Book Review Section

Compiled by John Jenkin*

Christopher Sexton, *The Seeds of Time: The Life of Sir Macfarlane Burnet.* Melbourne: Oxford University Press, 1991. x + 301 pp., illus., $39.95.

Sir (Frank) Macfarlane Burnet was a great biological scientist. He was responsible for several major technical developments and conceptual insights in his first field of research, virology, and for two conceptual breakthroughs in his second, immunology. His work was seminal — many of the important steps leading to the development of viral vaccines can be traced back to techniques worked up by Burnet, and much of the exciting cellular and molecular immunology of the last twenty years consists of answers to questions that make sense only in the context of Burnet's theories. He received the Nobel Prize, jointly with Sir Peter Medawar, for one of these, the concept that the immune system distinguishes self from non-self, and the consequent concept of immunological tolerance. He and many other immunologists regarded the tolerance work as second in importance to his other major contribution to immunology, the clonal selection theory for antibody formation. Virologists felt he might well have earned a Nobel Prize for his virology studies, and he was indeed nominated for one. Whatever the limitations of prizes as indicators of merit, it would be hard to shrug off one Nobel Prize and two near-misses.

I have not yet used the word 'Australian' — Burnet was a great scientist on the world stage. His importance to Australian biological science eclipses that of others like Howard Florey, because Burnet did most of his work in Australia, built up an Institute that is still possibly Australia's premier research centre, and inspired a generation of scientists who still dominate Australian biological science.

Burnet retired from experimental biology at the age of 65 and started a second career, which spanned another 20 years. He wrote extensively on biology during this later period, but was also a philosopher, elder and stirrer of public consciousness on a number of issues — a man with opinions on everything from uranium mining to eugenics, from smoking to medical education — with an inclination to put his arguments forcibly and with an authority that guaranteed that his views could not be ignored.

Many of Australia's immunologists and microbiologists knew Burnet. These scientists will read the book out of interest rather than to find out more about him; they may hope that the book will do nothing to diminish the image of a man they held in admiration. From people who knew Burnet, I have heard generally favourable comments.

The second group of readers comprises Australian scientists who did not know Burnet, and that is my own perspective. To an immunologist who came to Australia after Burnet had retired, a life of Burnet holds particular interest. The question has arisen amongst younger and émigré immunologists whether the continuing focus on Burnet is unhealthy; but the evidence is that Australian immunology is healthy in its diversity, that it has plenty of leadership, and that the tribute to Burnet results from a mixture of respect and courtesy rather than any unhealthy personality-cult. Indeed, Burnet in his later years believed that immunology had more or less run its course; his disciples have spectacularly proved him wrong but have had the discretion not to point this out.

To Australian immunologists and microbiologists who did not know Burnet, Sexton's book is full of interest. A comparison with Fenner's biographical memoir of Burnet suggests that Sexton's book is accurate, but of course it contains much more in the way of personal detail, while Fenner's memoir concentrates on the science.[1]

The largest potential readership comprises people further removed from detailed knowledge of the subject — people who neither knew Burnet personally nor are active in his fields of research in Australia. This is a diverse group, and Burnet's later years as a commentator on controversial issues will interest a wider group than is usual for a biography of a great scientist. For the general reader, the book is well written and readable. Christopher Sexton has not shirked the task of explaining the scientific aspects in general terms, and I believe the non-scientist would at least get a general grasp of the relevance of Burnet's work.

What does this book offer to the reader interested in how science and scientists work? In discussing this, it is appropriate to compare Burnet with Medawar. The two men were very different. Medawar was consciously

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(and delightfully) an aristocrat amongst intellectuals, a renowned wit, and at ease with everybody. Burnet considered himself to be at a 'low place in the peck-order', in spite of recognition bestowed on him.[2] He wrote in a straightforward, undecorated style, and was something of a social recluse. Medawar's essays, collected together in books such as *The Art of the Soluble* (Penguin, 1967) and *Pluto's Republic* (OUP, 1984), have influenced the way we perceive how science works, not least because they were written by a successful scientist who happened also to be a philosopher. Burnet didn't try to analyse, at least not for public consumption, how science works. And yet, if we understand the thought processes of a man who made not one but two major conceptual advances in immunology, the working habits of a man who made several seminal discoveries in virology, and the interpersonal skills of a man who so dominated Australian biological science, then we may obtain some insight into how science and scientists work. Sexton's book is helpful in this regard, although I found that I understood Burnet as a scientist better when I had also read Fenner's memoir and Burnet's autobiography.

Burnet, as portrayed by Sexton, was not driven to medical research by a burning desire to help humanity. Indeed, he seems to have been somewhat indifferent to the suffering of patients in his early days, developing only later a mission to overcome scourges such as influenza, over-population and the effects of smoking. This is probably not unusual. The public image of the 'dedicated' medical researcher is pleasant but inaccurate; scientists work long hours because of their fascination with their work rather than their dedication to helping mankind.

Sexton discusses the features of Burnet's work that seem to have had most bearing on his success — his ecological approach to infectious agents, his wide reading, his ability to integrate information from disparate fields, his capacity for lateral thinking. The discussion is interesting and informative. The same characteristics can be discerned more precisely from the memoir and particularly from the autobiography, where they are more vivid because of the author's infectious enthusiasm. Sexton's book provides an introduction to Burnet; anyone seriously interested should also read Fenner and Burnet. There is space here to discuss only two of the important characteristics of Burnet the scientist — his skill as an experimenter, and his ability to see in a mass of data a plausible model.

Burnet's experimental skill was most relevant to his virus work. He adapted a technique for growing virus in eggs and continued to adapt it until it became in his hands a powerful set of techniques, for assaying virus (by injecting low numbers and counting 'pocks'), for assaying antibody against virus, and for the production of virus in sufficient quantity for vaccination. The appearance of the pocks gave him clues on relationships between viruses. His skill came partly from his observation of detail (which he ascribed to his hobby as a naturalist) and partly from his tendency (again ascribed to his beetle-collecting) to 'collect' information; having got the technique working, he applied it to every virus that came to hand. His skill as an experimentalist, and his continuation of laboratory work with his own hands up until he retired, is an important lesson for today, when scientists, and medical researchers in particular, tend to conduct their research from their desk, with students and technicians doing the experiments. Burnet's passion for 'collecting' information would be less acceptable today, and would probably be labelled by any peer-review process as a 'fishing expedition'.

Burnet's most important immunological insight, the clonal selection theory of antibody formation, was not fully vindicated until many years after its formulation. Burnet used the term 'intrinsic unlikelihood' to describe what worried him about one of the rival theories, which held that antigen was used as template for the design of antibody to fit the antigen. But clonal selection, or earlier selective (as opposed to instructive) theories, implied that the immune system had a pre-existing repertoir, enabling it to react to an unbelievably large variety of antigens, equally intrinsically unlikely. Burnet postulated a mechanism of 'randomization' of the immunoglobulin genes by somatic mutation, such that a wide variety of different antibodies could be made. He was right in essence, but it was a conceptual leap well beyond the experimental techniques of the day to test. Clonal selection did not 'feel right' until years later, when the genetic mechanisms for generating diversity were discovered. An important knack required of a scientist is the ability to decide which areas of uncertainty make a hypothesis untenable and which will sort themselves out later.

Regarding Burnet's second career — as elder, philosopher, stirrer of the public consciousness — Sexton brings out Burnet's sincerity and honesty in these endeavours, and indicates that they provoked a wide response, much of it adverse. What the book does not

show clearly is how effective Burnet actually was in this role. Many of the causes taken up by Burnet — such as uranium mining, nuclear and solar energy, and cigarette advertising — are still important issues in Australia. Did Burnet place them on the agenda, or was he a follower; how much notice did the public and the politicians take of him? Did they humour the distinguished elder statesman of biology; were they irritated by this man, speaking outside his field of expertise; were they swayed by the conclusions of a great mind; or did they use him to further their own objectives? It is difficult to answer these questions from Sexton's book.

This period of Burnet's life also raises the question: should retired scientists speak out on public issues of this kind? Burnet's ability to think in evolutionary terms qualified him to speak as an expert on issues such as population size, and many of the other issues were in some degree biological. On the other hand, Medawar, who had a formal training in philosophy, was critical of some of Burnet's philosophical writings: 'This kind of thing may be all right for psychotherapy, but . . .' (Sexton, p. 210). Anyone familiar with Medawar's opinions of psychotherapy will appreciate the severity of the reprimand. If Burnet was not as skilled a philosopher as he was a scientist, his writings showed a profound concern for mankind, illustrated in a diary entry dealing not with philosophy but with the practicalities of his continued existence after the death of his wife: 'Now I am responsible for no one but myself — and perhaps my species' (Sexton, p. 224).

Burnet was an extraordinarily seminal scientist. Anyone with an interest in the history of science needs to understand something about Burnet, and Sexton's book is a good place to start.

References

1. Frank Fenner, 'Frank Macfarlane Burnet, 1899–1985', *Historical Records of Australian Science*, **7** (1987), 39–77; also published in *Memoirs of Fellows of the Royal Society*, **33** (1987), 99–162.
2. F.M. Burnet, *Changing Patterns: An Atypical Autobiography* (Melbourne, 1968).

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R.W. Home and Sally Gregory Kohlstedt (Eds), *International Science and National Scientific Identity: Australia between Britain and America.* Dordrecht: Kluwer Academic Publishers, 1991 (Australasian Studies in History and Philosophy of Science, Vol. 9). ix + 318 pp., illus., Dfl.165.00.

'Is Science Australian?' asked Donald Horne at a recent 'Ideas for Australia' summit in Melbourne. Amidst the predictable confusion of replies came three definite answers: yes, no, and maybe. For scientists, whether science is national or international, metropolitan or peripheral, seemed of little practical interest. Models, theories and observations — not political theories — are the business of science, and disciplines, networks and perhaps even Cooperative Research Centres are its social manifestation. There is nothing in science resembling the strident nationalism evident in the arts. Does it matter to science if Australia becomes a republic? Science may have something to do with style, certainly with resources, but little to do with the vagaries (and vagueness) of national identity. What, then, they might ask (and in Melbourne did) is the question?

The question is easy to parody and to polarize. That the activity of science incorporates a host of social factors, of which nationality may be one, is hardly a debatable proposition. But to define national, as distinct from ethnic or language-group identities, and to ask if they apply interestingly to the conduct of international culture, whether in opera or optics, remains a worry more for historians than scientists. Yet the sense that there is an identity remains. It surfaces visibly whenever the 'cultural cringe', a convenient phrase to disguise a nationalist reflex, is called into play. The question of national identity — certainly in sport — is clearly important to most Australians. And it is of intense urgency to science. At a time when nationalisms are resurfacing throughout Europe — the Soviet Academy of Science has disappeared, replaced by a Russian Academy — will we have a Ukrainian science, not to mention a Croatian science? As with the control of nuclear arsenals, we cannot afford to dismiss such questions lightly.

