

# Book Review Section

Compiled by John Jenkin\*

**Patrick Petitjean, Catherine Jami and Anne Marie Moulin, (eds), *Science and Empires: Historical Studies about Scientific Development and European Expansion*. Dordrecht: Kluwer, 1992. xiii + 411 pp., Dfl. 180.**

This interesting volume was created from a large and varied group of papers presented in 1990 at an international colloquium in Paris organised by the REHSEIS group (Research on Epistemology and History of Exact Sciences and Scientific Institutions) of the National Centre for Scientific Research. The book contains forty short contributions, including fifteen in French, presenting the work of scholars from four continents (excluding Africa and Australia), with strong contingents from France, India, Brazil and Japan. Also represented in the collection, by one or more papers, are Turkey, England, Spain, Mexico, Colombia, USA, Quebec, China and Sri Lanka.

It is not, perhaps, inappropriate to pay attention to the geographic origins of scholars engaged in studying science and imperialism, scientific centres and peripheries, the local and the metropolitan, and the cross-cultural comparison of institutions of knowledge production. Clearly, although situated in the heart of Europe, organizers put the periphery at the centre of the conference: no more than a third of contributors are based in Europe and the USA, while Latin American participants, especially Brazilians, were there in force. This comes as no surprise, given the strength and methodological sophistication of recent Latin American scholarship in the field of colonial science history. For the same reason, it is no surprise to see a number of familiar Indian names; but the complete absence of scholars from Africa, Southeast Asia or the Pacific is disappointing.

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In their foreword, the editors suggest that organizing a colloquium on the topic Science and Empires was 'a bit of a gamble', since the subject 'is not a currently-accepted *sub-discipline* of the history of science; rather, a *set of questions* which found autonomy only recently'. Of course, in some respects the study of 'science and empire' or 'colonial science' may be, as James McClellan recently put it, 'still nascent', yet the field's fast emerging maturity makes somewhat disingenuous the risks of hosting a conference on the subject. After all, Melbourne was the venue for two earlier conferences (in 1981 and 1988), both of which resulted in volumes similar to that under review, except for their primary focus on the English-speaking world: *Scientific Colonialism*, edited by Reinhold and Rothenberg, and *International Science and National Scientific Identity*, edited by Home and Kohlstedt. In 1985, Delhi sponsored a conference which gave rise to a publication *Science and Empire*, edited by Kumar, focused entirely on India.

Furthermore, international conferences on closely related topics were soon to be held in Spain and Sweden (1991) and Mexico (1992). Finally, at the vast 1993 International Congress of History of Science held in Zaragoza a significant proportion of the papers dealt with such topics as diffusion of knowledge, technological exchange, exploration, Latin American science and technology, ethno-science, science and colonialism; that is to say, science and technology in social, cultural and geographic context. Significantly, we find at Zaragoza plentiful examples of all three approaches to 'science and empire' set out in the typology utilised by the editors of the present volume: geographic ('science IN the empires'), utilitarian-political ('science FOR the empires') and autonomous ('science and empires') which, as they point out, raises important epistemological, historical and contemporary political issues.

Undoubtedly, as indicated in the Foreword and the Presentation, the editors are particularly interested in advancing the general theoretical, and what they call epistemological, dimensions of this emerging 'sub-discipline'. Unfortunately, it is in this area that the *Science and Empires* volume falls short (perhaps in part due to the brevity of individual contributions). True, there is a reasonable amount of debate over terminology but, as the editors indicate, that difficult matter 'awaits further clarification'. It is also true that many of the studies in the book offer some cross-cultural comparisons, with sessions dedicated to Latin America and to

that ubiquitous and altogether doubtful category 'Asia', within which are included studies of the Ottoman empire, India, China and Japan, curiously characterized by the editors as a 'distinct cultural area . . . the Far East'. There is also limited discussion of the possibility of finding suitable 'models' for understanding the spread and growth of science outside Europe.

While the editors have quite correctly searched for and discovered theoretical and methodological strands that tie together the diversity of case studies presented in this volume, and while the editors hint at the need for an approach which analyses 'the transformation of modern science in different cultural, social or ideological contexts', nevertheless, they fail to capitalize on one of the most central and provocative contributions made in recent years by the sociology of scientific knowledge. This is the simple recognition that all science is local, that the phenomenon we call science will never be fully understood until it is analysed in social and cultural context wherever it occurs. As David Turnbull argues in a recent paper, only an 'explicit focus on the localness of knowledge production provides the possibility for a fully-fledged comparison between the ways in which understandings of the natural world have been produced by different cultures and at different times'.

