

Book Review Section

Compiled by John Jenkin*

Ann Datta, *John Gould in Australia: Letters and Drawings, with a Catalogue of Manuscripts, Correspondence and Drawings relating to the Birds and Mammals of Australia held in the Natural History Museum, London*, Melbourne: The Miegunyah Press (MUP), 1997. xiv + 502 pp., illus., \$80.00.

Some time in June 1997, I visited the London shop of bookseller Henry Sotheran, who, in 1881 on the death of John Gould, bought up all his remaining book stocks together with their copyright. Here I chanced upon and bought a biography of John Gould. Only in October did I find time to read this book, in the event just days before Ann Datta's superb *John Gould in Australia: Letters and Drawings* landed on my doorstep for review.

To read Datta's book immediately upon Isabella Tree's *The Ruling Passion of John Gould: A Biography of the Bird Man* (1991) ensured for me a disturbing experience of much of Datta's text. It required adjustment to a sharply contrasting writing style and generated a dramatically renewed perception of the semantic force of style and idiom. In particular, it reminded me of the ambiguous, mystifying force, not only of the repressed formal style of Victorian writing but also of the sober style of modern empirical prose. Ann Datta writes with admirable lucidity in the latter of these styles. John Gould, constrained by his status as a prominent scientist and self-made middle class Victorian family man, used both throughout his life.

Part I of *John Gould in Australia* presents a well-documented 'life and times' of John Gould, a descriptive narrative record of his phenomenal achievements as book-maker and ornithologist. Part II offers an invaluable scholarly catalogue of the Gould letters and drawings in the Natural

History Museum in London, invaluable especially for Gould scholars remote from that collection, because every catalogued letter or part of a letter which relates to Gould and Australia has its abstract. That selective discrimination points to the rather misleading thematic meaning of the book's title: the John Gould of this book is, as he was in life, mostly elsewhere than in Australia, and his drawings, including those reproduced here, are mostly elsewhere than in the Natural History Museum in London.

But Australian readers are lucky that Datta chose to assert the Australian interest. She might equally have focussed on Gould's importance to European or Himalayan or British bird science, even on his long obsession with American humming birds. Even so, Gould himself drew most excitement and achievement from his Australian visit and work, in scientific discovery, in book making, in bird art. Finished Australian Gouldian illustration is not superior to Audubon's moving marvels nor to Edward Lear's intelligent nervous brilliants, but, after the Goulds' Australian visit, it thrust most earlier stilted birds into a past of ignorant bravura. Much of the Australian art is fine, some spectacular. Further, even in these days of general historical illiteracy, most Australians know that Gould's Australian work, massive, brilliant, archetypal and beautiful, still defines the direction of European-Australian bird sciences. (Some too begin to realize its profound and rich complement of knowledge in Aboriginal art and culture.)

All this aside, the empirical reserve of *John Gould in Australia*, its very certainties of style and approach, induce uncertainty, not about the brilliant birds of Gould's life-long study and delight, an impressive number of which acquire through Gould their first scientific naming, description and illustration, but rather about the bird man himself, his character, actions and motives, his feelings and intentions. With scholarly propriety, Datta lists her chief sources in her first sentences. Here she describes

* Faculty of Humanities, La Trobe University, Bundoora, Victoria 3083.

Isabella Tree's biography as 'the result of a comparatively short period of concentrated research'; and then, in a rare moment of criticism, as 'original, different and provocative'. The comparison, evidently, is with Gordon C. Sauer's fifty-year ordering of Gouldian data and with Datta's own research, whose concentration and duration can be deduced from the account which opens the catalogue.

Isabella Tree's lively biography offers a rattling good read and more. In direct contrast to Datta's biography, Tree's book is directed throughout by an uninhibited thematic criticism, always fascinating, nearly always convincing, and carried on a tide of evocative language arrested only by passages of acutely judged quotation. Her energetic writing brings us something of Gould's energy: 'When he was not ducking and weaving through the cedar brush with this curious hat on his head, Gould was sitting up at night on the Appletree Flats waiting to ambush a tawny-shouldered podargus or crouching next to a hole in the ground next to Stephen's garden gate waiting for the appearance of an unfamiliar little mouse'.

That metaphorical verve carries both Tree's open enthusiasm for Gould and a ready stream of judgment. Racy and adverbial, the book is nonetheless shrewd and accountable. It is difficult not to accept, for example, Tree's documented account of Gould's 'reluctance' (as against Datta's 'anxiety') to interrupt his collecting near the Hunter River in 1838 for the birth of his third son in Tasmania. Nor is it difficult to share her sense of Gould's negligence about the welfare of naturalist and collector, John Gilbert, in Australia; nor his turn-about, after-the-event distancing of himself from Gilbert's decision to join the Leichhardt expedition that brought about his tragic death in 1845 – an expedition from which, even so, Gould derived benefit.

If relatively quickly researched, Isabella Tree's book is convincing nevertheless; it is fully documented and its judgments are both psychologically shrewd and balanced:

Gould's was a happy life. He adored his work, and it brought him what he longed for most: fame and respectability. His complete surrender to the service of his vocation cushioned him from the blows felt by most people during the course of their lives: it comforted him in times of bereavement: it even assuaged the pain

of his final years. How happy Gould made other people is another question.

That is, Tree's book asks the human questions. By sharp contrast, and though aware of the relevance and history of such questioning, Datta's biography queries Gouldian activities only where her material offers no other way forward. An early example of the extreme punctiliousness of Datta's approach to surviving documents is her quotation of the intriguing paper renegotiating Gould's terms of employment as Museum Curator with the Zoological Society of London. Datta makes no comment on what can only be taken as a rather bristling, if formal, exercise in damage control: Gould, ever the opportunist, exploited his position in ways perhaps allowable at the time but needing containment. Even in Datta's final chapter, 'History's Verdict', she records rather than debates the long-established issues of Gould's careerism, money- and status-making, nor explores his disposition toward those who, at such poignant risk to their lives, served him and his career – in my judgement, a confusing mix of erratic warmth, evasiveness and cunning.

Datta sees Gould narrowly in the way he saw himself, as 'the bird man', and her scholarly responsibility as a smooth representation of his achievements as bird man and bird-book man. Except for her muted account in 'History's Verdict' and her detailed tackling of the question of Gould's ability as an artist, she steers a careful path around the moral/ethical disturbances that dog the Gouldian human story, even though her own richly informative attention to the evolving scientific culture of Gould's London knows that the human story carries the scientific one. Datta carefully records Elizabeth Gould's contribution to the great work at all relevant stages, but does not record that commentators have thought her artistic and lithographic work inadequately acknowledged by Gould. And beyond that inadequacy, it is also important to note, for instance, that Elizabeth performed an enormous workload, not only at critical times for publication but at critical times for herself. Whatever is decided about the quality of Gould's design and sketching for the finished bird illustrations, Elizabeth was doing unpaid artistic work of high order that Gould could not do. On at least two occasions she worked for many months bent awkwardly over the lithographer's stone

during the last stages of pregnancy. That is part of the human story.

