Book Review Section

Compiled by John Jenkin*

J.F.H. Wright, *Measurement in Australia 1938–1988: A History of Australia's National Standards Laboratory.*
Sydney: CSIRO Division of Applied Physics, 1988. vii + 134 pp., illus., $24.95

This history of the National Standards Laboratory in Sydney is an interesting one. The Federal Government made a decision in September 1938 to establish the Laboratory just before the outbreak of the 1939–45 War. Tenders for the building were let in late 1939, and the first part of the building in the grounds of Sydney University was completed early in 1940. The demands of the war overrode much of the planned development, and members of CSIR's Radiophysics Laboratory working on radar were the first to occupy the laboratories. As a result, the standards work of the Laboratory did not develop until after the war, from which time its reputation has increased steadily.

The need for a Standards Laboratory was evident in the pre-war period, when CSIR, starting in 1926, concentrated its efforts on research for primary production. This was a proper decision; but if Australia was (and still substantially is) a primary producer, and if its secondary industries were then small, they were by no means negligible. On a small scale certainly, and concentrated on a few products, but these industries were run by dedicated and adaptable entrepreneurs. We have only to look at their work during the 1939–45 War to see that, when called upon for new and specialized products, they rose magnificently to the demands placed upon them. But they were not organized into trade or professional associations with a need for centralised research laboratories; it would have been contrary to the pioneering spirit which many of them expressed.

Times were changing, however, and testing and standards facilities were required. Critical decisions about the future of secondary industries were foreshadowed in the publication of the Report of the Secondary Industries Testing and Research Committee in January 1937. This recommended legislation for the adoption of the legal standards of Great Britain as the legal standards for Australia, and for the establishment of an Australian Standards Laboratory within CSIR. This was a wise move, and the consequences are with us every day. When we buy 250 grams of butter or margarine (depending on our cholesterol level and medical conscience), when we buy 20 litres of petrol (remembering to buy it in as cool a part of the day as possible because energy is proportional to mass not volume), when we buy a metric rule, and when we check our watches against the pips on the radio, we can be sure what we are getting. The whole range of standards that establish the commerce of our lives are a necessary contribution to a civilized life. We can rely on our purchases, and we need not feel that we are being deceived by unscrupulous traders.

In Sellers and Yeatman's phrase, NSL is a 'good thing', and more than that, it is a good scientific thing. We should be proud of it. It expresses what our present Federal Government wants to see from the scientific community: science in action, science producing goods of internationally accepted quality and standard, science making society work better. I will not be drawn into debating if this is the only thing that the scientific community should do, but at the very least, at NSL science is being well applied. I expected, therefore, to see a book presented with more panache. The Foreword could have been written by the Chairman of CSIRO or even the Minister for Science. Instead, it was written by the present and preceding chiefs of the Division of Applied Physics, and however proper this may be, I think that an opportunity was missed. I didn't see a newspaper account of the launching of the book (I may have overlooked it), but I hope that there was one, as this record of success certainly deserves to be put before the public.

Turning to more technical matters, the history of the changing scientific basis of standards is well charted. The pace of pure research in physics has been such that many professional experimental physicists might not be able to say how the metre is now defined, give the number of Krypton wavelengths, or say why that was chosen. The story of the calculable capacitor is given, involving a theorem in classical electrostatics due to A.M. Thompson and D.E. Lampard. I well remember the pleasure of attending Lampard's colloquium at Monash on this theorem; like all successful arguments in classical physics, there is little to do but applaud. The voltage standard is now set by using the Josephson effect in superconductivity; who can tell what new techniques may lie ahead with the so-called warm superconductors?

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Since timing is now so accurate, it is no wonder that the acceleration due to gravity is measured, very neatly, by timing the upward and downard passages of a projectile through two horizontal planes. This was done by G.A. Bell, D.L.H. Gibbings and J.B. Patterson at NSL. And steady and necessary work also continues on thermometry, psychometry and photometry by the only methods which a nineteenth-century physicist would now appreciate.

If this were all, then the NSL would be a good laboratory; but the 1937 Committee recommended that the standards work should be accompanied by 'related research' — a sound provision. A chapter is devoted to a description of this work. Parts of it will be familiar to many practising physicists and chemists; some examples are dielectric absorption, magnetism, glassy metals, low temperature physics, interferometry and solar physics. Many of these were projects undertaken in collaboration with other workers in laboratories around Australia, and with internationally important results. Each technical chapter has a list of references to the resulting published articles.

Another chapter is headed 'The Laboratory, Industry and the Community', in which we find an account of the many interactions with industry. Apart from the establishment of primary standards, numerous calibrations, tests and measurements have to be done for a modern technological community. The generic word 'interpretation' of scientific information is used here; and the word 'cautious' is used to describe collaboration with industry, because the staff of NSL were trained in physics and engineering rather than industrial processes. This seems an unnecessarily self-effacing word to use, considering how much interaction has been achieved. Since 1983, an Applied Physics Industrial Program has been introduced to allow short-term appointments and thereby assist the development of new products and improve the efficiency of manufacturing processes. Some of these were commercially sensitive. It is not clear from the account given here if this program is a success or not; short-term appointments are not attractive to scientists in a country such as Australia, where there are not many positions for scientists. There may be more hope of obtaining the short-term services of engineers, were it not that they seem to get permanent positions relatively easily. There are no published references for this chapter, though the wide range of topics covered is flattering to the laboratory.

