'The gendered use of the telephone: an Australian case study', *Media, Culture & Society* **14**, 57-72, 1992.
- ¹⁸ A Moyal, *A Woman of Influence: Science, Men and History*, op cit, p 107.
- ¹⁹ see chapter 4, Genesis. The Independent Scholars Association of Australia, in A Moyal, *A Woman of Influence*, pp 36-45.
- ²⁰ A Moyal, *Portraits in Science*, National Library of Australia, Canberra, 1994.
- ²¹ A Moyal, *Breakfast with Beaverbrook: Memoirs of an Independent Woman*, Hale and Iremonger, Sydney, 1995.
- ²² *A Woman of Influence*, p ix.
- ²³ *A Woman of Influence*, pp 3-8.
- ²⁴ A Moyal, *Platypus: The Extraordinary Story of How a Curious Creature Baffled the World*, Allen and Unwin, St Leonards, 2001, 2nd edition 2010; Smithsonian Institute, Washington DC, 2001; Johns Hopkins University Press, Baltimore, Maryland, 2004.
- ²⁵ *A Woman of Influence*, p 114.
- ²⁶ *A Woman of Influence*, p 53.
- ²⁷ A Moyal, *The Web of Science: The Scientific Correspondence of the Rev W B Clarke*, Australia's Pioneer Geologist, 2 volumes, Australian Scholarly Publishing, Melbourne, 2003.
- ²⁸ *A Woman of Influence*, pp 77-78.
- ²⁹ A Moyal, *Alan Moorehead: A Rediscovery*, National Library of Australia, Canberra, 2005.
- ³⁰ *A Woman of Influence: Science*, pp 85-86.
- ³¹ A Moyal, *Maverick Mathematician: The life and science of J. Moyal*, ANU E Press, Canberra, 2006.
- ³² A Moyal, PAM Dirac and the Maverick Mathematician, *Journal & Proceedings of the Royal Society of New South Wales*, **150**, part 2, 188-194, 2017.
- ³³ A Moyal, *Koala: A Historical Biography*, CSIRO Publishing, Collingwood, 2008.
- ³⁴ *A Woman of Influence*, p 120.
- ³⁵ A Moyal, *Koala: A Historical Biography*, op cit.
- ³⁶ *A Woman of Influence*, p 196.
- ³⁷ *A Woman of Influence*, p 9.