This said, the ambiguity of Victorian writing style remains. The seemingly hearty resumption of business-as-usual in the letters following Elizabeth's sudden death in 1841, tells us most of all about the baffling opacity of Victorian formality. Their deep reserve may conceal a marvellous indifference – that allowed by a vocation so single-minded that it over-rides even such personal concerns. It may conceal an unimaginable pain, endured in a silence which has no permissible expression. It may, in a most desperate sense, have 'comforted [Gould] in times of bereavement' and carried him through what, in Eliza's very especial case, was a quite remarkable loss – emotional, family, professional. It is interesting that Datta's preface judges Richard Bowdler Sharpe's *Biographical Memoir* of 1893 as a true 'picture' of Gould's life 'even allowing for the inhibitions that prevailed in Victorian England which prevented mention of the less attractive characteristics in the subjects of biography'. Datta's writing flows quiescent beneath the shadow of similar significant inhibitions. It might be said to beguile with its own scholarly formality; also with its implicit rebuke of those, like Tree, who make judgment.

Datta's is a sober, faultless kind of history writing which might well be called old-fashioned, were it not for the close, unstinted research which seems successfully to contextualize almost every facet and moment of a phenomenally busy life, its myriad contacts, both institutional and personal. Here, just at the right reading moment, is a succinct innovative history of gardening at Windsor Castle, of the Royal Society, of the Zoological Society of London, of Gould's use of the Society, of the Society's use of Gould. The clear sense of Gould's place within the new culture of science, as well as a surely dismaying range of book-making cultures, is one of the most valuable aspects of this essay. Gould's energy and commitment made that place and held it sure over five decades.

Here too are succinct accounts of the history and character of the new modes of book illustration, of lithography, of bird art and its contemporary practitioners: Edward Lear, Elizabeth Gould, Joseph Wolf, Henry Constantine Richter. Then, of the Gould household in Broad Street, Golden Square, of the clerkly, unclerkly life of Gould's

secretary, Edwin Charles Prince. Here are the wonderful narrative moments (which Tree also recounts) of Gould's crucial taxonomic involvement in the episode of 'Darwin's finches' and in the bright whirling episode of Gould's humming birds. Most important, here is the story of Gould's voyage under sail, with Elizabeth Gould, small son Henry and others, to Australia in 1838-40. And of the opportunities this man of unfailing energy and perception could make of those colonial adventures that were to prove so productive and of such historic importance to Australian ornithology. It is informative history, affirmative and reassuring. But while it rehabilitates the so-productive bird man who could not draw, it skirts round the egoist who seemed so often to work out of the work of others.

However, while the rich contextualization dominates the London story, it falls short in the crucial Australian chapter. The Goulds arrived in Van Diemen's Land in 1838, just eight years after Governor Arthur's 'Black War' attempted the massacre and genocide of all the original Tasmanians. While the book's silence on this may mimic contemporary settler silence, its traumas of repression must still have reverberated in the grand houses and tiny settlements where the Goulds visited and their child, Franklin, was born. Though Datta is characteristically silent on the point and though his bird-hunting was obsessive, Gould was himself mindful of the terrible history of the lovely places he visited. Writing of his trip to Flinders Island, Isabella Tree quotes from Gould's letter to Eliza of 8 January 1839:

I look forward with considerable pleasure to our arrival at Flinders whither I proceed purposely to see the remnants of the inhabitants which once peopled this fine Island over which they were Lords and Masters but now submissive creatures to the wiles of Englishmen.

Datta includes 'Aboriginal tribes' in her account of the population of Van Diemen's Land in 1841, but what tribes were these so long after their people's forced removal to Flinders Island? Gould's *Birds of Australia* records the assistance of Aborigines in bird collection and Aboriginal bird names whenever they are known, but individuals (like Natty and Jemmy of the Upper Hunter valley) receive no naming that I have found in Gould's books. Such

omissions should be mentioned in Datta's book because they are part of the imperial culture that defined behavioural, including naturalist, histories in the colonies. In London, Gould's career was part of the evolution of a professional middle-class and of Enlightenment science. In Australia, it was part of the imperial colonization of an occupied land and the dispossession of its inhabitants. The first entry in an otherwise conventional bird collector's list sent to Gould's secretary from Australia by a Mr Shepherd is 'cranium of Aborigine'. That now startling item points to a genocidal practice, widespread and lucrative even among the most prominent bird collectors. It is also openly casual about confounding the destinies of indigenous people with those of animals. Whatever the contemporary glories and continuing scientific benefits of Australian colonial bird collecting, the activity was a vigorous part of, and uncannily mirrored, the invasion of a sovereign people.

John Gould in Australia: Letters and Drawings is a wonderful book. Though, like Gould's *Birds of Australia*, almost too heavy to lift, though needing a home lectern to read, I'm delighted to have my copy. Its design and production are, in the best Gouldian tradition, classically beautiful. Reproduction of its many plates in colour and monochrome is both fine and generous; their alignment with relevant text is meticulous and, for that reason, illuminating. These aspects of production by Miegunyah Press complement Datta's fine research and text.

My argument with the book is that it is still, at the end of our century, an imperial book. Australian history long repressed Aboriginal experience and managed to 'forget' Aboriginal names. Datta's index meticulously records every individual mentioned in her text except the assistant collectors Natty and Jemmy. Further, many of John Gould's Australian birds, as he predicted, have been and are seriously endangered by the imperial-colonial culture which so suddenly and ruthlessly invaded their world, animal and human. The original people who knew them better than Gould ever could remain culturally endangered. We are all, here in the world of Gould's and our birds and especially under present government policies, endangered; and our salvation lies possibly less in the Gouldian scientific heritage than in its profound complement of Aboriginal

knowledge. In an otherwise actively contextualizing book, the politically endangered and endangering history, the human story of Gould's Australian birds, is missing.

Elizabeth Lawson
Canberra, ACT

S.R. Morton and D.J. Mulvaney (eds), *Exploring Central Australia: Society, the Environment and the 1894 Horn Expedition*. Sydney: Surrey Beatty & Sons, 1996. x + 398pp., illus., \$85.00.