It will be seen that all the topics I have mentioned are those performed by the 'workers at the bench'; but one chapter 'The Laboratory and the National Measurement System' discusses the laboratory in terms of organisation. It is astonishing to read of the rearrangements and changes that have been made since 1950. The laboratory has changed its name, sections have changed their names, and there is a plethora of acronyms. This makes very confusing reading, and it is difficult to see the reasons for these many changes. The CSIRO seems to like 'Reviews', and the NSL has not been excepted from them. What can be the reasons for so many? The overt terms of reference are given here, but surely there must be deeper reasons — the 'hidden agenda'. By 1985 there had been eight reviews in fourteen years, and amongst the conclusions of the last review one finds the following sentence (reproduced on p.44): 'It is important that the Division be now allowed to get on with its mission for at least 5 years without further review'. The author, who must have shared much of the frustration that the laboratory workers felt, was moved to call this a 'sensible suggestion'. I should think so indeed! NSL and the nation have been well served by fine research workers doing good science and good engineering, visible to many of us in other laboratories and industries. It seems to me that CSIRO as an organization should have recognized this, and allowed NSL to get on with its work without such constant review. Perhaps we should recall more often the old saw of Falkland: 'when it is not necessary to change, it is necessary not to change'.

The author of the present work, J.F.H. Wright, died just after finishing the manuscript and, as the two chiefs of the Division say in the Foreword, the book is a memorial to him. There are two things missing, however, that detract from it. There is no index, and apart from the mentions of the staff throughout the book, there is no list of scientists and engineers. Even after I had just read the book for the first time, I wanted to look up certain points and to follow the work of certain workers, but I could not do this readily. This is unfair to a good laboratory and unfair to good workers. There will be many readers who think that a technical book is unusable without an index, but they must not be dissuaded thereby from using *Measurement in Australia 1938–1988*. It needs to be read, and it deserves to be read.

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Marsden Hordern, *Mariners Are Warned!: John Lort Stokes and H.M.S. Beagle in Australia 1837–1843.* Melbourne: Melbourne University Press at the Miegunyah Press, 1989. xxiv + 359pp., illus., $44.95.

The fame of John Lort Stokes, naval surveyor, will undoubtedly be enhanced by this skilfully crafted book by one who has sailed the same waters and has drawn on his own experiences to bring colour and life to his narrative. Although the name of Stokes is less well known than that of his hero, Matthew Flinders, his achievements in Australia were arguably greater. His lengthy voyage on HMS *Beagle* completed the earlier work of Flinders and Phillip Parker King in surveying the Australian coast. The *Beagle*, too, is better known for its second voyage to South America with Charles Darwin than for this, its third survey voyage.

The association of Stokes and the *Beagle* was a long one. Stokes joined the 10-gun brig as a midshipman at the age of fourteen and was attached to the little ship for eighteen years. He sailed on its two South American survey voyages and on its six-year Australian voyage as mate and assistant surveyor under John Clements Wickham, until he himself assumed command after Wickham retired due to ill-health. Even while Wickham was in command, Stokes did most of the survey work. He surveyed the waters around Fremantle and large areas of the Western Australian coastline. He charted the treacherous Bass Strait, Port Phillip, the south-west of Tasmania, Port Stephens and parts of northern Queensland and the Gulf of Carpentaria. He discovered the Fitzroy, Victoria and Albert Rivers in Western Australia. He discovered Port Darwin, which he named to honour his friend. The bond had been formed with Darwin on the second voyage of the *Beagle*.

Normally steady, painstaking and conscientious, Stokes' passion for exploration at times led him to take unnecessary risks. Recklessness could have cost him his life. Unlike the other naval explorers, he extended his explorations inland, ignoring all dangers. He was speared by Aborigines on one occasion and had close encounters with crocodiles and rapidly rising tides. Excited by his discovery of the Albert River and what further exploration might yield, he took a party upstream, and when the ship's boat could penetrate no further they set out on foot. In the appalling heat his men dropped out but Stokes pressed on, driven by his obsession:

> he set out to cover a short distance further than any white man had ever ventured into this unknown land. As he strode, he heard the beating of that distant and familiar drum, summoning him southward. Quickening his step to its rhythm, he broke first into a jog, and then a trot, pressing ahead faster and faster, so that in the end John Lort Stokes, R.N., captain of H.M.S. Beagle, was running alone, half-crazed, towards the centre of Australia.

Stokes' increasing knowledge of the interior had forced him to abandon his long-held hope of finding an inland sea, but his dream of a fertile hinterland lingered on.

Hordern gives proper attention to the remarkable surveying skills and achievements of Stokes and other members of the *Beagle*'s company. He has drawn heavily on the journal Stokes wrote for the Admiralty, a factual account that he believes was probably intended for publication. Little of Stokes' feelings on personal matters emerges. (Not even his marriage rates a mention in his journal.) Fortunately, one of the mates, Benjamin Francis Helpman (later harbour-master at Warrnambool and brother-in-law of Stephen Henty), kept a chatty, detailed and revealing diary. From him we learn much of shipboard life, surveying duties, and colonial life and society, until he left the *Beagle* in February 1840 to command the Western Australian government schooner *Champion*.

The chain of association and service that linked the navigators is emphasised — from Cook, through Bligh, Flinders and King, to Stokes. Through the 'old boy' network of officers of the Royal Navy that extended to the farthest outposts of empire, Stokes came into contact with other men who extended the boundaries of human knowledge. Their presence adds a further dimension to the narrative. There was Rear-Admiral Sir Francis Beaufort, the Hydrographer of the Navy for twenty-six years and who served in the post with great distinction. There was Stokes' friend and mentor, Phillip Parker King, and there was the naval surveyor, Owen Stanley, who had served with Stokes, under King, on the *Beagle*. Stokes' uneasy relationship with the explorer (Sir) George Grey and his cordial relationship with the helpful Sir John Franklin, at that time lieutenant-governor of Van Diemen's Land, provide other fascinating sidelights.