For this reason, among others, it is a pleasure to welcome the essays from Rod Home's bicentennial conference — long overdue, but with a timely relevance. With other key publications appearing in and since 1988, it marks a stage of maturity in the history of Australian science. In this case, it traces Australia's elliptical trajectory as seen from the foci of our two 'great and powerful friends', the United States and Britain. The editors pose a problem both simple and seemingly eternal: if it is meaningful to speak of a 'dependent science', can we also speak of

an 'independent science'? If so, is there a 'natural' transition from one to the other which Australia's history exemplifies?

Eleven authors in search of an answer illuminate a set of unifying issues from contrasting standpoints. Wade Chambers usefully distinguishes between the geography of distance and the psychology of isolation; the first does not necessarily imply the second, while the second flourishes in Bloomsbury as in Botany Bay. What historians have done, Chambers argues, is to make a shibboleth of distance, when in fact prejudice (and perhaps, dare we say, envy?) is at issue. The transmission time for new ideas was rarely, if ever, a limiting condition on the advancement of knowledge in Australia. It was, all too frequently, a question of personalities. Indeed, we could go on to say, such were the differences between military headquarters and the front line. Whatever one's view of the metropolis, visibility depended on the particular scientific garden one chose to cultivate.

Australians, Chambers says, were 'not tyrannized by geography but made'. In their 'making', there were social conventions to be observed. As Beth Newland and David Knight easily demonstrate, Australian scientific culture was, in the first instance, and for some time afterwards, British. The 'long arm of London', a happy phrase Robert Stafford has used elsewhere, reaches out to survey, list, catalogue and, of course, control. The effect lends an aura of manifest destiny. The United States had its Far West, France (Michael Osborne reminds us) had North Africa and Indochina. Australia (along, one might argue, with Africa, Canada and India) became the frontier Britain had to have.

The implication was both simple and profound. British practices, customs, traditions and people created a form of 'provincial' science we have chosen to call 'colonial'. Scots, East Enders, Cambridge men all had a part to play, and brought their different provincialisms to intitutions half-formed. Strong personalities left their mark in stone and street signs. But, as in Manchester or Liverpool, as Rod Home demonstrates, little wonder that, whatever their local civic pride, Australians looked to London as the fount of honour and reward.

He might have added that, in the light of contemporary politics, it was even less remarkable that Britain went out of its way to keep the delicate 'crimson thread of kinship' intact. The ambitions of liberal imperialism, personified in Michael Foster, Biological Secretary of the Royal Society, included the maintenance of an efficient empire and, whatever the fashionable myopic policies of the Colonial Office, understood the importance of tradition and symbol. The Royal Society was not alone. From the British Empire University Congress of 1903 onwards, the political establishment saw the importance of keeping its hand on a fissiparous empire — particularly if, of course, it could be done inexpensively.

Eventually, as everyone knows, our brown and pleasant British suburbs became, in the New Year's coinage, 'Bush country'. Americans, with their vast resources, professional training, corporate values and competition, became Australia's role models. Historians will protest that reaching towards America was inevitable long before the Pacific War made it necessary. Some would find its beginnings in the Victorian gold rushes; others, with the appointment of America's first Consul at Sydney in 1836; still others might choose the arrival of American technology at international exhibitions in Sydney and Melbourne in the 1880s. Those looking still deeper would no doubt begin the story with 1792 and the miraculous appearance in Sydney's harbour of the brig *Philadelphia*, with its cargo of beef and rum for the starving settlement. The image of America as provider, patron, arbiter of pop-culture and now principal investor seems to overawe Australia's 'independence' in most spheres. But in science, the editors argue, that relationship has grown stable. The National Science Foundation, the British Council *and* the Australian government — a troika, we are assured — made this book possible. Australia may have once been a colony, and is now a client, but it has made its own mark. The question now before it is one not of parentage, nor of patronage, but of parity — achievable in esteem if never in aggregate wealth.

The essays trace some of the tendrils that have linked Australia to our English-speaking cousins, reaching through the history of our respective museums (Kohlstedt), our interests in radio physics (Gillmor), and in geophysical theory (Le Grand). A highly original piece by Jan Sapp illuminates one of the ways by which conservative Australia, which sent to America its imperial Griffith Taylor, could still give career and comfort to a geneticist, Michael White, for whom McCarthyite America was the foreign land. In this case, and in many others, isolation was overcome by institution-building, using 'local' creatures (in this case grasshoppers) to create a wholly new focus for his discipline of population cytology. Uniqueness the world must recognise, especially where environment so dominates life. With this as his cue, Stephen Pyne, possibly the world's foremost 'fire' historian,

reminds us that different ways of seeing nature will produce different theories and different practices. In their European ignorance of Aboriginal ways, it took 'New Australians' long to recognise that the 'frontier' and the 'bush' were not the same. Now that distinction is the hallmark of fire management, a discourse in which, Pyne says, because of their different systems, Americans and Australians talk past one another. It is, he suggests, a parable of Australian-American relations.

Well might we ask whether Australia, its patron and its parent are indeed divided by their common language. The problem lies implicit in this book, as in much comparative scholarship. The problem deepens if Australia, having lost its ageing parent, and not quite sure of its patron, has yet to find a peerage of its own. A 'middle power' in strategic terms, producing a respectable 3% of the world's science, it has still to cover the world's research front, and make something uniquely its own besides. The implications are considerable and reach well beyond science. And so do the implications of this book.

In a sense hardly intended by the editors, and certainly not their fault, one wonders if this volume will be among the last, and best, of its kind. While these essays give much, they omit much, and in the two years that have elapsed since their presentation, a new research field has opened, spurred by growing interest in the larger phenomenon of 'science and empire', and in the constituencies represented in once-despised regions of 'colonial science'. India, Latin America and southern Africa are becoming part of a refreshing new research enterprise, in which Australasia has a leading advantage. While Australia is reviewing its regional commitments and engagements, it may be that future comparisons in science, as in strategy, should leave America and Britain and look instead at other 'middle-rank' countries experiencing similar 'tyrannies' of environment, distance and isolation, where ideas and innovations flourish and where the traces of Europe remain as distinct.

Since the Bicentennial, scholars interested in the history of Australian science have had time to regroup, rethink and perhaps reorient their efforts. Diffusionist models are not quite dead, but no longer do we assume a linear process of irradiation or transplantation, nor do we assume transfer is always for the best. Assimilation is at least as important a factor, and far less studied, while we are persuaded by our Latin American colleagues that models of 'underdevelopment' were exported as easily as development models and assimilated far more readily. In the future, 'transferred development', in Ian Inkster's phrase — implying a modality of sidewise, even parallel progression — is likely to attract increasing attention, and with it a more global, spherical sense of interdependence. As Wade Chambers nicely puts it, 'a globe has no centre and no periphery'.

Taking this as the last book of the Bicentennial and the first of the future, it is presumptous to suggest where the history of ogression — is likely to attract increasing attention, and with it a more global, spherical sense of interdependence. As Wade Chambers nicely puts it, 'a globe has no centre and no periphery'.

Taking this as the last book of the Bicentennial and the first of the future, it is presumptous to suggest where the history of Australian science is tending. But issues crowd the agenda. No doubt the association of science and nationalism, rhetorically and in fact, will be with us forever. We have much to learn about women in Australian science; and coming centenaries of university chairs and major institutions established in the 1890s (including Sydney's Museum of Applied Arts and Sciences) will encourage scholars to look at the process by which non-British models were assimilated into Australian life. The 'march to Federation' should engage us in reviewing the relations of federalism and science. There remains enormous scope for scientific biography. Science first came to Australia as an imperial agency but, as Sapp reminds us, many who stayed to do science had come for negative reasons, which only became positive with the passage of time. Whether refugees, expatriates or migrants, their stories are complex and not easily summarized. Much work is needed, along the lines canvassed by Donald Fleming and Carla Borden, to register the impact of European (and now Asian) 'muses' as they traded their old worlds for new.

An agenda for the sociology of science is not obvious in this collection, but there is much to be said for the sociology of Australia's scientific culture. There emerge at least three strategies for scientific success in Australia, many of current interest and all worthy of study. Each is founded upon Australia's competitive position in either place or time. The first strategy concentrates on that which is unique to austral nature — including the flora, fauna and peoples of this land, and its location in the southern hemisphere. The second makes a virtue of distance from the epicentres of Europe, a space that allows room for critical perspective. As George Seddon once observed, science might be retarded

in Australia not because Europe was so far but because it was so near. Distance, the old enemy, has been banished, and Australians can play it to their advantage. Third, there is the factor of time, an ally of isolation, but sometimes working, ironically, on Australia's side. While the rest of the world scrambles to be first, Australians learn from others' mistakes. 'Never be first' is not a slogan that wins Nobel Prizes, but it appeals to science-based industries on which Australia's future may depend.

Inadvertently perhaps in its focus on national identity, this book touches a tender point of professional specialism. Readers will find it implicitly distinguishes between the culture of science, which it examines minutely, and the culture of technology, which it takes largely for granted. In the future, this is bound to change. It frequently surprises overseas visitors that a Western culture so dependent upon and fascinated with the latest high-tech, has scarcely begun to study its special historical relationship with technology. Institutionally, we have only begun to bring the conservationists and torchbearers of Engineering Heritage, with their copious listings of great engines and honoured bridges, to meet students of those social changes that engineering brought about. The symbolism with which our respective Academies of Science and of Technology celebrated the Bicentennial separately, and with their own separate histories, is too deep to be quickly forgotten; but perhaps a third force may be created by a new Society for the History of Technology, with an appeal to both historians and technologists, and by new courses in the history of technology in our university engineering departments.

Finally, we may hope that Home and Kohlstedt are the harbingers of new directions in the history of science in this country. It has become increasingly evident that the history of Australian science can no longer sustain itself separately from teaching and writing about Australian history more generally. The same is true in Britain and the United States, where enormous changes are happening in the way we see our discipline. Of the eleven scholars in this volume, only five hold formal positions in the history of science, and this is almost certainly to be the way in the future. If we are to speak to a larger audience of educated people, historians of Australian science must make common cause with their counterparts in social and cultural history. This is all the more important where, as in matters of national identity, the history of science and culture invite contrasting perspectives. The only requirement must be a commitment to scholarship that insists upon Australia as a subject in its own right, and one worthy of international notice.

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Joan Freeman, *A Passion for Physics: The Story of A Woman Physicist.* Bristol: Adam Hilger, 1991. x + 299 pp., illus., $49.50.

In 1964, I completed my Ph.D. in nuclear physics at the ANU and took up a Research Fellowship at the Atomic Energy Research Establishment at Harwell in England. I chose to join Dr Joan Freeman on her unusual beta-decay experiments. Working with her was a delight, and her experiments proved to be of considerable significance to the emerging electroweak theory of the combined electromagnetic and weak interactions. I have read her autobiography with great interest.