The centenary of the Horn Scientific Expedition to Central Australia was celebrated in 1994 by the publication of a facsimile edition of the expedition report and by holding a symposium in Alice Springs, during which the work of the expedition was reconsidered by a group of scientists, historians and anthropologists. This book is the product of that symposium, and it is both a tremendous pleasure and a considerable contribution to the history of Australian science.

Twenty-six papers in four groups cover matters as diverse as the history of the original expedition ('The Expedition in Context'), the archaeology and anthropology of the Centre ('Past and Present'), and the knowledge of human societies, palaeontology, geology, plants and animals created by the expedition ('The Expedition's Anthropological and Scientific Contribution'). The final group of papers presents a series of longitudinal studies of the region ('Environment and Biota 1894-1994'). The volume closes with a very thoughtful reflection on the state of the related matters of reconciliation and land management in Central Australia. Together these papers comprise the most thorough and well-considered analysis of the human and natural history of Central Australia that has been collected since the Horn Expedition itself.

One of the reasons for this is the consistently high standard of the editing and production. The editors acknowledge that the original goals for the volume (that of celebrating the achievements of the Horn Expedition, examining those achievements in terms of contemporary approaches to the natural and cultural histories of the region, and taking stock of the changes that have taken place there since 1894) required a pluralist approach, where the diversity of

perspectives and data could be retained. Morton and Mulvaney have managed to do this while maintaining high production values and clear, direct writing. The maps, tables, diagrams and line drawings are uncluttered and user-friendly, and the volume as a whole is enriched by the use of Baldwin Spencer's wonderful photographs of the Centre and its people, taken during the expedition.

Another reason for the outstanding result is the quality of the papers themselves. Space (and the limited expertise of this reviewer) prohibits discussion of all the contributions, but the following essays give a flavour of the diversity and quality of the contributions. Tom Griffiths' short exposition of the social and intellectual context of the expedition is well matched by the more detailed discussion by Philip Jones of the influence of Ferdinand Mueller and the Elder expedition on the nature and organization of scientific expeditions during this period. Mike Smith presents an up-date on the archaeology and human ecology of the region which, while opting somewhat uncritically for the prime-mover of growing population density as the motor for cultural change in the Pleistocene, makes a real contribution to our understanding of the human history of the region. Similarly, Dick Kimber's fascinating speculative history of the period 1794–1894 surely lays to rest the notion that Aboriginal societies prior to contact with Europeans were inherently conservative and static, in technology, social organization or ritual. Howard Morphy's re-evaluation of the place of Baldwin Spencer and Frank Gillen in the history of anthropology persuasively argues that the construct 'British social anthropology' needs to be regarded with some suspicion, and that some rearrangement of the disciplinary pantheon is long overdue. Such a re-evaluation will have implications far beyond Central Australia.

Turning from anthropology to plants and animals, I was particularly struck by Calaby's discussion of Baldwin Spencer's legacy among animal collectors in Central Australia, particularly the Overland Telegraph officials and, of course, older Aboriginal women, whose work, as Latz notes in his essay, was not acknowledged in print. The discussion by Gillbank and Maroske of the role of Ferdinand Mueller in the description of the larapintine flora provides an interesting counterpoint. The fact that the contributions made by

Aboriginal people to the work of the expedition went unacknowledged is noted by a number of contributors. Others (such as Baker and Nesbitt) observe that some expeditioners did not seek or simply ignored Aboriginal input.

However, in one important way this book goes beyond the very notable achievements of the original expedition. *Exploring Central Australia* is much more than a straightforward celebration of a worthy enterprise; it is a reflection on the ways in which non-Aboriginal frameworks of gaining knowledge about the human and natural landscapes of Central Australia have shaped our understanding, and an attempt to subject those frameworks to stringent re-analysis. In the closing essay by Morton and Foran, and in the contributions of Rowse, Baker and Nesbitt, Briscoe, and Stafford Smith, West and Thiele, there is a strong sense of the need to understand and to work through those frameworks before reconciliation can occur and before sustainable management of the land can be achieved. The contributors to this important book know better than most that such goals are difficult to reach, but there seems little doubt that the cause of this more enlightened approach to understanding the complexities of the region has been well and truly advanced by *Exploring Central Australia*.

Tim Murray
Department of Archaeology
La Trobe University

K.T. Livingston, *The Wired Nation Continent: The Communication Revolution and Federating Australia*. Melbourne: Oxford University Press, 1996. xiv + 218 pp., maps, \$55.00.

The history of Australian telecommunication is one of the major stories of this country's social, economic, technological and political development. My own volume, *Clear Across Australia* (Moyal, 1984), opened up a substantial field which, it was my hope, would draw many researchers to its fertile historical domain. With this small and compact book, Kevin Livingston has emerged as a key contributor.

In a contemporary world of information technology and telecommunication growth and change, Livingston's aim is twofold: to point out the relevance of telecommunication history to current issues of political

and national control of telecommunications, and, as we move towards 2001, to reveal the significant part colonial debate and the intercolonial conferences on communication in the 1880s and '90s played in the prelude to a federated Australia.

Both aims are important. Federation history has to date largely ignored the significance of communication in shaping Australia's federal system, while historical comparison and analysis reveal a point (clearly unknown to those now pushing the information superhighway, the global village and other media developments) that Australia has a tradition reaching back to the mid-nineteenth century of public debate about communication issues – regarding public versus private ownership, competition, monopoly, broadcasting policy, and the 'public good'. 'Only by recovering a sense of history', writes Livingston, noting a Canadian correlation, '[can] contemporary telecommunications be demythologised'.

Divided into three parts, this is a firmly focused book. *Clear Across Australia* mapped the broad spread of that glamorous early technology, the telegraph, spun out by linemen across a country of magnificent distances and manned by a corps of dedicated and skilled telegraphists. Livingston reviews the forging at a bureaucratic level of the intercolonial telegraph network, made in 1858 between Adelaide, Melbourne and Sydney and extended to Queensland in 1861. 'The very rapid extension of the telegraph lines across the borders of the four eastern colonies', he argues, 'was the earliest and most spectacular example of a genuine federal, even a national outlook shown by the governments of the separate Australian colonies'. Tasmania joined the network by submarine cable in 1869.

Livingston's Part 1, 'Cooperation and Rivalry', gives important emphasis to the pioneering role and vision of a core of young technical bureaucrats, the superintendents of telegraphs in the four eastern colonies: Canadian Samuel McGowan in Victoria, who in 1854 introduced telegraph technology and Morse Code to Australia, and the Englishmen Charles Todd in South Australia, Edward Cracknell in Sydney, and his brother William Cracknell in Brisbane. Working in areas of technical expertise beyond the ken of ministers, these men took full advantage of their knowledge and put their influence to national effect. They constituted 'a coterie of experts who communicated with each other, ... read one

another's regular reports in which they invariably commented on developments in the other colonies ... [and] were able to capitalize on pressure groups, encouraging developments in intercolonial and international communication services'.