The clarion call then is to approach the history of local, national and regional scientific traditions symmetrically: to ask precisely the same questions of science in Europe as of science in any other locality. If the emerging sub-discipline, to which the editors of this volume have made a useful, even notable, contribution, is characterized as 'science and empires', then the imperial centres will be privileged in historical scholarship in the way they have been privileged in history. This is by no means to deny that, in cultural, political and economic terms, forces of imperialism are among the most potent with which the historian of science must deal. Rather, I wish to suggest that knowledge production is a central feature of every culture, pre- or post-modern, building on ideas generated within and without any particular local tradition which may, depending upon the aims of a study, be defined along national lines, along imperial lines, along language lines, or even along cultural lines in the anthropological sense. Seen in this light, the separate cases examined in the present volume are perhaps even more successful than they appear when grouped under the rubric 'science and empires'.

Considered as a bibliographical introduction to this general field of interest, *Science and Empires* leaves something to be desired for readers who are seriously encountering the area for the first time. For the same reason, I was sorry to see the absence of a subject index, though a comprehensive name index is provided. Due to the large number of contributions, I shall give no space to the discussion of separate individual pieces, especially since it seems to me that no particular papers in this collection stand out above the others. However, the general standard of scholarship is uniformly high, and the volume contains much food for thought for anyone interested in comparative history of science or in questions relating to science and cultural imperialism, or even to readers of *Historical Records of Australian Science* who may simply want to judge the Australian case in broader context.

In sum, this collection of papers forms an important new source for the study of comparative scientific traditions. It will be particularly useful as a supplement to the several related anthologies published in recent years in this rapidly growing field. Partly as a result of the Paris conference, a lively and helpful *Science and Empire Newsletter* has been set up by REHSEIS to serve the network of interested scholars around the world.

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**Graeme Davison**, *The Unforgiving Minute: How Australia Learned to Tell the Time*. Melbourne: Oxford University Press, 1993. viii + 160 pp., illus., \$18.95 pb.

The intimate relationship between science and society need hardly be emphasized in these days of ever-changing physical, biological and medical technology and governmental obsession with applied science that produces prompt and substantial financial returns. Some areas may appear immune from these considerations, however, such as 'time and space', which conjure up for most scientists and lay-people alike, thoughts of Newton, Einstein and Hawking, relativity and astronomy, space travel and science fiction.

Yet this book, by the noted Australian historian Graeme Davison, uses the phrase 'time and space' regularly throughout its fascinating and densely-packed 160 pages (a chapter is also entitled 'Time Conquers

Space'); and Professor Ken Inglis says in the Foreword: 'Davison does time as Blainey did space, and since time and space form a continuum, he draws much on Blainey's work. I can't think of a better way into Australian history . . . than a reading together of *The Tyranny of Distance* and *The Unforgiving Minute*'. Further reminders, if they were needed, that science in all its forms is but an aspect of our shared human experience.

This book arose from an 'interest in the topic germinated during the process of writing chapters for . . . a volume in a bicentennial series', and it is the third volume in a new series from OUP entitled 'Australian Retrospectives', designed 'to examine formative issues in our national history in a style accessible to non-specialists . . . in a brisk and intelligently speculative manner'. Davison satisfies these aims splendidly, in a study of the meaning and social impact of time in its Australian context.

During my transition from physics to history of science, perhaps my most important realization was that the Industrial Revolution is a very recent historical phenomenon, and that the consequences that have flowed from it—including the advances of 19th- and 20th-century science—are of even more recent date (trivial as that may, at first, appear). Here again, it is surprising to read how recently our lives have come to be dominated by the clock. Thus, for example, household clocks and reliable pocket watches date only from the late 19th century; time was not standardized in Australia until 1895; and compulsory education and the formal instruction of children to tell the time were not introduced until the same period.

How was life regulated previously? Davison's book provides a number of answers: for the Aborigines, by life's natural rhythms, night and day, summer and winter, birth and death; for the early navigators, by the sun, the stars and their Greenwich-set chronometers; for the early convicts, 'doing time', by the clock on the Hyde Park Barracks, a bell and regular toil from dawn to dusk according to a strict timetable; for later citizens, by church and civic clocks, bells and time-balls, until personal time-pieces became widespread; for country people, by the rhythms of the seasons and the farm, long after city people had become slaves to clock time. Australia has never been a timeless land.

The power and influence of the Industrial Revolution, the Evangelical Revival and Utilitarianism—well known to British and

Australian historians—are again manifest in the emerging desire for regularity, punctuality, orderliness, respectability, and the strict and scientific division and use of space and time.

Cities and towns for decades ran quite satisfactorily according to their own local time, determined by reference to sidereal time as measured at each State Observatory. But with the coming of the railways, punctuality, convenience and safety could only be assured by the regulation of time and distance, and this indeed became possible with the aid of the new electric telegraph. International telegraph links also added to the need for a standardized system of time; Banjo Paterson's 'townsfolk . . . had no time to waste', and Henry Lawson's 'Faces in the Street' had a 'fear of being late'. The eight-hour-day movement of the 1850s—demanding eight hours labour, eight hours recreation and eight hours rest—achieved practical realisation sooner, and symbolic significance longer, in Australia than almost anywhere else.