Born in Perth in 1918, her recollections begin four years later when the family moved to Sydney. Her mother, Ada, had been sent to a boarding school and was a talented pianist, but her ambitions of university studies had been thwarted by the collapse of her father's business; she trained briefly as a teacher and then married. Ada and Albert Freeman were, however, 'quite unsuited to each other'; they ultimately separated, and Ada devoted herself to giving her daughter the opportunities that she herself had been denied. The mother-daughter relationship was always deep and pivotal.

Joan was sent to Sydney Church of England Girls Grammar School (SCEGGS), where study was enjoyable and successful; but in 1929, in the Great Depression, Albert Freeman lost his job. Ada took over a private kindergarten, which grew in numbers and slowly expanded its offerings, but still the family income was inadequate to pay school fees. The SCEGGS Headmistress offered to waive them because of Joan's academic abilities. This redoubled the expectations upon her and increased her motivation to do especially well. In 1932, she obtained outstanding results in the Intermediate Public Examinations. She also vividly remembers a small newspaper item announcing that Cockroft and Walton had split the atom at the Cavendish Laboratory in Cambridge.

SCEGGS had no Chemistry or Physics classes at the matriculation level, but Ada's persistence and Joan's eagerness persuaded the Head of the Physics Department at the Sydney Technical College to allow her to attend his evening classes, although he had

'never had a schoolgirl in the class before'. Despite her success — she topped the class — further schoolgirls were barred from Sydney Tech. classes, the environment of the College being considered unsuitable. Joan obtained equally outstanding grades at the Leaving (Matric.) Examinations; she earned the highest marks overall in the State and won a scholarship to the University of Sydney. The euphoria mother and daughter shared at that moment 'was, I think, the greatest in all our joint experience'.

While still an undergraduate, Freeman was encouraged by V.A. Bailey and G.H. Briggs to major in Physics. In fact, she graduated with a double first — first-class honours in both Physics and Mathematics — and in 1940 began an M.Sc. with Bailey as supervisor.

As her M.Sc. neared completion, she felt a desire to be involved more closely in war work at the new Radiophysics Laboratory. Bailey baulked at the prospect of one of his best students working under D.F. Martyn, and an acrimonious and high-level correspondence apparently ensued. The problem was solved by Martyn's departure, and Freeman happily became part of Pawsey's team, working on radar.

The account of her early years is honest without being sentimental, easy to read, personalised and non-technical. The reader is swept along in an adventure, identifying closely with the author. It is the story of a woman who sees the best in everyone. Anger and unhappiness, one suspects, have been largely suppressed in her life as well as in its telling. Thus, for example, we find on page 49 the following isolated sentence, referring to her first year at Sydney University: 'My beloved Grandpa died as a result of a street accident; then Grandma, becoming senile, had to be brought, unwillingly, to live with us; my father, put off by this situation, left home; and my mother still struggled with her school'. Just what anguish is hidden here we shall probably never know. Instead, we are buoyed up by her outstanding academic achievements, visual descriptions, quiet commitment and delightful pieces of humour.

Events moved rapidly at war's end: Freeman turned down a permanent lectureship at Sydney University in order to concentrate on research, and then E.G. Bowen showed her an advertisement for CSIR Senior Studentships, allowing study in the U.K. towards a Ph.D. degree. She applied successfully, and in August 1946 sailed for England and Cambridge University — without her mother but with her ever-present encouragement. She was amazed to discover that women could not be admitted to full membership of the university; this happened, at last, in 1948.

Pawsey encouraged her to pursue her first love, nuclear physics, but the golden era of nuclear physics at Cambridge was over. Rutherford was dead, the war had dispersed his team, and the department was leaderless and disorganised. In addition, Devons gave a daunting introduction to the laboratory: nuclear physics was tough, and there were far too many research students for the meagre staff and facilities. Freeman was without a supervisor, and the winter was the severest of the century: 'In a surge of self-pity and homesickness, I wept bitterly'.

Spring, however, brought renewal. Freeman insinuated herself into Dr Burcham's group, and slowly her studies of alpha-particles released by proton bombardment bore fruit. A secretive 'Nuclear Nit-Wits Club', made up of students from 'the colonies', provided camaraderie and helpful discussions of difficulties. As her career exemplifies and affirms, 'a successful woman physicist does not have to be a blue-stocking, or to have an aggressive personality . . .; enthusiasm, perseverance, and an independent spirit seem to be more important qualities for a woman working in the male-dominated world of physics'.

Her research in 1948 included some neutron-induced, alpha-particle spectroscopy using a Harwell nuclear reactor, and when her thesis had been completed and examined, she successfully applied for a job there. Pawsey, visiting Cambridge, encouraged her to follow this preference rather than return to Australia simply on the basis of a perceived obligation. For a long time she was the only woman physicist at Harwell: 'I rather enjoyed my unique status . . .'

Joan and John Jelley married early in 1958 and left for a sabbatical year in the U.S.A., where two events shaped her remaining career: she met Roger Blin-Stoyle, on leave from Oxford, who was to collaborate with her on 'the most successful research project of my career', and she learnt that she was 'to be given responsibility for Harwell's newest, very expensive acquisition [a tandem Van de Graaff accelerator] and for all the staff involved'.

There were some technical and administrative teething problems with the tandem, and Freeman had to use all her tact and hidden toughness to bring the machine into operation. A small list of collaborators, including a succession of Australian graduates, joined her to add their own contributions to the new experiments. All were

intrigued to note her soft Australian accent — she is 'still an Aussie at heart'.

Here my only major disappointment with the book arises. In the Preface we are told 'I have kept scientific details to a minimum, hoping that my account will appeal to the general reader as well as to scientists', and in this I believe she has been very successful. But in a mere four pages, her important experiments on certain superallowed beta-decays, on their relevance to the long-sought and emerging unification of the basic forces of nature into one coherent theory, and on the exemplary collaboration of experimentalist (Freeman) and theorist (Blin-Stoyle), are dismissed with little more than a glance. The topic is an esoteric one, and it may have proved difficult to explain it in laymen's language, but its severely restricted treatment is to be regretted. For this work, Freeman and Blin-Stoyle were jointly awarded the 1976 Rutherford Medal of the British Institute of Physics: 'I abandoned myself to my sense of exhilaration, wishing only that my mother, who had died three years previously, could have witnesses this highlight of my career'.

In 1977, the beta-decay studies ceased; they had run their course and a new atmosphere pervaded Harwell. 'We must be mercenary, not missionary', the Deputy Director said. In addition, with age 60 approaching, she faced retirement, while her male colleagues were allowed five more years. For the first time in this account we find her 'seething with indignation'. Harwell refused to budge and won her reluctant compliance with a five-year consultancy. Her husband took early retirement in 1979 and accepted a part-time consultancy at the Royal Greenwich Observatory. Together they took up ocean sailing.

The second half of the book lacks the sparkle of the first but is most interesting nonetheless. I wonder about the title; 'passion' is not the appropriate word. Instead, the book is full of personal courage and persistence, excitement and achievement, and a deep love of physics. Here is old-fashioned respect for colleagues and gracious acknowledgement of their contributions to a career and success. Those who had little impact or were positively unpleasant are silently ignored.

We are left with an enchanting account of a unique career, of important aspects of physics teaching and research in Australia earlier this century, of nuclear physics in the U.K. thereafter, and of the success of a woman against the odds — all told with a refreshing lightness of touch. But it is also possible to be misled by Freeman's success; she clearly had very special qualities, and there were very few women who could emulate her example. One hopes schools, universities, institutes and professions no longer regard it as acceptable for women to face such disincentives. In addition, this is a story of a time when the desire for knowledge was an accepted and respected motive for research, which was not only intellectually challenging and rewarding but also a delight. The tragedy is that this book is now a piece of history — of an era fast disappearing or already past. It deserves to be widely read.

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Libby Robin, *Building a Forest Conscience: An Historical Portrait of the Natural Resources Conservation League of Victoria (NRCL).* Melbourne: NRCL of Victoria, 1991. iv + 155 pp., illus., $15.00.

A.P. Winzenried, *Green Grows our Garden: A Centenary History of Horticultural Education at Burnley.* Melbourne: Hyland House, 1991. xiii + 186 pp. illus., $30.00.

It is timely that two historical works concerned with such important issues as arboriculture, horticulture, conservation and education should appear during yet more conflicts in the so-called 'environmental debate'. These studies have some interesting links, and although centred on the Victorian experience, have wider implications. Both books are profusely illustrated, well-indexed and carefully documented.

Building A Forest Conscience is a factual history of a movement with a vigorous sense of purpose, motivated not only by personal interest and the ever-increasing demands of industry and 'development', but also by terrible disasters. The disasters themselves were rendered all the more terrible by Judge Stretton's finding that certain tragic 'fires were lit by the hand of man' in January 1939 and February 1944, resulting in the loss of 120 lives and an almost incalculable amount of personal property, native forests and wildlife.

The development of the Natural Resources Conservation League of Victoria is traced from its origins in the 'Save the Forests Campaign' of 1944 to 1951, to the present organization, which fulfils part of its aims and keeps itself economically viable by distributing nearly 1,200,000 trees a year from its nurseries at Springvale South, Cran-

bourne and Echuca. Unfortunately, success brought its own problems, for by 1988 Government assistance had fallen to a miserable one percent of the League's revenue. By this time, the League and its predecessor had raised and distributed over 20 million trees. The League's other aims are pursued through energetic programmes in the fields of conservation and education.

Predictably, many bright ideas met dull responses, and the League soon appreciated that the protection of forests and the planting of trees fell short of wider goals; thus the 'Inseparable Trinity' of forests, soil and water was enthusiastically promoted to encourage political and public awareness of what was being lost so rapidly.

The book is very much a memorial to the efforts of such enthusiasts as the schoolmaster-nurseryman Cyril Everett Isaac, M.L.C. for the South-east Province of Victoria from 1940 to 1952. Born at Brunswick of English parents, Isaac taught in State schools from 1900 to 1922, becoming a founder of the Victorian State Schools' Horticultural Society (1910) and Supervisor of School Gardening (1913). He founded the first Victorian State Schools' Nurseries at Coburg and Hughesdale, and after returning from World War I, decided to establish his own nursery at Noble Park. By the time of the Depression, he employed about 20 people and supplied seedlings for the first time in plywood punnets. Later, Isaac devised the wood-veneer tube (instead of metal) for tree seedlings. As a founder, organizer, broadcaster and director of the League, Cyril Isaac is here remembered as a politician who was interested in much more than mere politics.

In both the main text and the informative appended chronology, memories are stirred of disastrous bushfires between Black Friday 1939 and Ash Wednesday 1983, of Arbour Days and community tree-planting schemes, of Junior Tree Lovers, of battles for national parks and the Little Desert controversy in the 1960s, and of the 'Save Our Bushlands' campaign; the themes may be old but the issues remain current.