Part 1 also offers a new perspective on the impact of the spreading telegraph lines on the colonial press. The intercolonial links proved a great service to country newspapers. By late 1861, there were thirty-five towns with local telegraph stations in New South Wales, forty-four in Victoria, twenty-four in South Australia, and seven in Queensland, a total of 110 telegraph stations in the eastern colonies. But while newspaper intelligence blossomed, the rapid spread of news by telegraph raised some challenging new questions. How accurate and reliable was the information transmitted by the intercolonial telegraph? How good was the new breed of newsagency operators? Was there a danger of 'blunder and perversion'? What legal considerations related to the ownership of telegraphed news?

Just as we experience it today, the latest developments in communication technology constituted a constant source of speculation in the Australian press. From the late 1850s, 'cable fever' gripped the colonies as hopes and plans for international links stirred newspapers and legislatures long before the technology was proven or available. The pressure for international connection, indeed, was to shatter the co-operative environment initially enjoyed by the eastern colonies, as South Australia and Queensland clashed in fierce competition to build the Overland Telegraph Line. In Part 2, 'International Dimensions', Livingston explores this and the emergence of the 'perennial suspicion and distrust' between bureaucrats and political leaders that came to characterize intercolonial debate over telegraphic and postal matters from the 1870s.

In Part 3, 'Federalising Communications', the book turns, as the author writes, to 'the lengthy story of the extensive pragmatic negotiations over communication issues that took place between representatives of the separate Australian colonies in the latter half of the nineteenth century and which led to the federalizing of communications in 1901'. Between 1867 and 1901, there were twenty-five Post and Telegraph conferences held in the capital

cities of Australia and New Zealand and attended by ministerial Postmasters-General and their key technological bureaucrats. By 1890, these meetings had become annual or biannual events, engaging the delegates intensively for a week or more. Topics ranging from postal and telegraph rates, subsidies and uniform policy, to questions of cable routes and international arrangements were thrashed over, tediously at times or with simmering heat, and were reported extensively in the colonial press. Detail of the conferences, drawn from these press reports, may not make for thrilling reading, but their importance cannot be overstressed. As Livingston notes, the P&T conferences became occasions for working through some of the most significant areas of 'practical federation', and for directing attention and debate to the federal government's powers over communication. With their litany of discord, competitiveness and rivalry (as well as a good measure of co-operation), they tend to challenge the orthodox historical acceptance of the view that Australia-wide communication systems fostered national harmony and unity.

In the 'nineties, the P&T conferences also became a forum for establishing a time-zone system for Australia. In this, the astronomer Todd, using his British experience of longitude, played a leading part, having collaborated with other colonial government astronomers earlier in establishing longitude by telegraph to determine the boundaries of South Australia, New South Wales, Victoria and Western Australia. Though the proposal Todd put to the 1893 conference for one standard time for the whole of Australia was later over-ridden by the premiers in favour of three standard time zones within Australia, the consensus reached by the colonies in 1895 in standardizing their times at ten, nine and eight hours ahead of Greenwich Mean Time marked another significant achievement in 'practical federation'.

Importantly, by the 1890 Federation Conference and the 1891 Federal Convention, political leaders were including communication issues in their discussions on a draft federal constitution, and their intent and choice of language proved remarkably farsighted. John La Nauze (1968) first drew attention to the emergence in the constitution of the expression giving the Commonwealth power over 'postal,

telegraphic, telephone and other like services'. Livingston enlarges on the evolution of this durable phrase that has managed to bring every new telecommunication medium of the last ninety-six years comfortably within its purview.

The Wired Nation Continent, with its difficult title, is a timely addition to the growing body of federation literature and opens a dense stretch of bureaucratic, political and communication history to view. The difficult title also has its historical roots. In 1957, at the age of 89, the Commonwealth's first public servant, Sir Robert Garran (1958), jotted down in his memoirs the impromptu phrase coined by Australia's first Prime Minister, Edmund Barton: 'For the first time in history, we have a nation for a continent, and a continent for a nation'. The addition of 'wired', Livingston contends, 'underlines the links, past and present, between technological communication networks and the emergence of the Australian federal nation state'.

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Ann Moyal
Cook, ACT

A.T. Ross, *Armed and Ready: The Industrial Development and Defence of Australia, 1900-1945*. Sydney: Turton & Armstrong, 1995. xvi + 436 pp., illus., \$39.95 pb.

Over recent years, there has been a spate of books dealing with military history, such as the official histories of the Vietnam War, the Indonesian Confrontation and other topics; and we can also look forward to the centenary histories of the Defence Department and the Australian Military Forces that are to be published in 2001 to mark the establishment of the Federation. However, all these publications ignore the question of how the Australian forces were armed for these many conflicts and the contribution to them of the developments

in Australian defence science and technology.

This book by Andrew Ross on the history of the Australian defence industry from the turn of the century helps to fill that lacuna. Ross' book runs to 436 pages, and that very size helps explain why this topic about the arming of the Australian forces has been ignored by historians in general and particularly military historians for so long. The book demonstrates how the complexity of the Australian defence industries can only be understood by deep archival research and by following through the important debates that occurred in the various centres of decision-making, whether they be the military, the defence industry, the Defence Department, the several Ministers or the Cabinet.

Could anything constructive have emerged from this arena of debate, infighting and power struggle? The brief answer is 'yes', but mainly in the long term. Ross identifies some of the heroes and anti-heroes in this procedure, and he also examines the economic theories and factors that determined the course of events before the Second World War and which continued to determine the arming process in the years leading up to and during the war. The author demonstrates the point that may escape most observers of those pre-war years, that no munitions could be manufactured until orders were lodged with the Munitions Board by the three military services. And these services refused to order munitions, partly because they were not given the additional funds and partly because they perceived no great threat to Australia.

Australia was then dependent for all its strategic intelligence on the British. We had no embassies overseas and, while the British were collecting intelligence about the military strengths of Germany and Japan and maintained radio listening posts in Hong Kong and Singapore, none of this information seemed to be shared with Australia. The US Navy was also collecting radio intelligence about Japan and was breaking Japan's naval code as new versions of it were adopted. It was through this US effort that Australia was eventually able to gain some insight into the immediate plans of the Japanese. R.G. Casey, Australia's first ambassador to Washington, established contacts with intelligence officials there and reported back to Australia what snippets of information he could glean. Casey, when

serving in earlier years as Treasurer, had been responsible for pushing the military services into placing orders for the manufacture of munitions before the war, thereby expanding the production of the local munition plants. He had intelligence links to Britain dating back to the early 1920s, and it could have been there that he saw the necessity to put a reluctant military on a stronger war footing. Casey's role in these years, his engineering and technical knowledge, and particularly his intelligence contacts, can now be seen to have been very important for Australia's pre-war security interests.