The 20th century heralded new time regimes. The Great War and its by-products had an enormous influence. The wireless not only broadcast regular time signals but was also programmed to a tight schedule that made listeners like-minded; the aeroplane, telephone and automobile shrank both time and space; and the wrist-watch gave the convenience of grandfather's pocket watch to every man, woman and child (thereby, at the same time, giving them some freedom to devise their own timetables). To improve the efficiency of war work, time-and-motion studies began and daylight saving was introduced. The fame of Australia's early aviation pioneers rests in part on the heightened awareness by Australians of international time and distance. At a mundane level, the time allowed at a city parking meter has steadily been reduced.

In the inter-war years, 'efficiency' and time control became pervasive features of both industrial and domestic life. Davison then points out that the rigour of these regimes produced resentment at work, at home and amongst artists, commentators and comedians; flexibilities had to be introduced. But the late 20th century has seen a return to the tyranny of time. The time gap that had long separated Australia from the rest of the world and that was both a barrier and a buffer has shrunk; we are now attached ever more closely to all the world, in time and in distance. Time management and frenetic time watching are back in favour. One wonders if the lessons of the past have been

heard, and if heard, truly understood.

This is a fascinating and enchanting book. It lacks any serious discussion of the history of the determination and measurement of time or of their evolving accuracy, and it has been given a trivializing and misleading subtitle. But it is primarily a social history; and I am confident Australian scientists and historians of science will enjoy and profit from this very readable little book.

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**Christopher Lever**, *They Dined on Eland: The Story of the Acclimatisation Societies*. London: Quiller Press, 1992. xvi + 224 pp., illus., £18.50.

In the mid-nineteenth century, botanical gardens and acclimatization societies provided a global network of the movement of plants and animals across national and geographical boundaries. With imperial redistributions of biological resources regarded as essential for economic development and human comfort and pleasure, governments, societies and individuals were prepared to expend vast amounts of time and money on the appropriation, both clandestine and overt, of exotic plants and animals. Ships criss-crossed the oceans with these organisms to enhance and enrich colonies and empires.

With the wisdom of hindsight—over a century's accumulated biological knowledge—many of the diverse and dedicated attempts to introduce exotic organisms now appear foolish and bizarre. However, in the context of the political and scientific knowledge of the time, they were generally well-intentioned practical attempts to effect economic and environmental improvements. An increased diversity of agricultural production and the biological control of agricultural pests were common aims.

Botanical gardens, in which the suitability of newly introduced plants was tested, have received some historical attention. The usually short-lived and less obviously productive acclimatization societies, however, have provoked little serious historical interest. Their historical treatment within a single volume is certainly needed.

With an interest in the Acclimatisation Society of Victoria, I was keen to see what sort of synthesis of the acclimatization movement Lever had produced. I wanted to know how the aims, activities, memberships and

lifespans of acclimatization societies varied around the world. What were the intellectual links between societies? How common was it for zoological gardens to develop out of acclimatization activities, as they did in Melbourne? I hoped that Lever would provide a detailed global picture of acclimatization against which I could view the Victorian society with greater clarity.

Having read Lever's book, I am now suffering from an attack of zoological exhaustion from a surfeit of stories of animal introductions. If you are interested in a protracted litany of such tales, *They Dined on Eland* will fascinate and satisfy you. However, if you share my wider interests in the acclimatization movement, you will be less than fully satisfied with Lever's book.

Lever discusses the activities of acclimatization societies in France, Britain, Australia, New Zealand, Russia and the United States of America. His detailed documentation of animal introductions reveals his zoological authority and enthusiasm. However, the enthusiasm and zeal with which ardent acclimatizers introduced and exchanged organisms around the globe is less evident.

Lever provides enough zoological detail for readers to make their own comparisons of animal introductions at different places and at different times, but provides no such synthesis in the text. I was interested but not surprised to learn that the songbirds eagerly sought by members of the Acclimatisation Society of Victoria in the 1860s were simultaneously being sought by other societies. So were alpaca, deer, salmon and trout.

I knew that Edward Wilson had suggested the wombat as a suitable source of meat for British middle-class families. From Lever's book I learned that wombats were purchased from the Victorian society by the British society in 1863/4, and were given the run of a property in Clapham where concern was expressed 'that they will do much injury by burrowing, but experience has shown that when in a state of domestication and where a habitation is provided for them they do not burrow, but accommodate themselves to their altered circumstances!'

Aided by Lever's indexes, readers can follow the fate and fashion of various species—from the agouti to the zebu. Indexed plants and animals are listed alphabetically under their common names within categories—mammals, birds etc. One Australian mammal, the brush-tailed possum, has as negative an environmental image in New Zealand as the rabbit has in Australia.

Lever reports that it was introduced to Auckland and Canterbury by local acclimatization societies in the 1860s, and that subsequent possum releases by the Wellington Acclimatisation Society three decades later followed advice that: 'Damage done to fruit growers, etc. is very small and amply compensated by the commercial value of the skins. . . . In no respect can it become a pest like the rabbit.' An inaccurate prophecy indeed. Another Australian animal, whose transportation across the Tasman Sea is mentioned by Lever, is the green tree frog. It was introduced by the Canterbury Acclimatisation Society in 1867.