Stokes might have been reticent in his journal about his personal affairs, but his public attitudes shine through clearly. His imperialism he did not question. He believed in Britain's Christian civilizing mission, although he was troubled that 'cruelty and oppression have too often disgraced our name and faith' in the treatment of native races. He was an acute observer and found much to admire in the Aborigines he encountered on his explorations.

In many ways his attitudes were remarkably ahead of their time. When the *Beagle*'s surgeon-naturalist took possession of a male skeleton wrapped in bark to take back to the Royal College of Surgeons in London, Stokes doubted the morality of the action in violating the tomb. Unlike most of his contemporaries, he believed that white occupation of Aboriginal tribal land had provoked attacks on Europeans. He pleaded for white tolerance and understanding of the country's 'more rightful proprietors'. He deplored white treatment of the Tasmanian Aborigines and he was disillusioned by the effect of European contact among the Aborigines around Sydney.

Hordern's elegantly written and skilfully constructed account of this voyage of achievement never fails to hold the reader's interest. His research has obviously been monumental and his appendices are a most welcome addition. The Admiralty instructions for this third and last surveying voyage of the *Beagle* are enough to make strong hearts quail. The compilation of the varied descriptions that survive of the 235-ton ship and the simulated plan and elevation are worthy inclusions. The organisation of the vessel was masterly for the enormous and lengthy task it was called upon to undertake.

The intriguing title is the result of Horden's own experience in World War II. The raw young commanding officer of His Majesty's Australian Motor Launch 1347 was sailing across the Gulf of Papua from Port Moresby trying to pick his way through the intricate reefs to Thursday Island in the darkness. Only a 'caution' that he spied printed on the edge of an old Admiralty chart saved him from running his vessel and crew onto the deadly Bramble Cay Reef. The chart had been made in 1824 by the naval surveyor, John Septimus Roe, who had sailed with King and who is part, too, of this story of the *Beagle*'s third voyage.

Reviewers seldom give unqualified praise, but I have only one minor quibble. This is a high quality publication that was clearly expensive to produce and is a joy to handle. It is unfortunate that a few errors were not detected in the proof-reading.

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Susan Davies, *The Martin Committee and the Binary Policy of Higher Education in Australia.* Melbourne: Ashwood House, 1989. vii + 224pp., $22.95.

This book traces the origin, operation and demise of the binary policy of higher education in Australia. It is a detailed study of the Martin Committee of Inquiry of the early 1960s. Its chairman, Sir Leslie Martin, is identified as the author of the binary policy, which promulgated separate roles and functions for universities and colleges of advanced education. Special access to Commonwealth Government records, including cabinet documents related to the Martin Report, was obtained, and most of the key participants in the policy-making process were interviewed.

The book is particularly appropriate in that we are now witnessing the demise of the binary system, or at least that is what we are told will be the outcome of the mergers and takeovers which have been initiated in the Dawkins' era.

It is interesting to reflect on why the binary system was introduced. It was quite specifically stated in the Report of the Martin Committee and by John Gorton in a ministerial statement on the Report, that the emphasis of the new colleges of advanced technology would be on technical and business subjects, with a strong vocational orientation. The colleges were to be primarily teaching institutions offering courses only to diploma level. Gorton emphasised that colleges were not to teach to degree standard nor to attempt to turn themselves into universities (p.135).

The Martin Report was quite explicit in its rationale for universities and colleges. It divided students into two general categories: those with lower academic ability and more likely to adapt to a more practical form of education, and those whose academic ability would enable them to cope with more analytical problems with emphasis on scholarship and research. It was closely wedded to the centuries-old concept of the division between intellectual and manual labour. Above all, the Report was a response to the great increase in students demanding entry to higher education in the late 1950s and early 1960s. By creating a binary system in higher education, the pressures on the universities to take students of 'lesser' academic ability were reduced, thus preserving universities as elite institutions. As Susan Davies concludes, 'The Martin Committee marked the transition from an elite to a mass system of tertiary education in Australia' (p.176); but it also sought to maintain those distinctions between the practical and the academic that had bedeviled Australian education for over a century. This was fundamental to the approach of the chairman of the Committee, Sir Leslie Martin, who was a physicist and disciple of Sir Ernest Rutherford, with whom he had worked at the Cavendish Laboratory in Cambridge for four years. That experience had a profound influence on his approach to universities and research. He took without question the primary role of the university in any

system of higher education. The role of the technological institutions was to translate the research findings of the university into an applied form. A comment made in 1975 summed up his approach:

> Now the education that I was aware of as a professor of physics was good for turning out men who were going to do research — the best of them — and of course there would be the rump, who would come out as BSc's and become teachers and turn into engineers or what have you (p.50).

He identified two types of student — the pass student and the honours student. Both were needed — the former in industry, teaching, the professions, the latter in the universities and scientific institutions doing research. His approach permeated the Martin Report. As Susan Davies points out, what mattered to Sir Leslie Martin 'was the creation of alternative institutions in Australia which would offer vocational education . . . particularly in the application of knowledge in technical matters', and by so doing 'free the country's academic institutions — its universities — to concentrate upon research and training on the Cavendish model'.