The movement which was born in the desolation of forest fires, now sees itself beset by additional, even more insidious enemies such as salinity, ozone depletion and the 'greenhouse effect', while even yet, logs in the diminishing forests and disputes in diffident parliaments continue to smoulder.

Green Grows our Garden is an institutional history marking the centenary of Burnley College of Horticulture (since 1983 the Burnley Campus of the Victorian College of Agriculture and Horticulture). Notable among the College's Commonwealth Reconstruction Training Scheme students after the Second World War was Alexander Wilkie, who became the NRCL's first nursery manager (1947) and later Manager of the League itself (until 1958). The College also has special links with Melbourne's Royal Botanic Gardens through the translation of three of its Principals to become directors; John Cronin, Frederick Rae and Alexander Jessep. Another director, R.T.M. (Dick) Pescott, the Gardens' historian, taught entomology at Burnley during the 1930s.

With telling detail and whimsical touches, the story of an important educational establishment, set in magnificent gardens adjacent to Richmond Park on the Yarra River, has been carefully recorded — notwithstanding the suspicion that the first Principal, Charles Luffman, destroyed crucial early records. Apart from such eminent students as Emily Gibson (née Grassick), Olive Mellor (née Holttum) and Edna Walling, pioneers in Australian landscape design, other prominent names associated with the institution include Baron von Mueller, Joseph Bosisto, Alfred Deakin, Charles French (senior and junior), and the authors Evelyn Mordaunt and Lauretta Luffman, wife of the first Principal.

Having established experimental and acclimatization gardens at Burnley, the Royal Horticultural Society of Victoria endeavoured to boost Victoria's fruit industry. By 1863, the Society had catalogued some 1,400 varieties of orchard trees as well as ornamentals. Garden curators were appointed, including the celebrated George Neilson, who was in office when the Society declared itself bankrupt in 1891. His services were retained by the Department of Agriculture which, to its credit, assumed control of the enterprise, developed it, established a school and retained authority for 92 years.

During its first century, this singular institution has changed its name, its courses, its administration and its status, while it moved from offering certificate courses to bachelor's degrees. In many ways it remained all the while somewhat conservative, persisting with gardening in the English tradition and using horse-drawn (and presumably human-drawn) equipment until the 1950s.

Although the more recent changes (such as reclassification and amalgamation) are reflected in differing degrees of despair all over the country, the earlier stages in the development of Burnley are both unusual and interesting. The early courses were intensely practical, and intended for boys as young as fourteen; lectures were 'free to all interested

in Horticultural Pursuits, Ladies included'; casual attenders were welcome, and in 1899 female students were formally enrolled if they were at least sixteen years of age. It was soon appreciated that there were clear differences between the sexes, not only in age but also in social status, intellectual ability and academic achievement. Expectations, too, were different, with the boys hoping to qualify for employment and many of the girls believing that they were at a finishing school.

While the curriculum was still predominantly practical, there was, under Edward Edgar Pescott, a stronger agricultural emphasis, thereby broadening the original horticultural base. Since the late 1970s, the courses have become more scholarly, less practical, and consciously directed towards satisfying criteria for wider and higher academic acceptance. Here, as elsewhere, some staff members, feeling bruised or unwanted, left as the changes intensified, yet the tradition of a friendly, familial atmosphere, nurtured by long-serving, caring staff, has apparently been largely retained, despite increased enrolments.

There are constant and dramatic reminders that 'times have changed', yet the founders may wonder if the changes have been made in the name of educational progress or of administrative convenience. When considering the training and qualifications necessary for an efficient and energetic greenkeeper or nurseryman, parks manager or gardens superintendent, one Principal was apt to say, 'ask the fellows who cut the hay'. The author himself asks, 'What would Edna Walling have to say about designing garden plantings by computer?' What indeed? I am composing this review on a faithful Olivetti typewriter bought second-hand from my local university thirty years ago; which perhaps explains my disgust at learning that the old Principal's house, the very 'hub of the gardens and the college', was razed in July 1980 to be replaced by a trendy sunken garden. Happily, this well-written history sets a much higher level of taste, with some courageous prognostications of what the next decade may have in store for this venerable and unique institution.

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R. MacLeod and D. Denoon (Eds), *Health and Healing in Tropical Australia and Papua New Guinea.* Townsville: James Cook University, 1991. viii + 213 pp., $16.00.

Until recent times, the topic of tropical health was depicted almost invariably in terms of military and heroic metaphors; in set battle-pieces, pith-helmeted European doctors armed with test tubes and syringes were ranged against a legion of evil-intentioned, exotic microbes bent on the total eradication of the white race and the end of civilization as we know it. The founding of the London and Liverpool Schools of Tropical Medicine in the late nineteenth century saw the emergence of 'missionary medicine', taken to the tropical regions by idealistic but ambitious young doctors equally bent on tracking down the offending microbes, finding a 'cure', and making a name for themselves in the process. Previously seen as a progressive, heroic and empire-extending process, this approach nowadays tends to be looked at rather more critically, exposing tropical medicine as a means of promoting white health in tropical regions rather than improving the health of both the indigenous and settler populations.

In his introduction to this volume, Roy MacLeod acknowledges that recent studies in this area have tried to come to grips with the new approach; indeed, in a recent book edited by MacLeod and Milton Lewis, many of the problems have been addressed.[1] In the current volume, these issues are taken one stage further by showing that health problems in tropical areas, particularly those of the indigenous populations, were problems of public health rather than those of clinical medicine. Microbe hunting might be a glamorous and self-promoting pastime (or at least it was depicted as such), but some basic attention to water supply, sanitation and diet could be far more effective. Tropical diseases, far from being exemplified by middle-class colonials suffering and sweating in settings of Somerset Maugham-type ambience, were far more likely to be problems of poverty, filth and malnutrition. After all, diseases such as leprosy and malaria had been prevalent in temperate climates in earlier times, before public health in western countries had become an issue of both social and political concern. Such an approach to the problems of tropical health is not new, of course; it was advanced, albeit with qualifications, by Emeritus Professor Douglas Gordon in his Bancroft Oration of 1969, in which he noted that[2]

> . . . most tropical diseases cease to be a major problem if there are the motives and means to improve diet, to get rid of filth, establish sound sanitation, to provide safe water, to promote personal clean-

liness and to do something effective about mosquito breeding and mosquito contacts.

All of these aspects are covered by MacLeod and Denoon and their fellow contributors in this volume, with the addition of discussions about alcoholism, maternal health and welfare, and housing, together with the less tangible effects of the alienation of indigenous populations. As MacLeod states, there is a need for a work which brings together the causes of ill-health and disease in the tropics as examined by researchers from the various disciplines of health administration, social history and the historical relationship of race and class. Single case studies cannot provide the wide scope which this volume offers, looking as it does at differing tropical environments.

The papers therein are a selection of those given at the section on medical history at the 1987 ANZAAS Congress on 'Science in the Tropics', held in Townsville, Queensland. They cover the geographical areas of northern Australia and the neighbouring Melanesian islands, an area which for many years shared political and medical institutions. The book is divided into two parts: in the first, the papers examine particular individuals in tropical health — administrators and doctors — looking at their attitudes to the work in which they were engaged. Particularly revealing is A.T. Yarwood's portrait of Sir Raphael Cilento as pioneer, husband of the redoubtable Phyllis, and practitioner of racial intolerance; although one is irresistibly drawn also by Donald Denoon's evocative description of officials and administrations in the tropics as veering 'between feverish depression and alcoholic elation'. In the second part of the book, particular situations and conditions in different communities are studied; and here, problems such as alcoholism among the Aboriginal population, leprosy, the health of miners, and the problems of pregnancy and childbirth on remote stations are examined. For example, in Lyn Riddett's study, 'Sisters, Wives and Mothers: Women as Healers and Preservers of Health in the Northern Territory during the 1930s', she not only examines the circumstances of white women giving birth in alien surroundings, but asks why, when there were experienced Aboriginal women available, there was still a barrier to aid being extended or accepted. This is an excellent example of the 'new' type of question being asked of the evidence; for, as MacLeod points out, the history of medical ideas is inseparable from the evolution of social ideas concerning racial relations, a situation which all of these papers go a long way towards elucidating.

Roy MacLeod has provided his usual, thorough introductory remarks, pulling together the topics and weaving together the themes to produce a coherent picture, although these papers do not require this treatment as much as do some publications from conferences; while Donald Denoon's paper, 'The Idea of Tropical Medicine and its Influence on Papua New Guinea', includes many of the themes which are becoming common to the 'revisionist' approach to health in tropical regions.

There is little about which to complain in this volume, but neither should it be damned with faint praise. It is an excellent book, from which readers will be able either to pick a particular paper in their area of interest or to read it in its totality, thus gaining a critical and comprehensive view of aspects of the historical relationship of health, medicine and the colonial experience.

References

1. R. MacLeod and M. Lewis, *Disease, Medicine and Empire* (London and New York: Routledge, 1988).
2. Recently re-published as Douglas Gordon, *Mad Dogs and Englishmen Went Out in the Queensland Sun* (Brisbane: Amphion Press, 1990), p. 12.

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Ragbir Bhathal and Graeme White, *Under the Southern Cross: A Brief History of Astronomy in Australia.* Sydney: Kangaroo Press, 1991. 96 pp., illus., $26.95.

In this book, by means of a concise account and the use of ample illustrations, Bhathal and White outline a history of astronomy in Australia — from Aboriginal legends through to present-day activities. The authors warn in a preface that their treatment of the subject is a discerning rather than a full one and that it is aimed at a general readership.

The book presents the subject matter in nine chapters. The first half of the book addresses Aboriginal astronomy, astronomy in the early years of European settlement, the advent and decline of the State observatories, and the rise and continuation of amateur astronomy. The second half covers the significant developments of the last half century, including radio astronomy, astronomy in the universities, international links in the science, and the establishment of major observing facilities around Australia. Four

appendices, a glossary of terms, a select bibliography and an index make up the remainder of the book.

Bhathal and White start with a brief chapter on the social, moral and practical significance of astronomy in Aboriginal community life. Aboriginal myths, paintings and naked-eye observing techniques are described to bring out the difference between Aboriginal astronomy and the modern scientific study.

The intrusion of European astronomy into Australia, with the progressive discovery of the continent by 17th and 18th-century European trading powers, is exemplified in the next chapter. A description is given of Captain James Cook's first voyage to the Pacific to observe the 1769 transit of Venus at Tahiti and his subsequent discovery and exploration of the east coast of Australia in 1770 using practical astronomical methods for latitude and longitude determination.