While Lever provides a wealth of zoological detail, the people, interests and ideas behind the avalanche of animal and plant transmigrations are less clearly evident. Nostalgia, rural economic development and sporting activities, which all prompted introductions of animals and plants, are mentioned, but without adequate analysis. It is sometimes hard to discern the degree to which each was influential. It is also hard to distinguish the individuals who were most influential in shaping the activities of the various societies. People are mentioned, usually in association with particular introductions, but with insufficient details adequately to explain their reasons for so doing. Frank Buckland appears frequently in the chapters on the British society, as does Edward Wilson in relation to his English and antipodean acclimatization activities, but not his persistent public advocacy of acclimatization in England before the establishment of the British and Victorian societies. Readers must use Lever's glimpses of the human participants to formulate their own impressions of their influence.

The degree to which scientists and scientific ideas influenced animal and plant acclimatization is not explored by Lever. Despite Michael Osborne's detailed work on the scientific ideas of members of the French society, Lever provides only fleeting mention of evolutionary ideas and their relation to acclimatization; for example, the anti-adaptation ideas of three British speakers on acclimatization, and the belief of members of the Russian society in the heritability of adaptations of acclimatized animals. The anti-evolutionary ideas of two influential members of the Acclimatisation Society of Victoria, Professor Frederick McCoy and Dr Ferdinand Mueller, are not discussed. How widely did acclimatizers share their belief in the immutability of species?

My copy of Lever's book is now dotted with

pencilled questions—when? why? reference? Endnotes are sometimes absent, inadequate, peculiar or minimalist. However, Lever deserves thanks for including a valuable bibliography and indexes for animals, plants, people and organizations (but not concepts), the several delectable omissions from which are annoying but not earth-shattering.

I am glad to have read Lever's book, and to be able to refer to it for information about animal introductions. Nevertheless, I look forward to the publication of a book that explores the ideas and attitudes underlying acclimatization activities, and that examines how these activities captured the imagination and money of people and governments in the nineteenth century.

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**Howard Morphy and Elizabeth Edwards (eds)**, *Australia in Oxford*. Oxford: Pitt Rivers Museum, 1988. viii + 96 pp., illus., £5.95pb.

**Stephen Martin**, *A New Land: European Perceptions of Australia, 1788-1850*. Sydney: Allen and Unwin & State Library of New South Wales, 1993. xxii + 145 pp., illus., \$24.95pb.

In cultural encounters, the participants possess each other by forming subjective representations of the other and storing these up as useful knowledge. The possession of Australia's Aborigines by Europeans began with William Dampier in the 1690s and became integral to the European identity; for to know the Aborigines (and other indigenous peoples in the European empires) as savages, was to know oneself as European and civilized. The collections of Oxford University discussed in *Australia in Oxford* were part of this process of possession and control.

Howard Morphy explains this process clearly and succinctly in his chapter on the role Australia played in the evolution of anthropology. Oxford's collection of Aboriginal cultural material was gathered in the late nineteenth century to 'demonstrate' the primitiveness of Aborigines and 'prove' current theories of social evolution and, by implication, the superiority of Europeans. Morphy shows how the eminent Pitt Rivers arranged artefacts to 'prove' the social evolution of races. To him the Aborigines were survivors of earlier social forms, for simplicity of artefacts was

equated with simplicity of intelligence and cultural evolution. Balwin Spencer's papers, housed at Oxford, were produced in this vein. But as Morphy argues, the richness of Spencer's ethnographic data, collected in co-operation with Frank Gillen, ironically exploded the very theories of Aboriginal primitivism he hoped to support. In another clear and impressive chapter, Elizabeth Edwards refers to the impact of photography on anthropology. Despite initial claims for objectivity, photography possessed the Aborigines as much as any text or artefact collection. Edwards argues photographs were taken by Europeans for European purposes. Aborigines were represented as benign savages to be protected in their decline and rendered safe through photography.

Other chapters on William Dampier's 300-year-old flora collection, on representations of Australia's natural history as 'peculiar', and on Charles Sturt are sound but not always set in the current literature.

John Legge's chapter 'Australians at Oxford' turns attention to collections of living humans at Oxford, arguing that Australians, even to the 1960s, saw a stay at Oxford as a pilgrimage to the source of academic life and excellence, a view now much diluted. As an insider, Legge conveys a good sense of 'being there' and raises enough questions for several PhDs. Working against the title of the book, Richard Symonds gives a good account of the presence of Oxonians in the developing Australian universities. It is an account of who was where and what they did, rather than an analysis of Oxford's impact, with the exception of his discussion of Rev. John Woolley's introduction of Oxford models and traditions at the University of Sydney.