The most interesting theme in the book concerns the demonstration of how the munitions directorate and their scientists and technicians built up the supply of armaments from almost nothing. Under the policy of 'beat Hitler first', the Allies directed the construction of aircraft, armour and artillery for use in the European theatre. Australia had to resort to designing and manufacturing its own tank, to adapting the established artillery to Australian and jungle-warfare conditions, and to building its own ships. Ross goes into great detail on these topics. In the case of the tank, for example, he discusses the long debates with the Army about an appropriate design. A very innovative design emerged that incorporated a range of new design features such as casting the tank's hull in one piece and designing the turret to take a very large gun that did not affect the turret's flexibility. Prototypes were built, and the photographs of it show it to have been a very threatening-looking battle vehicle.

It is in the design and manufacture of aircraft that the author best shows his ability to unravel the numerous themes and identify the struggles that led to this high-technology industry being established in Australia. Against British opposition, a group of businessmen established the Commonwealth Aircraft Corporation (CAC) before the war, to build an American-designed training plane to be known as the Wirraway. With the RAAF lacking any fighter aircraft, it was these training planes that had to take on Japan's front-line fighter, the Zero, when Darwin was attacked.

The results were devastating. The disaster was caused mainly by the inability of Australia to obtain late-model aircraft, and the government rightly concluded that

Australia would have to manufacture its own tanks, ships and aircraft if Australia was to survive. Australia could not rely on any assistance from its Allies for this type of weaponry. Aircraft production was continued by the CAC, and the Bristol Aeroplane Company permitted the Beaufort (in its various forms) to be built in Australia. But that aircraft was already obsolete, and after much wrangling Australia obtained authorization from the British to have the twin-row Wasp radial engine, manufactured by the CAC, fitted in place of the ancient and inefficient Taurus that the British themselves had fitted. Still with no hope of being supplied with better aircraft, Australia began making the Boomerang fighter and later, under the direction of L.J. Wackett, commenced building a sophisticated light bomber, the CA4. The RAAF was unclear about the type of aircraft it wanted. First it wanted a dive bomber, then it did not. Then it wanted a torpedo bomber, then it did not. The same situation occurred with the tank's manufacture. Initially the army wanted a light tank, then a heavy tank to fight the German panzers (of all things), then no tank at all. The CA4 went ahead, and a prototype was built and successfully flown. Components for about twenty CA4s and miscellaneous components for 550 were made. But it was the middle of 1944 by this time, and the Allied war manufacturing machine was by then fully functioning and indeed over-producing. The necessity for Australia to manufacture its own aircraft and tanks had lessened. The US-made Mustang fighter was now available as were US tanks. Wackett's bomber was abandoned, and all we have left are the photographs used to illustrate this book.

There are numerous lessons to inform scientists and historians of science in this work. Above all, it emphasises the necessity for a nation at war to have people in leadership positions who have some appreciation of engineering, science or technology. And this applies as much in military organizations as it does in government circles. Andrew Ross demonstrates repeatedly how delays, unnecessary reversals and indecision dominated much of the decision-making in defence science and technology during these war years. The book covers nearly fifty years of administrative, political and economic history in addition to analysis of design and mass-production techniques. It makes an important contribution to Australian

history and we are all in Andrew Ross' debt as well as to the Department of Industry Science and Technology who made its publication possible through the 'Australia Remembers' celebrations.

Frank Cain
School of History
University of New South Wales
ADFA, Canberra

Joan Webb, *George Caley, Nineteenth Century Naturalist*. Sydney: Surrey Beatty & Sons, 1995. xii + 185 pp., illus., \$37.95.

A peak in the Blue Mountains, not far from the Botanic Garden on Mount Tomah, was named Mount Banks by an English botanist, George Caley, who collected for Joseph Banks in the young colony of New South Wales early in the nineteenth century. Three other New South Wales peaks carry Caley's name, and he is also commemorated botanically. Robert Brown, several years his junior and another of Banks' botanists, gave Caley's name to various species and a genus of Australian plants. In dedicating the orchid genus, *Caleana*, to him, Brown described Caley as 'botanici periti et accurati' – a skilful and accurate botanist. In England and Australia, botanists have honoured Caley and, despite taxonomic reconfigurations over a century and a half, several species, including a *Banksia* and a *Grevillea* named by Robert Brown and a *Eucalyptus* named by Joseph Maiden, still retain the specific name *caleyi*.

Readers may know something of the botanical Banks and Brown but are excused a questioning silence about the botanical place of Caley. During Brown's predominantly coastal survey of the flora of New Holland for Banks during 1802-5, he collected thousands of plants, many of which he subsequently named. Some he collected with Caley in the hinterland of Port Jackson. While Brown's influential role in Australian botany is widely recognised, Caley, who collected over a longer period of time and may have foot-slogged a greater total Australian land distance, is relatively unknown. In *George Caley, Nineteenth Century Naturalist*, Joan Webb discusses Caley's activities in New Holland and elsewhere, examines his contribution to Australian botany, and explains why his work is little known.

Caley arrived in New South Wales with Governor King in April 1800 and left with Governor Bligh in May 1810. During this eventful decade, which included a rebellion, Caley collected plants undocumented by Europeans, not only in the readily accessible environs of Sydney and Parramatta but also during expeditions far into the ranges that kept the young European settlement hugging the coast. George Caley was an explorer as well as a botanist.

Because he was an articulate artisan, Caley provides an interesting early antipodean voice, so interesting that John Currey selected letters from Caley's substantial correspondence with Banks and prepared *Reflections on the Colony of New South Wales - George Caley* (Melbourne, 1966), which revealed Caley's voice to be rich and reflective. However, Currey does not provide enough extra-epistolary information to explain how Caley became so articulate in English and botany, nor how, despite his substantial and timely botanical work, Caley's name is not writ large in the annals of early European botanical knowledge of Australia.

Joan Webb, whose investigation of Caley began as doctoral research, used a wide range of primary and secondary sources, including William Stearn's history of the Natural History Museum in London and Anne Secord's work on early nineteenth-century artisan botanists that were published after Currey's book. Webb investigated artifactual as well as documentary evidence of Caley's work - herbarium specimens, correspondence, journals, maps and reports - at European, American and Australian herbaria, and she has produced an informative botany-focused biography of Caley. This review addresses its contributions to Australian botanical history.