A description of the establishment in 1788 of Australia's first observatory under the charge of Lieutenant William Dawes at Sydney Cove follows. Dawes' tasks were to determine an accurate longitude, provide a time service for the settlement and attend to the needs of shipping. The reader learns that Dawes combined astronomical, meteorological, survey and military activities and provided an intellectual focus in the settlement. He made an attempt in the last half of 1788 to view a comet of 126-years period, whose return had been predicted by Edmond Halley, but none was seen. A disagreement with Governor Phillip resulted in Dawes' return to England in 1792 with the observatory instruments. The observatory fell into disrepair and the fledgling colony was left without an observatory for 31 years. The practical emphasis of the astronomical and meteorological work conducted by Dawes was to be emulated in the observatories which were to appear in Australia during the nineteenth century.

A significant event of this period not mentioned by the authors is the total solar eclipse observed in September 1791 by Captain George Vancouver at King George Sound, Western Australia. From the demise of the Dawes Point observatory until the opening of the next, the astronomical record is largely the province of a number of important nautical and inland explorers, who used considerable astronomical observations to establish latitudes and longitudes. Chief amont these were Matthew Flinders and Phillip Parker King. Unfortunately, nor is this important survey work mentioned by the authors.

The third chapter considers the Parramatta Observatory, the second observatory to be established in New South Wales. Set up and paid for privately by Sir Thomas Brisbane shortly after he arrived to become the sixth governor, it was operated with the aid of his assistants Carl Rümker and James Dunlop. The reader learns of the initial successes, such as the recovery by Rümker of Encke's Comet in 1822 and the prodigious number of observations made of the southern stars in the first years of operation. The account mentions that the observatory was managed by Rümker and then Dunlop following the purchase of the observatory by the colonial government after Brisbane's return to England in December 1825. It is not made clear, however, that both Rümker and Dunlop left and rejoined the observatory at different times. The closure of the observatory in 1847, following an official inquiry, was an unfortunate end to an institution whose workers, through their vigorous efforts in the first few years of operation, made astronomers in Europe aware of Australian astronomy.

The authors next provide a generally fair treatment of the rise and decline of the State observatories. The positive achievements of the principal personalities — Ellery, Russell, Todd and Baracchi — are identified. The major observing programmes, telescopes and routine functions are neatly described; although Ellery and Russell did not receive knighthoods. The 1874 transit-of-Venus observing expeditions and 1922 total-solar-eclipse expeditions are briefly mentioned; although equally deserving of mention but not included are the 1871, 1910 and 1911 total-solar-eclipse expeditions. The 1871 expedition to Cape Sidmouth, Queensland, although clouded out, was a major undertaking for its day. A number of reasons for the decline of the State observatories are correctly identified by the authors, but there are others. In the case of Sydney Observatory, Russell's mismanagement of the observatory during his later years, his preoccupation with meteorology, and his refusal to make way for new blood accelerated its decline. In addition, Russell did not have to report to a Board of Visitors on an annual basis as the directors of the more efficiently run Melbourne Observatory were required to do. The absence of a chair in astronomy at an Australian university during the early 1900s, and the meagre employment prospects for young astronomers, mitigated against new thinking finding its way into the State observatories. The appointment of Baldwin, a graduate in physics from Melbourne University, as Director of the Melbourne Observatory was an attempt

to infuse this new thinking, but he found his time consumed by astrographic work. An individual not mentioned is Charles Merfield, who worked at the Sydney and Melbourne observatories and who developed an international reputation in gravitational astronomy and the computing of accurate comet and asteroidal orbit elements.

The role and contribution of the amateur astronomer in Australia is discussed in the next chapter. John Tebbutt, the hundred-dollar-note astronomer and a key figure in promoting astronomy in Australia during the last half of the 19th century, attracts the most attention for his outstanding observational work. The symbiosis between the amateur and State observatory astronomers during that period, and the eventual separation that took place during the first half of the 20th century, is then outlined. An example is R. Innes, of double star fame, who was one of the leading amateur astronomers of the 1890s in Sydney and who made the transition from amateur to professional status when he left Australia in 1897 to pursue a successful career as an astronomer in Johannesburg. Before Innes' departure in 1897, Charles Merfield worked with him on predicting comet orbits and was brought to the attention of Tebbutt by Innes. Tebbutt and Merfield then went on to develop a mutually beneficial, complementary and harmonious working relationship in the observation of comets. Tebbutt, the astute and well-practised observer, was supported by the energetic, accurate and enthusiastic computer Merfield. Both men were concerned about the sorry state of affairs that had developed at Sydney Observatory under Russell, and Tebbutt saw in Merfield someone capable of arresting the decline. Tebbutt attempted to use his influence in furthering Merfield's career, but Merfield's long battle to become a State observatory director was eventually frustrated. Mention is then made of some of the more prominent amateurs who have been involved in comet and supernova hunting. One programme of work which involved professional and amateur observers (from 1957 until 1962) and is not mentioned by the authors is the Moonwatch programme. As part of a world-wide programme sponsored by the Smithsonian Institution, teams in a number of states observed and timed the meridian passage of the then new Russian and American satellites. The important and enduring role of the amateur astronomical societies in the popularization of astronomy is also touched upon. Some of the well known societies are identified, although curiously, the fact that the Astronomical Society of South Australia was formed in 1892 and is therefore Australia's oldest active amateur society is relegated to an appendix.

The emergence of new branches of astronomy and their associated major facilities (principally in New South Wales) after the Second World War is outlined succinctly in the remaining four chapters. The principal players and the major successes in radio astronomy, solar physics, astrophysics and optical astronomy are identified, leaving the reader with a sense of the great amount that has been achieved, and that Australian astronomy is alive and well and continuing to move forward, with further exciting technical developments on the horizon. The importance of university and international links in keeping it so is amply identified by the authors, who also perceive a need to strengthen research in theoretical astronomy and astrophysics.

In conclusion, some remarks should be made about the book's layout. The dual column format allows most illustrations to be related more directly to the text, but this arrangement is not entirely successful: the reader often has to search for the main text amongst long figure captions of similar type. The inconsistent numbering of pages is also a distraction. Some minor errors of fact occur in the text and figure captions, one of the most glaring being that Australia's population in 1984 was 1.5 per cent of the world's population! These quibbles aside, the authors have produced a book which emphasizes the positive aspects of the development of astronomy in Australia, has a good balance in its content, and enough information to satisfy the general reader. The appearance of such a book on this subject is long overdue, and it can be regarded as a veritable nugget, albeit a small one.

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K.J. Frawley and N.M. Semple (Eds), *Australia's Ever Changing Forests: Proceedings of the First National Conference on Australian Forest History, 1988.* Canberra: Department of Geography and Oceanography, Australian Defence Force Academy, 1989. ix + 529 pp., illus., $15.00.

Rod Ritchie, *Seeing the Rainforest in 19th-century Australia.* Sydney: Rainforest Publishing, 1989. 171 pp., illus., $39.95.

Ian Watson, *Fighting over the Forests.* Sydney: Allen and Unwin, 1990. 173 pp., illus., $17.95.

A burgeoning interest in forest history has developed in Australia recently. It has been fuelled by environmentalists concerned about the management of diminishing 'wilderness', foresters defensively keen to 'set the record straight', and bureaucrats charged with the responsibility of managing public forests 'in the public interest'. Historians of science should welcome the development of this new field, as it offers scope for examining closely the work of a science which has been largely dominated by its bureaucratic and corporate niche. Forestry is an interesting science, being both interdisciplinary in content and insular in practice, and history is very important to its practice, because the time frames of most forests and plantations are much longer than the memory of their managers. Sound forestry practices must rely on historical information, because the results of its 'experiments' may be forty to eighty years in coming.

In *Australia's Ever Changing Forests*, Frawley and Semple have collected together 28 papers from different disciplinary areas, which deal with Australian forest history at local, regional, national, international and theoretical levels. All but one of these papers was presented at a conference in Canberra in May 1988, where it was resolved that an Australian Forest History Society should be established, with the aim 'to advance historical understanding of human interactions with Australian forest and woodland environments' (Appendix 1).

The collection is exciting in its breadth, especially as forest history has tended to be 'internalist' in style — by foresters, for foresters — and therefore lacking outside context and perspective. The book itself has been inexpensively produced at the Australian Defence Force Academy, and at $15 for 529 pages (including some photographs) is very good value.

Australia's Ever Changing Forests is primarily a book for researchers in the field. It lacks an editorial introduction to assist the uninitiated, which is a pity because there is material within it which could be of value to themes taught in courses on environmental science, history and politics. For example, Dargavel's piece reviewing the links between the Australian forest industry and labour history, Legg's historiographical analysis of the area, Lennon's timely warning about the limitations of the 'wilderness' concept, and Smith and Waterhouse's analysis of the ecology of weeds, would all be accessible to undergraduate students. The section entitled 'The Forests and Aboriginal Society' contains four well-written papers on the subject, all of which are open to newcomers to the field.

However, the primary aim of the volume is to share research and research techniques. This is particularly important in forest history because of the diversity of sources and the difficulty of accessing reliable, continuous material across time. The one common element shared by all the writers is their passion for 'sleuthing'. Forest history requires patience and an ability to assemble a story from a multi-media collage of sources:

> This study was hindered by the paucity of records and was pieced together from seemingly unrelated fragments, including old photos, cadastral [survey] maps, air photos, interviews, tree measurements, and contemporary forest records and wildlife studies [Lunney and Moon on the ecological history of the Mumbulla State Forest, NSW].

Historical information can come in many forms. There are often particular difficulties in identifying precise forest locations in historical literature, which is a problem for fire historians (e.g. Podger *et al.*, pp. 134–7) and for experimental forestry officers (e.g. Carron, p. 220). Almost every writer indicates that an indirect route has been taken to piece together historical evidence. Fahey's suggestion that 'bureaucratic secrecy' has been responsible for the paucity of sources in some cases, must be taken seriously. It is significant that one of the major sections of the book is devoted to 'Sources'. In addition, each of the other six sections is introduced by a review of the literature, the two by Frawley himself — on 'Regional Histories' and 'Conservation and National Parks' — being outstanding examples of this genre.

Whatever your motive for studying forest history — and Legg suggests a range, including the environmental challenge, the story of the forestry profession, the role of corporations in shaping forests, the history of the landscape, or radical political economics — this book has elements to suit you. It provides an important forum where researchers from different disciplinary backgrounds share ideas.

It is a serious problem, however, that some researchers are less able to explain the 'jargon' than others. One of the most technical and off-putting articles in the book is unfortunately the first, where the unexplained use of technical terms like 'vagile' (which I discovered after some research means 'capable of being widely dispersed in at least one phase of the life cycle') seems misplaced in an interdisciplinary collection. Some editorial

intrusion here would have greatly assisted the reader. The book would also have been improved by an introduction which drew out the major themes and perhaps highlighted the need to ensure the preservation of forest records and archives of all sorts, especially in the areas noted by Carron as 'neglected' — ecology, sociology and economics. 'Growth and yield' statistics are not on their own sufficient to construct rounded histories of our forests.