Morphy and Edwards are less assured as editors. There is no preface to state the aims of the book, no list of contributors to identify their provenance, no bibliographical essay on the major collections at Oxford containing Australiana. We learn that Spencer's papers are at Oxford, not through a list or Morphy's excellent chapter, but from Zelman Cowan's foreword. Nor is there a firm enough editorial hand. Referencing varies from footnotes, to bracketed notes in the text, to none at all in some chapters, and the bibliographical formatting is haphazard. There are a few 'typos' and Bernard Smith's classic is given a wrong title (p. 45). However, this slim, large-format paperback is beautifully produced, with sumptuous colour reproductions of artefacts and artworks held at Oxford. For this and much of the text, the book is a pleasure and enlightening to read.

Stephen Martin in *A New Land* explores another act of possession—that of a continent by European settlers, surveyors, scientists and collectors. Martin has based his account on European perceptions of Australia to 1850 on the manuscript holdings of the State Library of New South Wales, where he worked for many years as a librarian. Much of the material he has unearthed is fascinating and important to notify to a wider audience. This he does through many generously long quotations. There are some intriguing passages from Robinson's diaries, the conciliator of Tasmanian Aborigines, especially his account of the Bass Strait sealers. There are also many interesting accounts of various regions of Australia by scientists, settlers and travellers. All of these are supported by engaging illustrations.

However, Martin's approach is flawed. His decision to use only the one archive, rich as it may be, means that the analysis is driven by this repository, and not by the needs of the subject. Also, Martin is unread—judging by his endnotes—in the history of science and ideas that underlies the perceptions he is tracking. Nor is there much context to the perceptions he presents. Chapter 5, 'Convicted and Transported', for instance, reveals this lack of understanding of current scholarship and the context of convictism. Martin argues that convicts saw the land as a prison rather than a place to live and work. He uses the well-worn stories of the escapees William Buckley and the cannibalistic Alexander Pearce to illustrate his monolithic view of convict attitudes. To these accounts he adds the views of a member of a work gang, but does not say that only one-sixth of convicts served in them. He also highlights the jaundiced view of the artist, Thomas Watling, and features the grimness of Norfolk Island, where only a small minority of convicts served. Recent work by John Hirst and Portia Robinson has overturned this grim caricature of convict New South Wales, but Martin's endnotes contain no reference to any scholarship on convictism—neither the earlier horror or recent benign schools of interpretation.

*A New Land* is a useful introduction to the question of preserving a continent, but the discerning reader will soon want more sustenance than is offered here.

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**D.B. Foreman and N.G. Walsh (eds),** *Flora of Victoria, Volume 1: Introduction.* Melbourne: Inkata Press, 1993. viii + 320 pp., illus., \$89.00.

Fifty years ago, there was time between disembarking from one troop train and boarding another, to visit a couple of Melbourne's bookshops. Freshly fired with enthusiasm for botany by the inimitable Thistle Y. Harris at Sydney Teachers' College, and already committed to book-collecting, I rejoiced at the discovery of my first work on the Victorian flora—it was Baron von Mueller's *Key to the System of Victorian Plants* (Melbourne, 1885-88). The neophyte could only marvel at the erudition and dedication reflected in these two volumes, with their 'Dichotomous Arrangement of Orders, Genera and Species' and 'Annotations of Primary Distinctions and Supporting Characteristics' and 'of their Regional Distributions', all duly accompanied by 'Xylographic Illustrations'. Despite the title-page's assurance (in Latin) from Isaiah that 'the wilderness shall rejoice and blossom', the new prize had a daunting aspect. The Baron's prefatory advice, that collecting plants would provide 'joyous engagements far beyond what by the youthful observer could be surmised playfully at the outset', seemed to be at odds with the solid array of key numbers, distribution tables and terse descriptions in rather abstruse terms, enumerating the 2,000 or so species of vascular plants then believed to be indigenous to Victoria. The map and woodcuts provided welcome relief. 'Youthful observers', and probably many experienced botanists as well, waited a generation for further relief and enlightenment in Professor Alfred J. Ewart's 1,250-page *Flora of Victoria* (1930). For the last generation, Dr James Willis' learned and lucid *Handbook to Plants in Victoria* (2 vols, MUP, 1962, 1972) has provided what the work under review rightly declares 'is still an essential reference'. Now, 'as is the destiny of all floras and handbooks', even this has become a lower rung in the ladder of botanical accomplishment, but it is warmly reassuring to see that Jim Willis is one of the contributors to the present work.

In the light of assiduous field and 'indoor' work, refinements in taxonomic procedures, wider community interest and growing concern for environmental protection, not to mention advanced printing techniques, we have the first volume of what promises to be a magnificent new *Flora of Victoria*. Volume 1, the *Introduction*, sets the background for examining the 4,000 and more species of Vic-

torian vascular plants in the subsequent volumes—more than twice the number known to von Mueller. What a comprehensive, yet intensive background this is, finely produced, in clear, double-columned format, and with profuse illustrations of high standard!