As an author of Australian plant names and taxonomic publications - most notably his substantial and influential *Prodromus Florae Novae Hollandiae et Insulae Van Diemen* (1810) and supplement (1830) - Robert Brown is clearly an Australian botanical authority. In contrast, George Caley published nothing. Dismissing the naive assumption that Caley's taxonomic silence necessarily meant an absence of botanical influence, Webb sought documents and specimens to discover details of Caley's plant collections: where and when he collected, how he described and named his specimens, and the herbaria in which they have resided.

Webb begins her book by describing how Caley gained a formal education (including Latin) in Manchester and developed an interest in plants. As a stable boy and son of a horse-dealer, plant remedies for horse diseases spurred his botanical interests, and he participated in local botanical meetings and excursions. In 1795, Caley was sufficiently literate and confident in English and botany to write to the great botanical Banks to introduce himself and enquire about employment. He mentioned that he was born on a memorable day for Banks - 10 June 1770 - when Cook's *Endeavour* was almost wrecked on the Great Barrier Reef and Banks feared the loss of his rich plant collection from the aptly named 'Botany Bay'.

While working in several significant English gardens, including the Royal Botanic Gardens at Kew, Caley sought to learn all he could about plants from New Holland. He continued corresponding with Banks and was eventually offered an opportunity to sail to Sydney to collect specimens for Banks and seeds for the Gardens at Kew. Relatively few Australian plants were described by 1800, but, having studied those cultivated in England and those described in botanical publications, Caley was able to take up-to-date Australian botanical knowledge to New South Wales in 1800. Living in a simple house near Government House, Parramatta, Caley understood the importance of local knowledge and was soon trading food for information from local Aboriginals, who provided their names for the trees whose blossoms and fruit they collected for him.

In 1802, unaware of the short-lived peace in the war between France and Britain, three vessels undertaking scientific expeditions were in Port Jackson: the French *Le Naturaliste* and *Le Géographe* and the British *Investigator* which, under Matthew Flinders, was to survey the coast of New Holland and collect specimens. Robert Brown was botanist and Ferdinand Bauer botanical artist. Science was not at war but, as Webb explains, plant taxonomy was in turmoil. Webb discusses the mutual benefit of their meeting for Brown and Caley. Before and after circumnavigating the Australian continent and a trip to Tasmania, Brown shared collecting excursions with Caley and received a number of Caley's specimens, always with generic and specific names attached. After

meeting Brown, Caley's observations and descriptions became more detailed and he re-examined and revised his botanical notebooks.

In 1805, Brown took his massive New Holland collection, including Caley's specimens, back to Banks and England. There, with access to previous collections and current taxonomic ideas, he documented it. He wavered between two taxonomic systems, eventually choosing one based on selected distinctive characteristics, which allowed him to establish many new genera in his *Prodromus* (one of the first major floristic works so arranged). Meanwhile, in New South Wales, Caley was using genera established before 1801 and a taxonomic system being discarded by Brown, for he was more than a mere collector; he provided new specific names for genera he recognised and sometimes ventured to create new generic names. Within his substantial orchid collection, he recognised that certain hooded orchids deserved their own genus. Reminded of the hooded Druids, he called the new genus 'Druid's Cap' and named new species after Banks, Brown, Bauer and other botanists. Brown used the Latin translation of Druid's Cap until he created the new genus *Pterostylis* in his *Prodromus*.

In conjunction with recent botanical field work, Webb's research has enhanced our understanding of Australia's botanical heritage and solved a mystery about one of Caley's oft-renamed plants, commonly known as 'Shy Ladies'. For over 170 years, botanists doubted whether a plant that Caley recorded in the rugged Blue Mountains north of the Gosse River was the same as that recorded later under another name by Allan Cunningham south of the Gosse. These very 'Shy Ladies' were subsequently recorded only in a small area south of the Gosse. In 1987, in the herbarium of the Natural History Museum, London, Webb found two specimens affixed to the same page, one with Caley's handwriting '*Spiraeodites*. On Dripping Rocks. Luminous Valley. Nov. 1804.' and the other annotated 'Allan Cunningham. 1817. Near Mt Banks. Blue Mountains'. Botanists from Mount Tomah Botanic Garden have since struggled across swamps and ravines and found the rare 'Shy Ladies' (now *Acrophyllum australe*) on dripping rocks of inaccessible cliffs near where Caley recorded them.

Until 1963, the Natural History Museum in London was part of the British Museum, which, in 1827 received Banks' herbarium containing many Caley specimens. Caley's notebooks, in the Museum's Botany Library, indicate that he collected and attached names to specimens of about 1,000 New Holland species: at least 750 species in the vicinity of Port Jackson, 82 species near the Hunter River, 22 species on Norfolk Island and 71 species near Hobart. He also collected hundreds of zoological specimens. Webb undertook a cursory general examination and a detailed small-scale examination of the Australian plant collections in the Museum and found that over half of the species from the Sydney region were represented by specimens collected by Caley. Some are type specimens (specimens on which published descriptions of new taxa are based) whose taxonomic names and descriptions were published by others, usually Brown. Brown used Caley's specimens to establish fourteen new species in his *Prodromus* supplement, *Proteaceas Novas* (1830). Webb examined these and other type specimens attributed to Caley and found evidence of eleven Caley manuscript names being published by other botanists. On some of his herbarium labels Brown acknowledged Caley's creation of the taxonomic name, but because Brown published the name, his name rather than Caley's is attached to that name, e.g. *Persoonia rigida* R.Br. Thus, although Caley provided plant specimens and names, his own name is absent from the taxonomic lexicon.

Webb wondered why, in *Flora Australiensis*, Bentham cited Caley so infrequently for species that Caley collected before others. She explains that, when preparing the *Flora*, Bentham had access to Brown's herbarium, which included some Caley specimens, but the hundreds of Caley specimens in Banks' herbarium were inaccessible, in bundles in the British Museum's basement. Webb traces the passage of Caley specimens via the British Museum and two large private collections to herbaria in Europe and America. In herbaria in Vienna (where Joseph Maiden found fifty Caley eucalypt specimens), Geneva, Edinburgh and Harvard University, Webb found a large proportion of Caley's specimens for Sydney species.