Pictorial sources are very important to all forest historians, and particularly those working in the nineteenth century. *Seeing the Rainforests* is a lavishly illustrated and beautifully designed book which shows off some of the lovelier pictorial resources available to the researcher interested in the social and environmental history of rainforests. Watercolours, oils, engravings, photographs and picture-postcard images adorn every page, delighting the eye of the casual reader. Unfortunately, for the more serious reader, the text fails to achieve the aims set out in its preface: 'As an environmental history this book delves into the disciplines of anthropology, geography, science, literature, art and popular culture.'

Perhaps this is too much to expect of any book, and the resulting thin spread across multiple subject areas — without the discipline of any of them — leaves the text heavily dependent on uncritical use of secondary sources. This is paradoxical, given the wonderful primary sources which surround the words on every page. Despite the author's formal training in Fine Arts, the pictorial images are blandly captioned and often uninterpreted.

The chapters of the book look at themes in nineteenth-century rainforest history — Aborigines, scientific investigation, aesthetics, literature (armchair travel), clearing/settling, and recreation (especially the use of forests close to cities). No attempt is made to explain why we are looking at nineteenth-century rainforests as a subject, and material within these themes is poorly organized, jumping about both chronologically and geographically. The major underlying organizational structure is probably revealed on the back-cover flap, where the author describes himself as 'a conservationist' who 'became interested in rainforests whilst living on the far north coast of New South Wales'. Conservation 'messages' are scattered through the text, often in incongruous places and generally unlinked by evidence.

Perhaps the author was interested in nineteenth-century forests because he believed them to be 'closer to pristine' — to 'real wilderness' — than present forests. Certainly the few contemporary images he chose to accompany his 'Postscript' are selected for maximum effect, showing eroded gullies and clear felling, and bearing captions about the 'rapacious demand for woodchips'. Yet if one examines some of the nineteenth-century images carefully, they are not the 'romantic sylvan scenes' he suggests, but rather show evidence of damage by fire, disturbance, and rainforests that have lost their canopy. Twentieth-century conservation concerns are important motivators for some to undertake forest history research, but they must not overwhelm the evidence. Legg quotes Tosh in his paper on the historiography of forests in the Frawley and Semple collection: 'our priorities in the present should determine the questions we ask of the past, but not the answers . . .' Muddle-headed good intentions are no substitute for style and organization; but by all means look at the pictures — they are outstanding and could be used as primary sources in themselves.

Another important source for forest historians is oral testimony, which is the basis of an exciting analysis by Ian Watson. *Fighting over the Forests* is a well-presented paperback, attractively written and useful to a range of readers. It closely documents the 'two worlds' of Terania Creek in northern New South Wales, the battleground of one of Australia's most bitterly-fought environmental struggles. The text uses oral sources cleverly, and with sufficient context to make sympathetic understanding of different points of view. The 'two worlds' are represented by the voices of conservationists and of timber-industry workers, interviewed by Ian Watson in the mid-1980s following the decision of the NSW government to end rainforest logging.

The 'two worlds' are also closely linked with the old divisions between city and country, and between the practical and the theoretical:

> Well what you read from them [conservationists] is more or less something they're read themselves because their experience comes out of a book in an office desk in Sydney. Not experience. Not practical experience [timber worker 'Fred Cooper'].

There is also a good deal of sympathy for the individuals of the 'other' world, but no real grounds for compromise:

> I remember when the announcement [to end rainforest logging] was made. I just felt fantastic but I immediately thought of all those blokes that were going to lose

> their jobs and felt really sad and responsible that I had been part of that . . . But I just felt this other stuff so strongly and it's so hard to express that to guys like that. It just comes out that you care about this little fern and he's got five kids to feed [conservationist 'Sally Field'].

The material presented by Watson — from his tapes and his analysis of the aftermath of a major environment conflict — makes compelling reading. The book could be used in a range of undergraduate courses, or simply as a fine exemplar of how to incorporate oral transcriptions into a written discourse. The book is perhaps somewhat limited in its total analysis of the conservation dispute by the 'two worlds' concept. The 'other worlds' — of the corporate decision makers who buy the products of the local sawmills and of the bureaucrats in the NSW Forestry Department in Sydney — could have been added to give the analysis a richer texture. It is worth noting that this is not a history — it does not narrate the circumstances of the original dispute, and nor are the actors named (pseudonyms are used throughout); it is rather an exploration of the nature of an environmental dispute through a particular case study.

Watson's decision to separate out (in an appendix on 'Culture and Ideology') the technical tools of his analysis, assists in making the book accessible to a wide range of readers. The complexity of the analysis was, for me, more exciting and useful than the appendix, though this may have interested those with a formal political-science background. However, as we have seen from the books included here, forest history is practised by researchers from a range of disciplines. The challenge for texts in this field is to present research and evidence in a form accessible to any intelligent general reader. Watson's technique of separating the particular case study from the analytical tools of his discipline is one neat way to encourage a wider readership.

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John Pearn and Lawrie Powell (Eds), *The Bancroft Tradition.* Brisbane: Amphion Press, 1991. xviii + 268 pp. illus., $25.00.

This book, a tribute to Joseph Bancroft, Thomas Lane Bancroft and Mabel Josephine Mackerras née Bancroft — father, son and grand-daughter, was prompted by the opening of a new research centre to house the expanded research groups of the Queensland Institute of Medical Research. This building, 'in the hub of the largest medical complex in the southern hemisphere', was named the Bancroft Centre. The book is divided into nine chapters; the first, 'The Bancrofts', appropriately has as authors Josephine Bancroft, a great-grand-daughter of Joseph, and Elizabeth Marks.

Joseph Bancroft (1836–96) and his son Thomas Lane Bancroft (1860–1933) had different personalities, but both were set in the mould of the doctor-naturalists of the nineteenth century. Joseph was an extrovert, whose research interests were most often dominated by a practical outcome; he can be looked on as a founder of agricultural entomology and plant pathology. In medicine, he is remembered for his contribution to filariases; his name is recorded in the taxonomy of the adult worm *Wuchereria bancrofti.*

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intrusion here would have greatly assisted the reader. The book would also have been improved by an introduction which drew out the major themes and perhaps highlighted the need to ensure the preservation of forest records and archives of all sorts, especially in the areas noted by Carron as 'neglected' — ecology, sociology and economics. 'Growth and yield' statistics are not on their own sufficient to construct rounded histories of our forests.

Pictorial sources are very important to all forest historians, and particularly those working in the nineteenth century. *Seeing the Rainforests* is a lavishly illustrated and beautifully designed book which shows off some of the lovelier pictorial resources available to the researcher interested in the social and environmental history of rainforests. Watercolours, oils, engravings, photographs and picture-postcard images adorn every page, delighting the eye of the casual reader. Unfortunately, for the more serious reader, the text fails to achieve the aims set out in its preface: 'As an environmental history this book delves into the disciplines of anthropology, geography, science, literature, art and popular culture.'

Perhaps this is too much to expect of any book, and the resulting thin spread across multiple subject areas — without the discipline of any of them — leaves the text heavily dependent on uncritical use of secondary sources. This is paradoxical, given the wonderful primary sources which surround the words on every page. Despite the author's formal training in Fine Arts, the pictorial images are blandly captioned and often uninterpreted.

The chapters of the book look at themes in nineteenth-century rainforest history — Aborigines, scientific investigation, aesthetics, literature (armchair travel), clearing/settling, and recreation (especially the use of forests close to cities). No attempt is made to explain why we are looking at nineteenth-century rainforests as a subject, and material within these themes is poorly organized, jumping about both chronologically and geographically. The major underlying organizational structure is probably revealed on the back-cover flap, where the author describes himself as 'a conservationist' who 'became interested in rainforests whilst living on the far north coast of New South Wales'. Conservation 'messages' are scattered through the text, often in incongruous places and generally unlinked by evidence.

Perhaps the author was interested in nineteenth-century forests because he believed them to be 'closer to pristine' — to 'real wilderness' — than present forests. Certainly the few contemporary images he chose to accompany his 'Postscript' are selected for maximum effect, showing eroded gullies and clear felling, and bearing captions about the 'rapacious demand for woodchips'. Yet if one examines some of the nineteenth-century images carefully, they are not the 'romantic sylvan scenes' he suggests, but rather show evidence of damage by fire, disturbance, and rainforests that have lost their canopy. Twentieth-century conservation concerns are important motivators for some to undertake forest history research, but they must not overwhelm the evidence. Legg quotes Tosh in his paper on the historiography of forests in the Frawley and Semple collection: 'our priorities in the present should determine the questions we ask of the past, but not the answers . . .' Muddle-headed good intentions are no substitute for style and organization; but by all means look at the pictures — they are outstanding and could be used as primary sources in themselves.

Another important source for forest historians is oral testimony, which is the basis of an exciting analysis by Ian Watson. *Fighting over the Forests* is a well-presented paperback, attractively written and useful to a range of readers. It closely documents the 'two worlds' of Terania Creek in northern New South Wales, the battleground of one of Australia's most bitterly-fought environmental struggles. The text uses oral sources cleverly, and with sufficient context to make sympathetic understanding of different points of view. The 'two worlds' are represented by the voices of conservationists and of timber-industry workers, interviewed by Ian Watson in the mid-1980s following the decision of the NSW government to end rainforest logging.

The 'two worlds' are also closely linked with the old divisions between city and country, and between the practical and the theoretical:

> Well what you read from them [conservationists] is more or less something they're read themselves because their experience comes out of a book in an office desk in Sydney. Not experience. Not practical experience [timber worker 'Fred Cooper'].

There is also a good deal of sympathy for the individuals of the 'other' world, but no real grounds for compromise:

> I remember when the announcement [to end rainforest logging] was made. I just felt fantastic but I immediately thought of all those blokes that were going to lose

> their jobs and felt really sad and responsible that I had been part of that . . . But I just felt this other stuff so strongly and it's so hard to express that to guys like that. It just comes out that you care about this little fern and he's got five kids to feed [conservationist 'Sally Field'].

The material presented by Watson — from his tapes and his analysis of the aftermath of a major environment conflict — makes compelling reading. The book could be used in a range of undergraduate courses, or simply as a fine exemplar of how to incorporate oral transcriptions into a written discourse. The book is perhaps somewhat limited in its total analysis of the conservation dispute by the 'two worlds' concept. The 'other worlds' — of the corporate decision makers who buy the products of the local sawmills and of the bureaucrats in the NSW Forestry Department in Sydney — could have been added to give the analysis a richer texture. It is worth noting that this is not a history — it does not narrate the circumstances of the original dispute, and nor are the actors named (pseudonyms are used throughout); it is rather an exploration of the nature of an environmental dispute through a particular case study.