> Bound up with the chairman's belief in the separation of pure from applied study and research were outdated notions of innate intelligence, which decreed that people could be sorted easily into categories of academic or practical, and of social class (pp.113–4).

Susan Davies has focussed her study on the politics of educational policy-making in Australia through a detailed and critical examination of the development of this binary policy in higher education. She set out to show how both economic considerations and educational ideology played significant roles in determining policy. She has used the papers of the Martin Committee and the files of the Prime Minister's Department as well as cabinet submissions related to the Report, and has produced an important and comprehensive study of the workings of political processes and decision-making at the federal level.

She has also shown how the outlook of a single individual, Sir Leslie Martin, whose views were very representative of university thinking in the 1950s, could influence a government to develop a binary system of tertiary education, which was to dominate Australian higher education for 25 years.

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Anthea Hyslop, *Sovereign Remedies: A history of Ballarat Base Hospital, 1850s–1980s.* Sydney: Allen & Unwin, 1989. xvi + 414pp., illus., $39.95.

Ballarat, that gold-rich Victorian provincial town, did not waste much time in acquiring a hospital. Not soon enough to provide full emergency care to the unfortunate victims of the Eureka Stockade of 3 December 1854, but not long afterwards. The first building was opened in 1858.

Ever since, the elite of Ballarat have given time and money to conduct this major community service. The town and district have been canvassed and appealed to: dinners, speeches, bridge days, street parades, radio and TV "hours", testamentary bequests and much more have all been plundered to sustain the Ballarat Hospital. Above all, from beginning to end, the government — of Victoria and latterly of Australia — has been the principal subscriber. Probably this has always been true, although, since Dr Hylsop doesn't employ much tabulated numerical data, I cannot be sure.

In the late 1950s the young Ken Inglis published his MA thesis, suitably improved, as a history of the Melbourne Hospital. In it he raised a variety of questions about hospitals. That book, and its agenda, remains the standard by which hospital histories in Australia can be judged. Some since have been longer and larger. Probably Gordon Rimmer's study of Hobart hospital is the most substantial in that physical sense. Others have been decently modest, in keeping with their character, location or period of life. Some have been labours of love written by former medical persons, others by academic faculty in their spare time, some by freelance historians.

Ballarat chose the last path, paid handsomely, was patient as well as open with its author, and has been well rewarded. Anthea Hyslop has written a fluent, readable story about the hospital up there at the top of the rise on the western side of Ballarat. She has a good ear, a slightly sardonic style; she is self assured, never in doubt, always at ease amid the complexities of power plays and building plans.

As a result, the physical entity evolves steadily under her pen, from the cheap and nasty 1850s building to the complex, if confusing, range of buildings with which she concludes. One could have wished for a map with clear identification of the city streets bounding her seven-acre site, but that apart, the story of that physical evolution dominates the book.

Alongside that process are the obviously linked stories of how the hospital has been governed, by committee or council, working

with secretary or superintendent alongside the salaried medical officer and the matron. The book is then a neat and absorbing examination of power exercised in an institution, with those four elements interacting in various ways, and a fifth, the government, steadily exercising more and more control, till it has become dominant.

The processes for which a hospital is intended are discussed occasionally, as Hyslop moves from the buildings and the decision-makers to describe some patients and their difficulties; but usually it is one story or another to decorare her tale. Nowhere has she tallied patient processes consistently or comprehensively, though at times there are annual totals of patients treated and so on. Beyond that, there is little attempt to assess the quality of the process, nor to reflect on its character.

One important valuable exception is Hyslop's thoughtful discussion of the problem of exclusions: the children, the pregnant women, the infectious, the chronic. She shows with some skill and sensitivity that this regionally-based hospital found it difficult, from the beginning, ever to be watertight and self-confidently exclusive in the range of cases it would admit. Where else were gravid women to give birth? Chronically-ill people clearly did stay for months or years. Children were eventually provided space. But this was as much to save money on the cost of a separate institution as anything else. The early wards seem, from the illustrations, to have been pretty nasty places. Diphtheria and typhoid patients, and other infectious cases, were constantly in and out of the place. As the author shows, the responsibility for funding the care of infectious cases was eventually found to be with local government. In the influenza epidemic after World War One, the councils developed their own emergency arrangements at the showgrounds as well as at the hospital.

As the author herself admits, the last fifty years, when the hospital has become more complex and costly, it treated less fully than the first fifty. Her reason is that the past needs recovering, the more recent times are more familiar. While I admit that there is some strength in that case, and in the importance of beginnings, still I fear that time pressed heavily and enthusiasm waned. The complexities of finance and technology, of changing demand and opportunity, need the fullest and most thoughtful analysis possible if our community is to gain a reasonable view of hospitals for the twenty-first century.

That is to say, there is something disappointing about this enjoyable and well produced book, for all its length and interest. It is a thoroughly old-fashioned study of one particular agency. Larger contexts are only hinted at, the exception being the flue epidemic. The author's gaze flows from behind the desks at headquarters; she rarely gets out and about. There is not enough numerate analysis of trends and processes. Even the crucial question of the moral basis upon which the hospital operated — charity or community service? — is merely touched on from time to time, and taken for granted. The author accepts the case put in the 1850s by the elite of Ballarat for the necessity of a 'hospital', and rarely stops to ask what that institutional solution to the delivery and receipt of medical care really implied. There is little explicit recognition of the cheap and nasty character of the service being delivered in the regional centre, little realisation that the townspeople really couldn't afford the standards to which they aspired. Implicitly the story tells us that Ballarat Hospital was a terrible place in which to be sick or injured, since everything has to be done at the lowest possible standard of care. The most notable problem, but again one which Dr Hyslop touches only obliquely, was cross infection. She tells us wards contained mixed ranges of cases, but she does not enquire if this killed patients; not is there criticism of the conservative and lethal policies that such promiscuity must surely have implied.