In our time of technological revolution, we have on the one hand profound specialization, and on the other, a desire to seek, or even to establish, meaningful links between apparently diverse and unrelated fields of enquiry. Geographers, ecologists, palaeontologists, climatologists, anthropologists, ecologists, environmentalists, historians and botanists alike will welcome this work with enthusiasm and respect.

In this *Introduction*, Victoria's plants have not been withdrawn from their environmental context to be examined as a separate entity, but rather, significant environmental and human factors have been assembled and analysed to account for those plants and their antecedents—the rocks, soils, landforms and climatic conditions that affected their development and distribution. We are also led to consider the effects of human occupation, of fire, and of invasions by exotic species now naturalized; the ways in which native plants met needs of Aboriginal people; and the present concern for the continued existence of rare and threatened species amid social, political, industrial and economic demands on space and resources. The editors, Don Foreman and Neville Walsh, have accordingly had to contend with offerings dealing with an enormous diversity of topics—*Allocasuarina* and alluvial deposits; black box and blackberries; conglomerates and cypress pines; droughts and dunefields; *Exocarpos* and explorers; fossils and frosts; Gondwana and grasslands . . .

Following an introductory article by Dr Jim Ross of the National Herbarium of Victoria, there are ten chapters, dealing with Victoria's fossil flora (David C. Christophel), the State's geology and geomorphology (J.G. Douglas), climate (Neville Walsh and the Bureau of Meteorology), botanical exploration (James H. Willis and Helen Cohn), natural regions and vegetation (Barry J. Conn), soils (Frank Gibbons and Jim Rowan), plants used by Koories (Beth Gott), the flora and fire (A. Malcolm Gill), rare or threatened species (N.H. Scarlett and R.F. Parsons), and the impact of introduced plants (G.W. Carr). Nor have 'rogue' native plants (e.g. Coast Wattle, *Acacia sophorae*, and Sweet Pittosporum, *P. undulatum*) escaped attention should they 'invade, sup-

press and ultimately displace' other indigenous species because of changed conditions. Many readers will be surprised, if not alarmed, that 'naturalized aliens now constitute about 30 per cent of the flora of Victoria'. All readers will be pleased to notice that vernacular nomenclature has been promoted where possible and appropriate.

The authors demonstrate a commendable mark of the true expert—they do not assume too much, they do not drop their readers into deep and unfamiliar waters. The nature of fossilization is explained before there is any consideration of the fossil flora, and one is considerably led to an appreciation of geological epochs and their almost inconceivable time-spans before the vast variety of land-forms is discussed. There are local, tangible references to give real meaning to geological processes, whether they produced a Cambrian outcrop at Mt Major or the Barrabool Hills sandstone used in building St Paul's Cathedral. The chapter on climate should enable us not only to appreciate the nature and effect of a principal factor determining plant growth but also to interpret the daily weather map with great confidence and accuracy!

Dr Barry Conn's major contribution on the Natural Regions and Vegetation, replete with explanatory maps and coloured photographs, surveys attempts to describe and to classify plant communities and vegetation alliances or 'types'. In the past, mono-disciplinary approaches have often been used as the basis for a 'system'—for example, geographical, climatic, botanical—but here 'a multi-disciplinary approach' has been adopted to recognize sixteen natural regions, using straightforward geographical terms which are self-explanatory. Within these are recognized subdivisions down to plant communities and their dominant species. Descriptions of these regions include their location, extent, land use, and whether they contain national parks, either proclaimed or proposed.

The crucial matter of soils and their physical, chemical and nutritional properties, receives due attention, while 'the human element' is effectively surveyed in chapters dealing with the use of plants by Koories, and by those chapters which begin 'Over 150 years of land settlement have transformed the Victorian countryside' and 'From the first days of European settlement in 1835 a tide of deliberately and accidentally introduced exotic plants began to sweep across Victoria . . .'

I found my own interests in botany and

history enlighteningly and entertainingly met in the chapter on botanical exploration, which pays due respect to 'official and 'unofficial' explorers and collectors, and to both professional and amateur botanists. Ferdinand von Mueller and one of his lesser acquaintances, my old friend the Rev. H.M.R. Rupp, are accorded appropriate tributes.

These specialized chapters have helpful and unifying cross-references, and each has abundant sources and bibliographies in the best academic tradition; the appendices are detailed and informative and the index is clear and comprehensive. The coloured map endpapers show the natural regions with commendable clarity, with cities, towns, rivers and roads also shown to good effect.

The motivators, contributors, editors and publishers of Inkata Press have given this *Flora of Victoria* project a worthy and impressive inauguration. Natural historians of many persuasions will eagerly await in the next three volumes what the Baron would have termed the 'Annotations of Primary Distinctions and Supporting Characteristics' of the 4,000 species of plants still surviving in the Victorian bush, which, despite fearful inroads and tremendous modification, remains beautiful, varied and intriguing.

With the advent of *Flora of Victoria*, clearly it is time to move the good Baron's prized works (recently re-backed, more on account of age than of vigorous use) to some honoured place higher but less accessible, perhaps a little closer to the older history books. Such action would not suggest that 'this remarkable man . . . Australia's greatest nineteenth century botanist' would not hail this twentieth-century project as the grand achievement it is, and promises to be.