Watson's decision to separate out (in an appendix on 'Culture and Ideology') the technical tools of his analysis, assists in making the book accessible to a wide range of readers. The complexity of the analysis was, for me, more exciting and useful than the appendix, though this may have interested those with a formal political-science background. However, as we have seen from the books included here, forest history is practised by researchers from a range of disciplines. The challenge for texts in this field is to present research and evidence in a form accessible to any intelligent general reader. Watson's technique of separating the particular case study from the analytical tools of his discipline is one neat way to encourage a wider readership.

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John Pearn and Lawrie Powell (Eds), *The Bancroft Tradition.* Brisbane: Amphion Press, 1991. xviii + 268 pp. illus., $25.00.

This book, a tribute to Joseph Bancroft, Thomas Lane Bancroft and Mabel Josephine Mackerras née Bancroft — father, son and grand-daughter, was prompted by the opening of a new research centre to house the expanded research groups of the Queensland Institute of Medical Research. This building, 'in the hub of the largest medical complex in the southern hemisphere', was named the Bancroft Centre. The book is divided into nine chapters; the first, 'The Bancrofts', appropriately has as authors Josephine Bancroft, a great-grand-daughter of Joseph, and Elizabeth Marks.

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cine, scholarship and civic life; country of residence and civic and scientific contribution; scientific names. The list ranges, in alphabetical order, from Achilles, whose qualifications are taken to be 'warrior, first-aider', to Zorn, an 'apothecary, botanist and senator', who never left Germany but whose name was given to *Zornia*, a genus of basically tropical legumes. Inevitably, the first impression is of a dictionary or a census statement.

I would also question other aspects of the book: does the author mean Harrogate, not Harrowgate, as the domicile of Dr Augustus Greeves?; when he states in the index that the common name for *Baloghia* spp is 'Bloodwoods', a name usually applied to some species of *Eucalyptus*, is he correct?; how do I know that the genus *Brunoniella* is named after the surgeon Robert Brown — why not, more logically, after some unknown 'Bruno'? Such problems tend to arise, however, simply because I do not have access to the relevant information: the common name 'Bloodwoods' might well be applied to the genus in question, either locally or in some other country, and there may well be a Harrowgate in England. The reader must take the material presented on trust: but, as is evident from the acknowledgements and the index, the author has gone to extraordinary lengths to provide such validation as is reasonably possible. He may have bent the botanical rules of nomenclature somewhat, but only to provide the reader with interesting titbits of information. And the same is true of the illustrations, which are scattered throughout the text and do much to relieve what could otherwise be a boring layout; the botanical illustrations would be inadequate for strictly botanical purposes, but this is not the intention of the book. The pictures or photographs of the various human entrants, together with appended comments, must be viewed similarly; where else would I discover that the 'Singapore daisy' (*Wedelia trilobata*) was named after a German professor, Wedel, and that a species of the same genus contains a potent toxin? And where did the author find the drawing of *Cephaelis ipecacuanha*, taken originally from the notebook of William Piso when he visited Brazil; how did he ascertain that surgeon James Patrick — of Ireland, England, Australia, New Zealand and the South Pacific — was equally diverse in his professions — 'surgeon, botanist, writer, military surgeon, murderer'? This book is as much about people as the plants which bear their name.

I now find that I have frequent recourse to this volume. So too do my friends in the medical profession, professional botanists and those inquisitive people — the so-called 'amateur botanists' — who are generally interested in plants and, increasingly, Australian history. I would strongly recommend the book to such people. But a word of warning: this is not a book that one 'can't put down', rather it is one that, when placed on a coffee table or at the bedside, one can't help picking up. Fancy that — the Macadamia nut, Australia's only native crop species, was named after a doctor from Glasgow, John Macadam!

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Gavan McCarthy (Ed.), *Guide to the Archives of Science in Australia: Records of Individuals.* Melbourne: D.W. Thorpe, in association with Australian Science Archives Project and National Centre for Australian Studies, Monash University, n.d. [1991]. xi + 291 pp., illus., $75.00.

As is now more widely known, the Australian Science Archives Project was founded in 1985 under the direction of Professor Rod Home at the University of Melbourne, in order to 'safeguard, for the use of future generations of Australians, important collections of personal and institutional records documenting the history of science in Australia, and at the same time to render these records accessible to present-day users.' As part of this important work, the Project has developed a computer-based Register of the Archives of Science in Australia.

The Introduction to the present volume describes its background and contents in the following way:

> The archives of science, in which we include the records of technological and medical research, comprise materials in many different formats and information recorded on many different media. This guide locates and briefly describes the records created by individuals who have worked in Australia, from the earliest explorers and navigators . . . to the computer software developers of the 1980s . . . Some collections are treasure troves, containing personal and professional materials that document not only the processes of science but also its humanity. They document the networks created by scientists, their battles with authority and with each other, and their co-operation to achieve longer term objectives; and they

provide lasting evidence of the progress and processes of science in Australia.

The guide is intended to lead readers to most sources of archival information relating to Australian science, although the depths of the Australian Archives, the archival bodies of state and territory governments, and the extensive CSIRO Archive have not yet been tapped. The entries are arranged in alphabetical order by surname. In briefly reviewing the guide, I have turned to the entries for those scientists with whose careers I am at least a little familiar.

While the content is indeed largely restricted to scientists 'who have worked in Australia', a few others are included because of archival material preserved here. Their entries often tickle one's curiosity. Thus, for the English physicist C.V. Boys, we find that the Basser Library has 'handwritten instructions for making quartz fibres, sent by Boys to Professor Poynting in Birmingham in 1894'; and for Ernest Rutherford, that the Basser has 'handwritten letter from J.J. Thomson to Rutherford 1907; personal bank book (England) 1922–23; annotated copy by Rutherford of J.T. Bottomley's *Four Figure Mathematical Tables . . .*'

In the cases I know, the descriptions of the archival records for each scientist are accurate. They are, perforce, rather brief, perhaps unnecessarily so in a few places. Thus, for W.H. Bragg, the only entry is 'a collection of 6 letters from Bragg to J.P.V. Madson 1909 . . . Basser Library'; an additional entry, such as that appearing for J.C. Verco ('information in the official records of the University of Adelaide') would have alerted users to the wealth of information on Bragg's Adelaide career to be found in the same repository (but perhaps this is obvious).

The biographical notes for each entry pose a potentially greater problem. Places of birth and of education and training are generally omitted, a significant loss, whose relevance is highlighted by their appearance in a few cases (e.g. Duffield and Sanders). Destinations on departure from Australia are also generally (but not always) omitted. The brevity of the biographical notes is very severe in most cases. On the other hand, such criticisms may be unfair; the notes are adequate to allow identification of the individuals concerned. Users will, however, need to look elsewhere for more extensive biographical information. Useful appendices and an index complete the volume.

The principal value of this guide, then, is in identifying the personal papers of individual Australian scientists. It is largely a guide for serious scholars, and not for 'amateur' historians, schoolteachers looking for student projects, etc. That said, it should equally be emphasized that, for its chosen audience, it is a major new asset. At a time when research time itself has become valuable to an unprecedented degree, this guide makes impossible projects possible, and gives invaluable assistance to many, many others.

The compiler and editor, Gavan McCarthy, who is also Senior Archivist of the Australian Science Archives Project, has worked hard and long under difficult conditions, not least of marginal and uncertain funding (so tragically common in Australian scholarship today). He deserves much credit and our heartfelt gratitude.

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F. Molyneux, *A Refugee from Misc. 20B.* Melbourne: School of Mechanical and Production Engineering, Swinburne Institute of Technology, 1990, 153 pp., illus., $20.00.

This slim volume contains the autobiography of 'Prof.' Fred Molyneux. An expatriate English engineer, he came to Australia in 1965 to establish chemical engineering as a full and independent course of study within the School of Engineering at Swinburne Institute of Technology, rather than as an add-on subject to the Diploma of Applied Chemistry.

In spite of suffering from a terminal illness, Molyneux was encouraged to leave some tangible record of his life and work, and he showed great courage and persistence in assembling fragments of a rich, varied and vigorous life dedicated to the practice and teaching of chemical engineering. But despite great efforts on the part of the book's editor, George Ross, this largely anecdotal tale remains scrappy. Isolated incidents and episodes are recalled, but an absence of specific dates and places makes the reader's task a difficult one. Thus, when reading about his early, formative years in Merseyside and south-west Cornwall, I had to refer constantly to my *AA Road Atlas of Britain.*

Fred Molyneux was born in a working-class district of Merseyside during the 1914–18 war, eldest of a family of five and son of a small property owner. Higher education must have had a high priority in the Molyneux family, since Fred's two uncles had graduated in medicine and the classics from Manchester University, where later his brother was to obtain an electrical engineering degree. Between 1933 and 1938, Fred

completed a B.Sc. and an honours degree in mechanical engineering at the Wigan Mining and Technical College. Following three years of apprenticeship and with the 1939–45 war in full swing, he was drafted under a wartime regulation, 'Misc. 20B' — a register of all qualified engineers and scientists, with their place and mode of occupation. This entailed a move from the heavily-bombed Liverpool to the equally heavily-bombed London to work on rocket motors and fuels. In the decade after the war, Molyneux worked first in the chemical industry and later with the Atomic Energy Authority on the design and construction of disposal plant for radioactive liquid effluents, and then on the production of uranium hexafluoride for the isotopic separation process.

At the age of forty, Fred Molyneux changed course and took a senior lecturer's position in the newly-created Department of Chemical Engineering at the Birkenhead College of Technology. Since 1946 he had been publishing papers on his industrial experiences in plant design and operation; in 1963, Butterworths published his *Chemical Plant Design I*, and in 1967 his *Laboratory Exercises in Chemical Engineering* was published by Leonard Hill, London.

Early in 1964, Molyneux took up a United Nations two-year contract in Venezuela, at the Universidad Central, Caracas, to work on the design and equipping of new chemical engineering laboratories. Some fifteen months later, with no job to return to in Britain, he accepted an offer to 'build up a Department of Chemical Engineering at Swinburne College of Technology in Melbourne, Australia'. Within a few years he had established a three-year diploma course in chemical engineering, which soon gained accreditation from the Institution of Engineers, Australia.

In the lat 1960s, Molyneux was invited to become a chemical engineering advisor to a United Nations team going to Cuba to form the Faculty of Technology at the University of Havana. Here things did not go well. Fred's impatience with the socialist experiment in Cuba led him to express views contrary to the Cuban authorities, and then to his resignation from the post after one year of a two-year appointment. Back in Australia, he continued enthusiastically as head of his department until his retirement at age 60. Determined to remain pedagogically active, he had completed a Diploma of Education at the age of 59. Following retirement, he did relief teaching in a number of secondary schools in the Gippsland area of Victoria. He was also instrumental in establishing a consultancy group within the Gippsland Institute of Advanced Education, to assist local industry on a contract basis.