To be sure, the sources the author had to attend to first were those provided by the hospital and the community. These she has wrought into the specific, ideographic text before us. But more carefully imagined alternatives would have called forth more evidence, notably of a statistical kind. In addition, a greater willingness to use the growing body of alternative analyses of hospital processes would have sharpened the narrative, generated yet more questions. True, a tactical and resource decision had to be made by the people who have paid for the work. The principal readers the author and the hospital have in mind are the councillors and long-time supporters and servants of the hospital. Specific narrative and judicious mention of successive heads of department take priority over analytic and comparative debate. Obviously I am asking for too much — or am I? Inglis did it brilliantly so long ago. Why must commissioned hospital histories often be bound in a strait-jacket of celebratory and narrativist history?

Let us enjoy this welcome addition to the genre of hospital history. Let us enourage one another to tackle the larger questions as well.

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Max Charlesworth, Lyndsay Farrall, Terry Stokes and David Turnbull, *Life Among the Scientists: An Anthropological Study of an Australian Scientific Community.* Melbourne: Oxford University Press, 1989. vii + 304pp., illus., $19.95 pb.

There has been unease amongst some social scientists that they have not had a fair share of the federal funds available for open competition amongst the scientists. I have always had some misgivings about the peer review system of assessing applications; but it was always difficult to be sure, the more so because every discipline proclaims in its own jargon, and I have found the jargon of much of the social sciences difficult to understand.

It was for such reasons that I looked forward to an attempt by social scientists to make their views more accessible to biologists. Max Charlesworth, Professor of Philosophy at Deakin University, and his collaborators set themselves the task of attempting to understand the sociology of the research workers at the world-renowned Walter and Eliza Hall Institute of Medical Research in Melbourne, and to see, using the methodologies that might be employed in studying a remote tribe, what the scientists there are doing. The study took four or more years, and the results have been published in this book.

The team was given full opportunity to delve into the workings of the Institute, and the adventurous explorers were pleased to find that 'the natives could not have been friendlier'. Not that there were no misunderstandings! In fact, on one issue the Director (who is always referred to in appropriately deferential terms) found it necessary to write a stern rebuttal of the views of the visitors, and this is printed in full; but it does not appear to have influenced the original conclusions of the investigators.

The report begins with an examination of the Institute's setting: its history, its place in the world of immunology, and its so-called 'culture heroes', especially the former Director, Sir Macfarlane Burnet, who had in 1971 published a historical account of the Institute. It then examines 'the subjective side of science' and the way science is seen to be done, giving great emphasis to the collection of data. Finally, one programme, the quest for a malaria vaccine, is described in greater depth.

Given the inherent fascination of the topic of immunology, the current interest in making Australia 'the clever country', and the desire to make science more accessible to the general public, this should be an important book. It is well written, easy to comprehend and fulfils the authors' hopes that it will be readily accessible to natural scientists. Regrettably, however, I found it disappointing.

Charlesworth and his collaborators appear to have approached their task within what they describe as a 'general theoretical framework'. It would be better described as a set of preconceived notions, and most certainly would not have represented a scientific approach to this or to any other problem. They hope that this approach may show up the 'limits of science', but the conclusions reached provide no visions of such limits.

The first conclusion is that scientists are just like other people. Apart from the fact that this comes as no surprise, it has been said many times before. However, this is only the first of several presumptions mentioned by the authors in order to refute them. The second conclusion is that 'power' plays a great part in the scientific process. Again, this seems most unsurprising, given that power as they describe it plays a part in so many human activities. They also discover that the progress of science is much more anarchic than they claim is generally believed. It is strange that, after a good deal of study into the 'scientific method', the authors seem to have grasped so little understanding of it.

They are very keen to generalise, often from anecdotal evidence, and they contrast the progress of physics with that of much of biology. That there are differences in approach between different individuals as well as betwen different disciplines also seems not to have been appreciated. The authors are surprised at the way scientific programmes are devised, and at the motivations of scientists; but their descriptions are at best unconvincing, and contrast vividly with the excitement so evident in the writings of scientists themselves. These are expertly described by, for example, Francois Jacob in his absorbing book *The Statue Within*; he has written evocatively of the interaction between himself and Jacques Monod as they designed experiments to unravel the way in which proteins are synthesised.

Charlesworth and his colleagues seem never to have quite grasped the role of hypothesis in the design of experiments, nor to have appreciated the difference between a theory and an hypothesis. Indeed, they seem to treat the two terms as if they are synonymous. The extensive discussion of data collection also misses the essential point. Again this is far better seen in the vivid description given by Jacob of his excitement at asking the right question and the thrill of finding it answered, either supporting his hypothesis or, more interestingly, when it gives an unsuspected answer, thus posing a whole set of new questions to be examined.

One of the most surprising misunderstandings occurs in the authors' description of the role of the scientific paper. After stressing the use of a 'paper' as a measure of priority of discovery, of providing a measure of productivity, and of providing an author with prestige, they overlook the real purpose of publications in science: to provide the opportunity for others to repeat, confirm or refute the conclusions that have been reached. The complete thought processes that have gone into reaching the conclusions, all the hypotheses that were found to be untenable, all the blind alleys, all the experiments that turned out to be irrelevant have no place in allowing others to evaluate the conclusions. But the fact that these are not described in no way diminishes the value of a paper to its intended audience, namely other scientists.