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**P.J. Mylrea**, *In the Service of Agriculture: A Centennial History of the New South Wales Department of Agriculture, 1890-1990*. Sydney: NSW Agriculture & Fisheries, 1990. x + 282 pp., illus., \$35.00.

Peter Mylrea graduated in Veterinary Science in 1951 and spent 37 years in the New South Wales Department of Agriculture, retiring from the position of Chief, Division of Animal Health, in 1988. As an impressionable young man, he joined a stable department at the zenith of its popularity and influence, guided by its longest

serving Minister, the Hon. E.H. Graham, and longest serving Under-Secretary and Director, Dr R.J. Noble. He became a devoted servant of the Department, gained an intimate knowledge of its work and administration, and was well briefed to write this valuable history of its first 100 years.

It is fashionable in some circles to blame many of our environmental problems on the adoption by Australia's pioneer farmers of farming methods and animals inappropriate to our soils and conditions, as if they should have known better and as though they could have chosen differently. It is acknowledged by Dr Mylrea that from 1788 until 1890 there was virtually no formal government assistance to farmers, although as early as 1820 loss of soil fertility was attributed to monoculture, continuous cropping, burning of stubble and the non-return of manures to the soil. For the most part, however, until 1890, farmers made do through trial and error, native ingenuity and self-help. By the 1830s, some groups of enlightened farmers had set up their own demonstration gardens to find out what would grow best and what methods to use. By the 1860s, men of education and enterprise began to take a lead. They set up model farms according to the best available farming practices, where many young aspiring farmers gained beneficial training. For example, James Manning, who from 1830 to 1833 studied agriculture at Hohenheim Agricultural College in Germany, established the *Kameruka* estate for the Twofold Bay Association in 1853 and later, on his own account and with assistance from his brother Sir William Manning, Chancellor of the University of Sydney from 1878 to 1895, established the *Warragaburra* estate close to Bega. In 1859, Thomas Sutcliffe Mort, a businessman and financier, took over the Bodalla section of John Hawdon's Moruya holding and established model farms that supplied a disproportionate share of quality hams, bacon, cheeses and other produce to the Sydney market. Many successful farmers on the Far South Coast emerged in the 1880s after learning their trade on these estates, which coincidentally survived until 1990.

Dr Mylrea takes up the story in the 1870s and 1880s, when governments gradually became aware that farmers were struggling in the dark and in need of assistance. After near starts in 1874 and again in 1886, the Department of Agriculture had its genesis from within the Department of Mines. It can readily be seen why the first Director of Agriculture, Dr H.L.C. Anderson, pushed educa-

tion as an important part of his brief. In 1891, Hawkesbury Agricultural College was opened, and in 1897 Anderson moved that a Chair of Agriculture be created by the University of Sydney. Nothing happened. In 1904, another Director of Agriculture, W.J. Campbell, wrote to the University suggesting that a chair be established. This time the suggestion was agreed to, and in 1909, during Anderson's second period as Director, Professor R.D. Watt was appointed. Although the details of these events are outside the scope of Dr Mylrea's book, they demonstrate the strong lead these early Directors gave to agricultural education. This was strongly continued by the third Director, G. Valder, who had been Principal of Hawkesbury College (1897-1902). He set up the Field Branch, which established trial/demonstration plots on farms. Initially, Agricultural Instructors were appointed to supervise the plots and use them for instructing farmers, but their role gradually changed to advising farmers and emerged as the extension service. The agricultural colleges were closely bound to the Department until the years leading to the Second World War. The post-war years saw a strengthening of research and an expansion of extension.

The first section of the book deals with the eleven directorships which cover the period, and four other major sections deal with: service to plant industries; service to animal industries and fisheries; scientific, economic and biometrical services; experimental farms, agricultural colleges and institutes. There are also several appendices.

In the Epilogue, Dr Mylrea points to the strong theme of science that underpinned the Department's progress and service. It is a tribute to the first directors who saw science as fundamental to improving farmers and farming, to the men of the University Senate who insisted on science-based curricula for the BScAgr and BVetSc degrees introduced in 1909, and to Professors R.D. Watt and J.D. Stewart whose strongly science-based courses produced many outstanding graduates who have served and guided the Department since. For example, R.J. Noble joined the Department in 1913 and retired in 1959 after holding the position of Director for the record term of nineteen years.

This book contains a treasury of information on the development and functioning of the New South Wales Department of Agriculture as well as problems faced and social changes along the way. There is much to remind us of how far we have come during

these years. For example, it is surprising—with our vast communication networks of television, radio, newspapers and computers—to read of the great difficulties the Department faced in getting information to farmers for almost fifty years. There is much to trigger nostalgia in the excellent array of photographs of places and methods many of us have used and forgotten. It is interesting to be reminded of how much less formal and perhaps less disciplined we have become, as we look at the formal attire of students, farmers and departmental officers in days gone by, even in our own lifetimes. The prize for formality would have to go to Dr Nathan Cobb, the first plant pathologist in New South Wales, who is seen on p. 198 in waistcoat, stiff collar and cravat, sitting on a three-legged stool in a wheat field, examining rusted plants, with a microscope mounted on a tripod before him.