Who, then, was 'Prof.' Fred Molyneux? From this autobiography it is difficult to see where he stood on a range of political and social issues. For example, his inability to come to terms with the socialist system in Cuba contrasts with his strong criticism of the 'old boy' network, wherein technically trained officers for the British Army were, in his opinion, selected according to family background and social status. This dichotomy might well be set against the irony of his having to take out Australian citizenship for passport/visa reasons in order to make a trip (after retirement) to the People's Republic of China.

We do learn that he had strong opinions on student evaluation, favouring the Australian approach whereby students could be passed subject by subject, in contrast to the British system of passing or failing a whole year's work. We also know that he had strong feelings in regard to the lack of opportunity for chemical engineering students in Australia to gain experience in — and credit for — the design of chemical processes and plant. A silver medal has been instituted in Molyneux's name at the Swinburne Institute of Technology for excellence in chemical engineering design.

This book is worth the read. Although irritating at times, it does give a strong flavour of the social conditions facing a young man growing up in the Midlands of England in the 1920s, and of the difficulties facing someone determined to become a chemical engineer despite the few suitable tertiary courses then available. On the other hand, this volume presents a sobering warning against 'incomplete' autobiographies. Fred Molyneux, with rich and wide-ranging life experiences in chemical engineering, had so much more to tell than appears in *A Refugee from Misc. 20B*. One can only hope that those with an equally-involved and wide-ranging life in the technical professions will consider documenting their lives more fully.

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Harold Love, *James Edward Neild: Victorian Virtuoso*. Melbourne: Melbourne University Press, 1989. xi + 372 pp., illus., $39.95.

They don't make them like J.E. Neild anymore, which may be a good thing. Neild was an apprentice-trained doctor who became lecturer in forensic medicine at Melbourne University. He was a combative engineer of moves to unify the medical profession in Victoria, or to achieve a monopoly over health work, depending on one's point of view. He was, finally, an equally-combative journalist and theatre critic.

Harold Love's publishers describe Neild as a Renaissance virtuoso, but that is rather an over-statement. Neild was evidently a more or less adequate doctor, a bulldozer rather than a diplomat in medical politicking, and an opinionated — as often as influential — commentator on the turbulent theatrical life of Melbourne for more than a generation. Love himself is clearly a man of more than one skill. He knows a lot about the history of the theatre in Victoria and England, has a good overview of the history of the Australian press, and has read himself into the history of medicine in Australia.

A review for this journal will attend principally in Neild as a scientist and doctor, and to Love's treatment of the history of science and medicine. Neild was trained — or crammed — for the Licentiate of the Society of Apothecaries which, when he received it in 1848, was the most common qualification for medical practitioners in England. The few months of study involved was propositional, rather than inquisitive, in character. Neild also spent some time at University College medical school but, in the 1840s, it had yet to reach the peak of its influence on the new science of physiology. In any case, Neild did not complete his degree there. Similarly, although Neild made part of his living in Melbourne as a pharmacist, he had no exposure in England to the developments from physiology into pharmacology which better educated scientists, such as Anderson Stuart, brought to Australia in the last quarter of the nineteenth century.

Neild was a fairly acute observer of the world around him, but his skills in that regard were informed as much by his work in journalism as by his empirical experience in post-mortem examination. It is not evident that his judgements owed much to epistemological subtlety or theoretical sophistication. Love is charitable in his assessment of Neild as a pathologist and practitioner of forensic medicine. A less charitable view would be that Neild's forensic work was sometimes formed as much by the passion of his conflicts with other doctors as by his scientific understanding.

Neild wrote for several Melbourne newspapers and was editor for many years of the *Australian Medical Journal*. Love observes that the various vehicles gave him

> enormous influence over both his own profession and public perceptions of medical issues. It was a power that he was to use effectively but idiosyncratically, and at times irresponsibly.

The habit of passing editorial opinion off as science, which continues in Australian medical journals to this day, may be seen as a legacy of Neild's work. Similary, his aggressive assertion of medical professional interests against other workers in the health domain, and his vindictive pursuit of opposing cliques within that profession, are not without present parallels.

Harold Love may have taken Neild a little too much at Neild's own assessment of his significance in medicine. If so, the reason probably lies in Love's occasionally anachronistic account of developments in medical knowledge and professional organization. He takes at face value a reference to 'physiology', where the context suggests that Neild meant only 'anatomy' (as his peers in 1863 would have done); it would have been unusual for an 'M.D.' to have added much to a doctor's standing in the 1860s; and it is an overstatement to report the medical profession as 'adopting its modern two-tier structure of specialist and generalist' as early as the 1870s.

Love appears as a more sympathetic, thoughtful character than his subject. His analysis of the aesthetics and economics of Melbourne theatrical life in the second half of the nineteenth century, and of Neild's contribution to each, is fascinating. Whether Neild was a 'virtuoso' is more debatable. Even if that judgement were held in suspension, however, the account of Neild's scientific and medical career would be worth having for its capacity to provoke the questions: can medical education or medical politics still produce people like Neild today, and would we like either if it did?

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Muriel Utting, *Cooke's Perth Observatory*. Perth: W.A. Government Printer, 1989. 23 pp., illus., $6.00.

Muriel Utting, *Windows to the Southern Skies*. Perth: Murdoch University & Perth Observatory, 1991. 44 pp., illus., $6.00.

In the nineteenth century, the several colonial government observatories in Australia were very important institutions. In some, astronomy was, in fact, a less important activity; meteorology, weather forecasting, telegraph development, standard time keeping, surveying (of colonial borders, coastlines etc.), tidal measurements, seismology, geomagnetism — even responsibility for postal and telephone services and the promotion of science — all could fall within the orbit of these observatories. Not surprisingly, therefore, the colonial government astronomers were some of the most important early scientists in Australia; for example, Robert Ellery in Melbourne, H.C. Russell in Sydney, Charles Todd in Adelaide and W.E. Cooke in Perth.

As the twentieth century developed, however, the importance of the State observatories declined. In 1908, meteorology was centralised in a Federal bureau; and in time, posts and telegraph, surveying, seismology and other functions also passed to alternative authorities. Left with little more than routine astronomical observations and the advent of increasing national facilities even there, most of the State observatories ultimately were closed.

Not so the Perth Observatory, now at Bickley outside Perth; still small and doubtful of its future, it is energetic and productive nonetheless. Like the other State observatories, it deserves a written history, and Muriel Utting, an amateur astronomical enthusiast and recent Murdoch B.A. graduate, is preparing one in the form of a series of booklets, the first two of which are the subject of the present review.

The initial booklet focuses on Western Australia's first government astronomer (from 1896 to 1912), William Ernest Cooke. It is the story of a valiant and sometimes successful struggle against substantial odds: poor funding, high expectations, heavy work load, inadequate staffing and sometime disheartening public criticism. Strongly supported initially by the W.A. Premier, John Forrest, and by his South Australian mentors, Charles Todd and William Bragg, he found the isolation of Perth difficult. Cooke's achievements were significant, however, not least in the establishment of the observatory and in his important role as Secretary of the local Adelaide University Committee, which paved the way for the foundation of the University of Western Australia.

It is disappointing that this booklet does not adequately capture the essence and drama of its subject. I found the text disjoined and sometimes obscure, lacking connections to events elsewhere (in Australia and overseas), the references poor, and the captions and the relationship to the text of the many excellent photographs inadequate. A strong editorial hand could have improved the result substantially.

The second booklet, containing a broader picture of the beginnings of the Perth Observatory, is more balanced and better presented (although cost-cutting has apparently forced a reduction in the quality of the paper, to the detriment of the figures). Despite community interest in astronomy and the public need for better meteorological information, Premier Forrest had great difficulty in persuading the W.A. parliament to make an initial allocation of funds, which even then (in 1894) were severely limited. The author comments: 'The dissatisfaction arising from the establishment of an Observatory in Perth was a shaky start to that institution, and one which has never been remedied by any subsequent W.A. government.' Some things never change!

The plans for the new observatory were developed by Forrest in extensive consultations with Todd in Adelaide. Indeed, it was Todd who had trained Cooke and who now provided his valued assistant for the new position. Cooke 'wasted no time in setting to work, [and] from the outset he showed his ingenuity, particularly when he had a puzzling or difficult situation which required instant action. . . . Cooke was able "to make do" in one way or another. In fact [he] was to leave a permanent memorial of himself in all the programmes which still exist, in artefacts . . ., letterbooks and other documents which remain still in the new Perth Observatory at Bickley.'

This is not the definitive history of a State observatory, but it is a strong reminder of an important chapter in our early scientific history and heritage.

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H. Attwood, R. Gillespie and M. Lewis (Eds), *New Perspectives on the History of Medicine: First National Conference of the Australian Society of the History of Medicine, 1989.* Melbourne: Australian Society of the History of Medicine and the University of Melbourne, 1990. xi + 303 pp., illus., $20.00.

This modest book is at once satisfying and tantalizing. It is significant as a record of the first official conference of the Australian Society of the History of Medicine. The edi-

tors' brief Foreword provides a thumbnail sketch of the previous initiatives which led to the formation of the Society, and it is good to know that the second National Conference is in progress, on schedule, as I write.

New Perspectives also serves as a review of current interest and thought in the history of medicine in this country. Broadly speaking, the 39 papers fall into two groups. One explores the impact of disease on society, while the other records the lives of individuals and institutions. The emphasis is on the nineteenth century, although the Ancients (Galen) and Moderns (Bea Miles) are not excluded. The reader is invited to sample from a smorgasbord of brief papers. Some are merely abstracts compressed into a few paragraphs, and none is longer than twenty pages of text. The juxtaposition of so many contributions with widely different fields and intellectual approaches makes consecutive reading a recipe for mental indigestion.

This is probably inevitable in any record of a conference, although here it is accentuated because the original programme was deliberately all-inclusive in scope. In retrospect, the holding of the conference in the bicentennial year did have some effect in bringing forward a large number of accounts of the lives of pioneer practitioners and the foundations of Australian institutions. However, the book's most enduring influence may well stem from its identification of individuals from widely different backgrounds with specific historical interests and knowledge. This should stimulate collaboration beyond the limited circle of people lucky enough to attend the conference itself. Cost considerations have dictated a spartan production, so this is no coffee-table book. A more serious defect is the unexplained selectivity of the editors in providing reasonably comprehensive texts for some of the papers but abstracts only of others; but perhaps this simply reflects the inevitable difficulty of extracting manuscripts from authors after the meeting itself is over. If the conference proceedings are to become a regular feature of the Society's life, some prospective planning could be required.

Despite these criticisms, it is a pleasure to welcome the appearance of *Perspectives*, both for itself and as a harbinger of better things to come. Professor Attwood and his partners deserve our warm thanks for their persistence in seeing the venture through.

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