Several of the observations I find quite incomprehensible. 'In a sense', the authors say, 'Watson's book *The Double Helix* is almost as significant a part of their [Watson and Crick's] success as their actual discovery of the structure of DNA'. Scientists measure success by the new ideas that flow from a discovery; few scientists could agree with the view expressed here by the authors. Again, they speak of the 'lack of ambition' on the part of the biologists of the 1940s. What does this mean? I was a graduate student in a renowned biological laboratory in the USA in 1938. The period was one of immense ferment in genetics, endocrinology, physiology, and in a host of other disciplines. Certainly, some of the issues then under intense study have turned out to be of little continuing interest and are now forgotten, but that in no way diminishes the marvellous revolution that biology has undergone in the intervening years. But that anyone could have interpreted those biologists in the 1940s as lacking ambition, of the period as 'dismal and depressing', makes no sense at all to me. If Szilard claimed that biologists of the period 'lacked the faith that things are explicable', he simply got it wrong. They did lack the tools and the concepts that are available today, but they certainly did not lack ambition or faith in their ability to explicate the nature of organisms.

With all the help that they were given by the Institute's scientists, how could Professor Charlesworth and his colleagues have failed so lamentably to get below the surface? They certainly went to great lengths to learn about the science in progress in the Institute, but they appear to have learned little about the scientists themselves. Is there such a difference between natural scientists and the social scientists that the latter are unable to get a better perception of the motivations and the activities of the former than is presented in this book? Perhaps the peer reviewers did not get it wrong after all; perhaps sociology is, indeed, yet to become a science.

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Randolf Menzel (Ed.), *Australian-German Cooperation in the Life Sciences: Symposia on the Occasion of the 200th Anniversary of Australia*. Berlin: Deutsche Forschungsgemeinschaft, n.d. xi + 218pp.

A potentially valuable bicentennial gift to Australia was the offer of the Deutsche Forschungsgemeinschaft (DFG), the German Research Association, to bring German scientists to Australia to participate in a symposium on Australia-German involvement in biological research. The Australian Academy of Science agreed to co-host the symposium. While on a research visit to Germany, the Secretary of the biological section of the Academy, Professor Jonathan Stone, from the Department of Anatomy of the University of Sydney, helped crystallize the DFG project.

Consequently, in 1988 Professor Randolf Menzel of the Freie Universitat, Berlin, led a delegation of about seven distinguished German biological scientists to Australia for the symposium in the Academy's lecture theatre. The symposium provided an opportunity for these scientists to discuss their work, not only at the symposium but also with interested scientists in Australian research institutions. Thus a goal of the DFG project to stimulate continued cooperation in biological scientific research may well have been achieved; certainly scientific interests shared by Australian and German researchers would have been enhanced.

Another outcome of the symposium was the DFG publication containing the papers presented at the symposium. Since the German imprint on Australian biology is enduring and indelible, the book's title —*Australian-German Cooperation in the Life Sciences* — indicated a possible satisfaction of my interest in the history of Australian biology. However, my preconceived historical expectations remained largely unsatisfied; while some papers are historical, the book provides no systematic exploration of the development of joint German-Australian biological research. Understanding the scientific foundations of the symposium, I recognised the inappropriateness of my historical expectations and was disappointed rather than surprised by the lack of any underlying historical rationale.

Any underlying scientific rationale also remains hidden. While the book provides a record of the scientific papers presented at the symposium, nowhere does it explain the bases for the selection of either scientists or research topics. The reader is left wondering to what extent the research aired at the symposium represents either German science considered worthy of discussion in the antipodes, or scientific interests shared by Australian and German scientists. Editorially, the papers in the book fall neatly into three groups: German and Australian scientific papers presented to the symposium constitute the first two, with historical papers reprinted from other publications making up the third group.

The scientific papers presented by the German visitors focus on the authors' own scientific research. They range across such varied topics as biomembrane ion pumps, insect acoustic communication and colour vision, mammalian optokinetic reflex, immune response, arthritic pain and overian peptides. With only two exceptions, they include no reference to any links with either Australian material or Australian research. One exception, a paper by Drs Hoffman, Nelson and Stone, reviews their own and other relevant research on the optokinetic reflex in marsupials and placental mammals. It is the result of the collaborative neurobiological research of the German and Australian authors. Another neurobiological paper, Randolf Menzel's paper on colour vision in honey bees, also involved a German-Australian interaction; namely, his work with the ANU research groups of Adrian Horridge and Allan Snyder. Apart from Menzel's mention of Horridge's group taking 'advantage of the plentiful supply of different insect species' to study their visual adaptations, neither paper considers how or why a particular research project has been developed at a particular institution, other than the particular interests of the researchers themselves, of course. The German or Australian siting of the research is considered irrelevant to its content and development.

The several Australian participants apparently were more aware of the historical and geographical bases of their scientific stories. In his concluding remarks, the Chairman, Professor Stone, describes the productive German-Australian research collaboration in his own field, vision neurophysiology, from the 1960s. Only two other Australians addressed the DFG-AAS meeting — German-born Dr Uwe (not Ulrich) Proske from the Physiology Department of Monash University, and Professor Geoff Sharman, now retired from the School of Biological Sciences of Macquarie University. They were well chosen for the symposium; the researches of both are in a sense revolutionary and have deep German-Australian roots. Furthermore, both scientists attempted the difficult task of exposing those historical roots rather than presenting purely scientific pictures of their research.