Joan Webb has produced an interesting, investigative and interdisciplinary biography of George Caley. In melding botany

and history she has used a wide range of documentary and herbarial sources to expose Caley's life and work before, during and after his Australian decade and the botanical consequences of his Australian work. In explaining why, despite his substantial plant collections, Caley's name is not better known, Webb discusses scientific and social pressures that shaped his shadowy fate in the early nineteenth-century Australian botanical record. Her work demonstrates the vital and complementary importance of archival and herbarium collections in the investigation of botanical history.

Webb's book does not pretend to be Caley's definitive biography, nor the definitive discussion of Caley's botanical efforts (assuming for the moment that such definitive work is ever possible), and of course questions remain. I wonder which Australian species Caley sent Banks as seed for the Gardens at Kew, and which plants are recorded under Caley's name in *Hortus Kewensis* (1810–13). I also wonder whether any plants germinated from Caley's seeds were grown at gardens other than Kew, and whether any of Caley's horticultural offspring were used to establish new Australian plant taxa.

Webb has brought Caley's Australian botanical journey into the public domain in language which does not restrict the readership to academic researchers. Her book is generally thorough and detailed, with little ambiguity and opacity. Maps and illustrations, including Bauer's exquisite depiction of *Caleana major*, are clear and informative. There are useful appendices, including 'Plants named after Caley' and 'Caley's Eucalypts', and a good bibliography; but the endnotes and index are inadequate – the index even lacks plant taxonomic names! Some textual roughness reflects the real and untidy detective effort with which Webb persisted in pursuing evidence of Caley and his collections in order to explain his somewhat arcane place in Australian botany. I admire Webb's investigative effort and recommend *George Caley, Nineteenth Century Naturalist* as an interesting exploration of a small but important facet of Australian botanical history.

Linden Gillbank
Department of History and Philosophy
of Science
University of Melbourne

Peter J. Hallows and Donald G. Thompson, *The History of Irrigation in Australia*. Mildura: Australian National Committee on Irrigation and Drainage, 1997. 128 pp., illus., \$30.00 pb.

Australia has the lowest rainfall of the vegetated continents, and this, coupled with high evaporation losses, means that the surface run-off is the lowest of all continents. Despite these limitations, Australia does have some significant river systems, particularly those in the Murray-Darling Basin of eastern Australia, which provide water for irrigation in an otherwise dry interior.

As the populations of the colonies grew in response to the gold discoveries of the mid-nineteenth century, settlers moved further and further inland, often in response to a number of good years. A typical example was the movement into the northern riverine plains of Victoria following the good years between 1870 and 1875, but it was not long before the severe drought from 1877 to 1881 brought great hardship to the settlers and growing pressure on the colonial government to develop irrigation schemes as a matter of national importance. In later years, as population pressures continued to increase, irrigation was seen as a strategy to respond to demands for closer settlement, and in particular for schemes for the settlement of returned servicemen from the First and Second World Wars.

In the last years of the twentieth century, we now know that the obvious economic and social benefits of irrigation have not been without serious environmental problems. Agricultural production in irrigation areas is suffering from the effects of waterlogging and salinity as groundwater tables rise to within two metres and less of the ground surface over major regions of irrigation areas in the southern part of the Murray-Darling Basin. Saline and nutrient-enhanced drainage from irrigation areas is also contributing significantly to water quality problems, which have serious effects on the health of our rivers.

The History of Irrigation in Australia was prepared by the authors for the Australian National Committee for Irrigation and Drainage (ANCID) as a document that paints an overall national picture for the first time. It certainly does provide a useful summary of the history of irrigation in Victoria, New South Wales, South Australia,

Queensland and Tasmania, but there is little that is new, since the authors admit that there has been little or no basic field research or reference to original documents. The authors, both being civil engineers, confess to a strong engineering slant to their work and have paid only scant attention to the social and political aspects of irrigation which, in my view, is a serious limitation of the book. And an even more serious problem is that, although the book was published in 1997, it does not record any events bearing on the industry after the late 1980s.

The reality is that the last five years have seen very significant changes to the economic and social environment in which the irrigation industry in Australia is operating. For example, the Murray-Darling Basin Ministerial Council has agreed that the continued increase in the quantity of water extracted from the rivers of the Basin is unsustainable and, as a consequence, has imposed a cap on the level of water resource development, namely that existing at 30 June 1994. Other important changes include the separation of the water business activities of the Murray-Darling Basin Commission in response to the agreements reached as part of the COAG water reforms, the commencement of a pilot water trading scheme to support interstate trading of water in response to economic demand, and the transfer of government irrigation schemes to fully commercial irrigator-owned companies. All these new initiatives will have major implications for the future of the irrigation industry in the Murray-Darling Basin and will undoubtedly flow on to other irrigation regions in Australia.

To sum up, *The History of Irrigation in Australia* is a succinct and readable outline of the development of the irrigation industry in Australia up to the late 1980s, as seen through the eyes of two civil engineers. Within these limitations it is a useful work, but I am strongly of the opinion that the definitive history, which also addresses the impact of the dynamic present environment within the industry, has yet to be written.

John F. Lovering
President
Murray-Darling Basin Commission
Canberra

Karen Twigg, *A Vision Shared: The Maud Gibson Trust 1945–1995*. Melbourne: The Maud Gibson Trust, 1996. x + 66pp., illus., \$15.00.

At a time when, due to the diminishing support of governments, the pressure on scientific pursuits is bound up with the search for financial support, it is pleasing and interesting to read of a most successful enterprise that has voluntarily been providing just such support for fifty years. *A Vision Shared* deals with the history of the Maud Gibson Trust, which was established for the benefit of the Royal Botanic Gardens, Melbourne. Miss Maud Gibson, the daughter of the founder of the firm of Foy and Gibson, established the Maud Gibson Gardens Trust in 1945 as a memorial to her father, William Gibson. The trust deed specified that a special committee was to be set up to advise the trustees on how the annual income of the original £20,000 was to be used. The committee had two specific appointees, the Director of the Botanic Gardens and the Professor of Botany at the University of Melbourne, and also included a member of the Gibson family and two other distinguished Melbournians with interests in horticulture. This arrangement has been maintained, and indeed almost duplicated in the more recently established Botanic Gardens Research Committee.

Foresighted projects were sponsored by the Trust. The production of *A Handbook to Plants in Victoria* (Vol.1 1962, Vol.2 1972) by J.H. Willis for the first time gave the opportunity to combine the expertise of a field botanist with the study of the classical herbarium collections at Kew. The publication of several guide books to the Gardens, the *Orchids of Australia* by W. Nicholls, and the beginnings of the *Muelleria* journal are just a few examples of the Trust's influence. A member of the Kew Herbarium visited the Melbourne Herbarium in the early 'fifties and set the scene for further exchanges of staff between the two gardens.