Those interested in history or agriculture, and especially agricultural history, will find much of value in this book.

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**Margaret McPhee**, *The Dictionary of Australian Inventions and Discoveries*. Sydney: Allen & Unwin, 1993. x + 165 pp., illus., \$19.95 pb.

Should this book be reviewed in *Historical Records*?, I wondered. Surely it should. Australians have been splendid innovators and wonderful improvisors, and our tradespeople, engineers and scientists have invented and discovered more than could have been expected of a small population. How many of these inventions and their originators have received adequate historical attention; how many fascinating stories remain to be told? Furthermore, in the current climate, when inventions and discoveries that might produce millions of dollars are all the rage, a glance at earlier successes should surely be worthwhile; and it is salutary to be reminded of those that couldn't find support in Australia and later won fame and fortune overseas. Could some of these achievements be replicated? Have we learnt anything from past misjudgements?

Unfortunately, few of my hopes were satisfied by the present volume—in parts interesting and informative, but far too often unbalanced, erroneous and disappointing.

In a foreword, Clive Coogan asks 'what was Australian?' and 'what was an inven-

tion?'; but no explicit answers are given, and the content of the volume provides no clear indications. Thus, for example, among 'Australian' Nobel Prize winners there are entries for W.H. Bragg, Howard Florey, Macfarlane Burnet and John Eccles, but not for Lawrence Bragg or John Cornforth. On the other hand, the author has taken a liberal definition of 'inventions and discoveries', thus allowing a wide range of entries to be included.

The introduction promises much, including 'more than 400 entries . . . from the well-known—the stump-jump plough, the black-box flight recorder and the Sarich orbital engine—to those which are equally important but have not had the same public recognition—the flame ionisation detector . . . , the atomic absorption spectrophotometer . . . , and the Hume concrete pipe'. 'Wherever possible credit has been given to the inventor or discoverer; indeed some have their own entries.' 'An area in which Australians have been particularly prolific is that of agricultural inventions and research [80 entries].' 'On the domestic front were serendipitous discoveries such as that made by Granny Smith, who knew a good cooking apple when she saw one; and the effect of formaldehyde on snails, which led to . . . a highly successful snail and slug killer [Defender].' 'In other areas, the importance of the work carried out by the [CSIRO] is reflected in the large number of inventions listed [70].' Medical research has 36 entries, transport 33, military & defence research 16 (although the given list excludes 'optical glass', the entry for which is entirely defence related), and astronomy 16 (although this subject area is not listed, even though 'radioastronomy' is). The Introduction concludes with a note that 'in general, each entry outlines the invention or discovery . . . how it operates . . . and the need that brought it into existence'.

Regrettably, such promise is only infrequently fulfilled. The author is apparently most at home with agricultural and related subjects, so that 'in-vitro fertilisation', 'header harvester', 'shears-mechanised', 'Sirospun', 'stripper' and 'stripper harvester' all receive extensive treatments, approaching a page of text each. So, too, do a few other entries, such as the 'concrete building panel' and the 'SCATS traffic control system'. By contrast, some complex scientific and medical topics receive scant coverage; for example, the 'Chris Cross radiotelescope' is limited to six inadequate lines of text, 'computer research' five, 'diabetes—vaccine

research' five, 'electron diffraction' six lines, 'Epidermal growth Factor' five, 'gravity gradiometer' four, 'Sutherland's constant' a totally inadequate three lines, and 'X-ray crystallography' an equally ludicrous five.

More could be said concerning errors, such as the assertion that when a young Lawrence Bragg broke his arm in Adelaide, 'Bragg senior is believed to have taken the first diagnostic X-ray in the world when he used a Roentgen X-ray tube . . . to delineate the fracture'. Such nonsense has no place in any publication, especially when there is an ample literature available on the subject. Which raises the question of where the author obtained the information for the various entries, for the bibliography that concludes the book contains only twenty items of mixed reliability.

There are a number of informative and interesting entries in the book, giving brief but useful accounts of important but little-known Australian inventions and discoveries, but I have nevertheless felt it necessary to be harsh. Clearly, in retrospect, this is not a scholarly historical work, and no doubt it was never intended to be. A representation of the original *Victa* lawn mower on the cover is probably designed to indicate a publication for the newsagents' shelves rather than those of an academic bookshop. But when such a publication is so inadequate, its potential for misinformation, confusion and mischief cannot be ignored. Even more sadly, an excellent idea and a splendid opportunity have been squandered. It is to be hoped that the author, the publisher and the publisher's editor will assiduously check and substantially revise the text before any second edition is offered to an unsuspecting public.

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