In his paper 'Some German Contributions to Australian Zoology: Marsupium, Mammary Glands and Cremaster Muscle' Professor Sharman describes German contributions to the zoology of Australian animals, especially marsupial reproduction, from the early nineteenth century to recent times. He mentions both research in Germany and research by German zoologists in Australia, including Gerard Krefft, William Blandowski (of Polish ancestry), and Richard Semon. One tantalizing, century-and-a-half-long scientific thread followed by Sharman is the mechanism by which the enpouched baby marsupial obtains milk from its mother's teat. Could the new-born marsupial suck or was the milk pumped down its throat? — hence the interest in the mother's cremaster muscle. Another scientific thread, extending through the twentieth century, is the study of the confusing roles played by X and Y chromosomes in the determination of marsupial gender. Sharman's work indicates a type of marsupial chromosomal control unique to mammals.

Dr Proske's paper, 'An Electrical Sense to Monotremes', follows another fascinating scientific thread — that of the amazing discovery of a sixth sense in that group of mammals which two centuries ago challenged the very notion of a mammal. In his 1927 book, Harry Burrell had suggested the need for a sixth sense in the platypus. However, not until the 1980s was his suspicion confirmed and explained by the detection on the playtpus bill (and the echidna snout) of sensory receptors capable of detecting weak electric fields. As with marsupial reproductive physiology, monotreme sensory research has a long German and Australian history. Proske provides an eminently readable account of that history, which begins with nineteenth-century British and German anatomical investigations of the sensitive bill of the platypus and culminates with German and Australian elucidation of the glands and associated nerve endings which constitute the electroreceptors which allow the platypus to detect small prey in this distinctly un-mammalian way. As Proske points out, the electroreceptor research reaffirms the high evolutionary status of monotremes. The notion of monotremes constituting a primitive, almost pre-mammalian group, now appears distinctly dated.

Two German scientific visitors to the Australian colonies in the nineteenth century — Amalie Dietrich and Robert von Lendenfeld —

are the subjects of three historical papers, which were not prsented at the symposium but which were included at the end of the DFG publication. Was this to provide historical ballast?

Ray Sumner's paper, 'Amalie Dietrich's Australian Botanical Collections', and Ulrich Lüttge's preceeding introductory paper are reproduced from *Studies in International Cultural Relations*, vol. 29 (1988). From 1863 to 1872, Dietrich was employed by the Museum Godeffroy of Hamburg as a naturalist collector in Queensland. Sumner describes Dietrich's botanical career and the fate of her voluminous botanical collections. In following the threads of Amalie Dietrich's botanical work, sleuth Sumner has debunked earlier supposedly factual writing about Dietrich. At last a thoroughly researched and documented paper weaves Dietrich's work into the fabric of the history of Australian botany.

David Sandeman's paper, 'Robert von Lendenfeld: A Naturalist, Geologist and Zoologist in Australia' is an edited and unfootnoted version of his chapter in *From Berlin to the Burdekin*, published by the University of New South Wales Press. His travels, work and ideas, both scientific and social, in Australia from 1881 to 1886 are discussed. Although Sandeman barely mentions von Lendenfeld's biological work, his listed publications relevant to Australia reveals his important contributions on Australian sponges and coelenterates. von Lendenfeld attempted to sort out the confusion of names and altitudes of the peaks of the Snowy Mountains and determine which really was the highest peak. Sandeman attempts to reconcile von Lendenfeld's names with current information. Appropriately, Robert von Lendenfeld happens to be Professor Menzel's great grandfather.

For those interested in the history of Australian science, this book does provide glimpses of German involvement in Australian biology during two periods — the nineteenth century and recent decades of this century. Sadly, a more coherent picture was never intended. If you are interested in the development of marsupial or monotreme research, or vision research, or Amalie Dietrich's botanical collections, then this book is worth your perusal. In juxtaposing the writings of scientists and historians, it also exposes the dichotomy between scientific and historical writing. But don't expect an index, and don't expect to read it more than once — the binding won't stand it!

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Douglas Gordon, *Mad Dogs and Englishmen Went Out in the Queensland Sun: Health Aspects of the Settlement of Tropical Queensland.* Brisbane: Amphion Press, 1990. viii + 106pp., illus., $11.95.

John Pearn and Mervyn Cobcroft (Eds), *Fevers and Frontiers.* Brisbane: Amphion Press, 1990. viii + 276pp., illus., $24.95.

These two books form part of a growing list of titles published by Amphion Press, a non-profit publishing unit within the University of Queensland's Department of Child Health. Most of the fourteen monographs on Amphion's current list deal with the history of medicine and health in Australia, and to date the Press has specialized in manuscripts on the experience of people in northern Australia.

Mad Dogs and Englishmen Went Out in the Queensland Sun originated as the 1969 Bancroft Oration, a lectureship established in 1926 by the Queensland Branch of the British Medical Association. Professor Gordon's narrative, enlivened by several maps, charts, drawings and photographs, adopts an heroic tone as it charts the progress of settlers battling the elements in North Queensland. At issue is the claim that members of the white race could not adapt to life in the tropics, especially when they were required to work the soil themselves. Crucial to settler society was the economically viable exploitation of the land, particularly the activities of pastoralism, mining, sugar cane farming, and lumbering. The book is rather lean on details, but it outlines the progress of these industries from the 1860s to the interwar period. More interesting and valuable is the attention devoted to the demographic contours of morbidity and mortality, and the brief mention of the medical organisations and laboratories of the region. While most towns could boast of a hospital by the close of the nineteenth century, it was not until the plague visited southern Queensland in 1900 that a centralized strategy of public health replaced the efforts of local health boards. Although this pamphlet covers too much in too few pages, it holds interest and provides some 270 bibliographical references. Readers interested in a more general account of the health problems of Europeans in the tropics would do well to consult Philip D. Curtin's *Death By Migration: Europe's Encounter with the Tropical World in the Nineteenth Century* (1989).