The strong influence of Professor J.S. Turner was also felt in the fostering of the now famous botanical artist Margaret Stones, followed by the production of the *Banksia* drawings by Celia Rosser and the illustrations of *Wildflowers of South-eastern Australia* by Betty Conabere (1974). More recently, the illustrations by Anita Barley for the *Flora of Victoria* have been partly financed by the Trust. A large number and range of other projects were funded in the

Botanic Gardens and the Herbarium, ranging from collecting for specific plant groups and at particular Australian localities, to the formation of the Californian Garden and support for staff to attend conferences.

A general interest in native plants led to an attempt to culture and improve native flora, at first in South Yarra; but as early as 1945 Turner had recommended the acquisition of land in the country 'where plants could be grown and seen to better advantage under natural conditions'. It soon became apparent that the Trust was committed to establishing a native plant annex to the Botanic Gardens, but it was only in 1961 that Sir Samuel Wadham, who had replaced Sir Russel Grimwade on the Committee, was offered nearly unspoilt heath land on the Commonwealth military reserve at Cranbourne. It took a further seven years and the skilled negotiations of the Hon. Peter Howson, a nephew of Maud Gibson, to buy the Cranbourne Reserve, the first major addition of land for the Gardens. It makes interesting reading how the Trust then proceeded to acquire more land from diverse owners and from the clutches of developers over quite a long period of time, made possible by government and others giving more substantial funds. In 1991 the Board of Management of the Royal Botanic Gardens matched the amounts given by the Trust Committee for work on a master plan to guide the development of the Cranbourne Botanic Gardens for the next thirty years, as a first-class botanic garden of exclusively Australian plants. Now, after more than fifty years of the Maud Gibson Trust and the consequent establishment of the Botanic Gardens Cranbourne Annex, the Royal Botanic Gardens, Melbourne has created a new post of Assistant Director for the Botanic Gardens, Cranbourne. These Gardens, although 45 kilometres from the centre of Melbourne, attract up to 60,000 visitors a year and won an award of the Australian Institute of Landscape Architects for a series of landscapes representing the diversity on the Australian continent.

Altogether, this is a small but interesting and useful record of an important organization for the support of science and popular culture in Victoria. It also contains an extended lists of committee members that might be a useful reference for a Melbourne sociologist.

Sophie C. Ducker
School of Botany
University of Melbourne

T.R. Ophel, *A Tower of Strength: A History of the Department of Nuclear Physics [ANU], 1950-1997*. Canberra: published by the author, 1998. 236 pp., illus., \$40.00 pb.

Founded with the best of intentions in the years immediately after the Second World War, the Australian National University has subsequently fulfilled many of its founders' hopes but also engendered some envy and distrust, particularly from the rest of the tertiary education sector in Australia. With the celebration of its fiftieth birthday, the publication of Foster and Varghese's excellent *The Making of The Australian National University 1946-1996*, and a widespread political attack on the university sector in general, however, I discern a new level of acceptance and appreciation of the special place of the ANU in our cultural life.

An ingredient of this new maturity is a willingness to look back and appraise the record of the last fifty years – as Foster and Varghese did and as the Research School of Physical Sciences and Engineering did with its more modest *'Fire in the Belly': The First 50 Years of the Pioneer School at the ANU*. Professor Trevor Ophel of the ANU's Department of Nuclear Physics was the principal author of the latter work. He thought it 'a view from the trenches' rather than a history, but it is interesting and worthwhile nevertheless (see *Historical Records*, vol.11, no.4).

The present work is more limited in scope, more technical and, I think, less attractive to a wide audience. It is designed, the author says, to 'provide a sentimental journey for the old-timers, an instructive background and context for recent and future arrivals, especially graduate students, and an update of subsequent developments for those involved between times'. (The present reviewer is one such 'old-timer'.) There is a heavy emphasis on the technical side of nuclear physics research – on those many sophisticated facilities and techniques that have been the hallmark of such research and that have often found wider applications beyond it. Amongst these technical accounts, however, there are chapters of broader interest: accounts of problems and their solutions (or otherwise), as in 'Ghost Beams and other Poltergeists', and 'Skeletons in the Closet'. And personal touches do appear from time to time to leaven the diet, as with recollections of a number of vacuum

'accidents', their repair using 'glyptal', disputes over data handling, and the retirement of long-serving machinist Cliff Hill on medical grounds: 'Hill was formally told that he had thirty minutes to be clear of the premises, in accord with the rules of workers' compensation coverage. ... He stayed for an emotional farewell in the Darkroom at 5 pm. The chronicler unashamedly wept that night.' These lines are contained in a footnote, and it is a general feature of this book that the footnotes are especially interesting; they should not be passed over.

In a welcome chapter entitled 'Research Review', the current Head of the Department, Professor George Dracoulis, notes:

The outstanding achievements of the Department have rested in many ways on its ability to develop state-of-the-art accelerator and detector facilities with modest resources and staff, and to operate them continuously and reliably. ... This is a tribute to the skill, dedication and foresight of technical staff and academic staff, who have striven to establish and maintain an ethos of excellence to support the research.

Trevor Ophel was the leader in this regard over a very long period. Dracoulis' words justify the focus of this history, and Ophel's technical account is indeed authoritative and thorough. It will be particularly valuable for its proposed audiences.

However, Dracoulis also draws attention to 'a record of competitive research in physics for an unbroken period of over 40 years', and to 'the remarkably diverse areas in which 100 or so PhD graduates of the Department are now engaged, both in Australia and elsewhere'. Two young staff in the Department have won the Pawsey Medal. Its achievements in research have been very substantial, and it is, I think, disappointing that this history says so little about the actual nuclear physics research that resulted from the technical effort and excellence that is so well described.

The book is 'sincerely and respectfully dedicated to the memory of Sir Ernest Titterton ... who made so much of it happen'. This is a noble tribute, not least because the text makes it clear that the author and the 'Prof' disagreed relatively often on both day-to-day and longer-term matters of policy. The text contains many historic photographs of people, equipment

and events, and the volume concludes with detailed tables of staff, students and visitors who have inhabited the Department over the years and with group photographs of the Department taken every four or five years.

One wonders how many other departments, at the ANU or elsewhere, can boast such detailed and meticulous records as those gathered and treasured by Tony Brinkley and Trevor Ophel for ANU Nuclear Physics? Which enables me to say again that it seems to me a disgrace that the ANU does not have a fully resourced and staffed archive, for the preservation not only of its 'official' records but also of all those other records and memorabilia that alone can document adequately the life and achievements of this singular institution.

John Jenkin
School of Philosophy
La Trobe University