Fevers and Frontiers collects twelve essays on medical and scientific work on the margins of empire. The volume is largely biographical and institutional in tone, and topics range from the plight of orphans to advances in ambulance transportation. The first section begins with

unfootnoted summary biographies of physicians and surgeons, men such as Hermann Beckler, Hans Herman Behr and George Bennett. The environment these men confronted, and two sorts of health traumas common to northern Australia — snakebite and jellyfish stings — form the subject of amply-illustrated chapters by (respectively) Jeanette Covacevich and Peter Fenner. Readers interested in these subjects, as well as the current state of toxicological and therapeutic knowledge on cane toads, stonefish and the like, would do well to consult *Venoms and Victims*, an Amphion Press volume edited by Pearn and Covacevich.

Laced between biographies of great medical men, a chapter on medical instrumentation and an interesting but summary piece on alternative medicine, lie some true gems. Lesley Williams' chronicle of women physicians in Queensland, from one in 1891 to thirty-nine in 1941, portrays the Queensland medical world as a colony within a colony. The number of female practitioners rose precipitously in the first decade of the century, when Queensland benefited from an influx of highly qualified women who were unable to obtain posts in Sydney and other urban centres in the south. More highly feminised than scientific medicine was the profession of nursing. Lori Harloe's piece, which decries the undervaluation of nurses, includes some historical vignettes of Queensland nurses. Harloe, a practising nurse who knows of that which she writes, sees reform of nursing education as the key to higher standards and improved conditions for nurses. One thing is certain, the real empowerment of nurses and the much-needed construction of an environment where those on the front lines of healing can better exercise their craft will need to be negotiated with a medical profession that is largely male in composition and conservative in outlook.

Also writing on women's health is Wendy Selby. Her scrupulously documented and researched chapter on birthing practices before and after the Queensland Maternity Act of 1922 provides what much of medical history lacks and what much of modern scientific medicine has lost in its focused concern with diseases and etiology — the patient's point of view. The Maternity Act funded the building of maternity hospitals, baby clinics and specialty hospitals for the diseases of women. It also contributed to the decline of home births and the demise of midwifery. By 1928, one of every seven births occurred in a hospital, and by the close of World War II this ratio exceeded two of every three.

Sifting the contents of these volumes caused me to ponder the goals of Amphion Press. If one purpose is to produce good quality and reasonably priced books on medical history and the history of natural history, then the editors have certainly achieved this. Still to be defined, I think, is the target audience, be it local, national or international. Health professionals and professional historians, two groups of consumers who will find much of value in Amphion's list, have a low tolerance for unfootnoted prose. As the authors and the Press are involved in path-breaking and important work which holds up regional figures and events to a national and international audience, it behoves Amphion Press to require contributors to create clear bibliographical trails leading readers back to the best sources available. Thus, while Pearn's essay in the second volume — which provides brief biographies of twenty-one medical men *cum* explorers and reads a bit like a potted version of the *Australian Dictionary of Biography* — invites neophyte historians to join in the feast, it delivers only appetizers and fails to mention the sumptuous meals to be had and enjoyed at the local library or book vendor. In future edited volumes — and I hope there are many — the editors might also consider balancing the local, topical studies, which they do quite well, with one or more synthetic chapters. *Fevers and Frontiers*, for example, could have been strengthened by the inclusion of nationalist and internationalist perspectives. Thus a general essay on scientific voyages, or perhaps a piece on the conditions of colonial scientific practice in Australia, would have provided contextualist support for these valuable but somewhat idiosyncratic essays. Such an approach would better appraise readers on my own shore of the Pacific — not to mention those south of Brisbane — of the important place Queensland occupies within Australian history. With these bits of friendly criticism and praise, and the hope for continued prosperity, I join with other historians of the Australasian experience in welcoming Amphion Press to our far-flung community.

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Marlene Norst, *Ferdinand Bauer: the Australian natural history drawings.* Art in Natural History, No. 1. London: British Museum of Natural History, 1989. 120pp., illus., £9.95.

This is a welcome and long overdue tribute to the great skills, not only in art but in impeccable scientific observation, of Ferdinand Bauer. Marlene Norst's volume brings together, in print, copies of the finished colour drawings housed in the Botany and Zoology Libraries of the Natural History Museum, London, alongside pencil drawings which are housed in the

Vienna Natural History Museum. The former are major contributions to botanical and zoological colour illustration, the latter further add to our understanding of the stature of Ferdinand Bauer for the outstanding quality of his draftsmanship.

The surviving letters from Bauer are relatively few, and the text is skilfully interwoven with the accounts of others — particularly by Flinders of his great voyage circumnavigating Australia, and by Robert Brown — making the whole presentation interesting and readable. Also woven into the story are the biographical details that were provided by Dr Jan Lhotsky, a fellow Austrian, who had also visited Australia. He possibly never met Bauer, but he corresponded with his brother, Franz, and on this basis and from the limited information that was available to him even then, produced a biographical note after Bauer's death.

Clearly Bauer's contribution to European understanding, in the early 19th Century, of Australia's unique plant and animal life has been under-estimated. This publication, together with the major recent reproductions by Alecto Historical Editions of London, will help us realise the importance of Ferdinand Bauer's work.

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