

# Book Review Section

Compiled by John Jenkin\*

**Robert Stafford**, *Scientist of Empire: Sir Roderick Murchison, Scientific Exploration and Victorian Imperialism*. Cambridge: Cambridge University Press, 1989. xii + 293 pp., illus., \$49.95.

Roderick Impey Murchison, 'King of Siluria', is the subject of a series of recent books which analyse the social and cognitive aspects of scientific controversies and their closures. Martin Rudwick, in *The Great Devonian Controversy* (1985), gives a fine-grained account of Murchison's battle for recognition of his 'Devonian system'. James Secord's *Controversy in Victorian Geology* examines Murchison's conflict with Adam Sedgwick and its resolution in the acceptance of the Ordovician system. Most recently, David Oldroyd's *The Highlands Controversy* (1990) documents Murchison's part in debates over the stratigraphic succession in Scotland. These three studies, taken together, constitute an important and persuasive argument for the social construction of geological knowledge, but a construction constrained by the physical evidence.

Stafford's work, as his subtitle makes clear, is an expedition neither into the history of nineteenth-century geology nor into the analysis of scientific controversy, but rather into imperial history. Murchison's career and his own pronouncements serve as clear signposts for this expedition. Murchison succeeded in his conscious striving to become a large spider at the centre of a vast web stretching out from London to all corners of the globe. Through such institutions as the Geological Survey, of which he was Director-General, and the Royal Geographical Society, of which he was President, and through his many personal contacts in science and government, he sought to harness geological and geographical knowledge of far-flung regions to increase the wealth and power of Britain and to harness British imperialism to increase the scope and authority of British science.

Stafford chooses to organise his survey of Murchison's activities by geographical region

rather than chronologically or thematically. After a biographical chapter there follow in no particular order chapters on Murchison's involvement in the antipodes, the Americas, the Middle East, India and Central Asia, the Far East and Africa. Even within each chapter, regional subdivisions are generally treated as separate topics. A concluding chapter summarises Murchison's accomplishments and examines them in the broader context of political and cultural imperialism and its ideology. This arrangement has some advantages if one is interested in Murchison's attempts in a particular area to spread British imperial red on the political map or Silurian and golden hues on a geological one. Incidentally, it would have been helpful to have had appropriate contemporary maps to accompany the text, at least for readers lacking an encyclopaedic knowledge of nineteenth-century political and physical geography. It is certainly possible, once one has read the introduction, to dip into the relevant chapter or section without reading the intervening material or that which follows.

There are, however, also disadvantages to this arrangement. Readers must themselves try to build up a picture of the complexity and interlocking character of Murchison's multifarious interests. Moreover, since each subdivision is organised chronologically, the reader traverses again and again the same years — and sometimes the same characters — in the same chapter and among different chapters. I found this rather irritating and confusing in terms of grasping how Murchison's imperial attitudes, interests and programmes developed over time, whether or not these formed a coherent policy, and how these might have related to his more narrowly-scientific concerns. For example, concerning Murchison's experience with John Crawford's collection from Burma, Stafford comments (p. 111) that this first showed Murchison the scientific benefits of imperial expeditions, yet this is brought to the reader's notice half-way through the book in the chapter on India and Central Asia; that is, well after Stafford's biographical sketch of Murchison. As another example, there are various scattered remarks relating to the tension between Murchison's Russophilism and his staunch patriotism: a more systematic discussion would have been appreciated. To some extent, however, judicious use of the helpful index can enable readers to piece together a more chronological, developmental story.

Stafford's major themes are that there was an intimate and mutually-beneficial relationship between British science and British

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imperialism, that Murchison had an important hand in establishing and furthering this relationship, and that Murchison had a personal stake in these developments. Both his authority in matters geological and the resources to advance his preferred theories and interpretations were greatly strengthened by, and contributed to, his ascendancy within the official scientific and the unofficial imperial bureaucracies. Of the validity of these themes there can be no doubt. Stafford provides plentiful quotations from Murchison's writings which testify to his linking of the parallel extensions of British influence overseas and geological knowledge of distant regions. Murchison's frequent use of military metaphors makes clear that for him the advance of the British flag would be preceded or followed by the geological conquest of the region by his beloved Silurian system. If a reader still had any scepticism on this score, it would quickly be buried by the avalanche of names, episodes and references which Stafford commands. Stafford marshals not just a few examples to make his case, but dozens, each of which is meticulously documented.

Even so, the effect is that of a reconnaissance rather than an excavation, for almost every paragraph could form the basis of a research paper. This is not a criticism of Stafford. His scholarly presentation well exploits archival and published sources, and he packs an amazing amount of information into each section. Rather, it is a comment upon the richness of Murchison's career as scientist, imperialist and official or unofficial adviser to countless governments, companies, promoters, explorers, scientists and others. I would, however, have welcomed further speculation by Stafford as to the extent to which interpretations of foreign geology were shaped by Murchison's theoretical convictions, and how, if at all, such interpretations may have affected later geological work in those regions.

Historians of Victorian Britain and imperial historians will doubtless form the most receptive audience for Stafford's treatment. The narrative is 'dense', in that it assumes considerable familiarity on the part of the reader with diplomatic and political events and personages around the world. On every page there is such a procession of people, places, dates and references to major and minor events that the reader runs the risk of losing sight of Stafford's grand themes. This would be unfortunate because these themes serve as amplifications of and correctives to various assumptions of conventional imperial history. In particular, Stafford emphasises

not only the extent to which science was a willing and often useful partner in imperial endeavours but also some of the ways in which Britain exercised cultural authority as well as actual authority in its distant colonies. Historians of geology will find little new: the only topics which receive much attention are Murchison's meridional theory of gold deposits and his theory of the structure of the African continent. These topics have, however, been treated in more detail elsewhere and only brief discussions are given here. Historians of science more generally will find plentiful illustrations of how metropolitan scientists sought to control the flow of information from provincial workers, to allocate reward and recognition in accord with their own interests, and to preserve for themselves hegemony over theorising.

To use Stafford's own words (p. 223), his study of Murchison provides abundant evidence that 'natural science helped imperialism reshape non-European environments in the image of Europe, and by so doing became an important component in its grid of cultural, political, economic, and military domination.'

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**Frank Fenner (Ed.)**, *History of Microbiology in Australia*. Melbourne: Australian Society for Microbiology, 1990. xiv + 610 pp., illus., \$75.00.

In 1987, the Australian Society for Microbiology decided to commission a history of its discipline. This was a huge task, and must have appeared daunting to most. However, the Society had the foresight to invite Professor Frank Fenner to do the job, and he completed it in three years.

The President of the Society, Professor David White, states in his Foreword that this is believed to be 'the first comprehensive history of any branch of the natural sciences in Australia', and perhaps the first history of microbiology undertaken by any nation. The subject is huge, covering a wide array of organisms including bacteria, fungi, protozoa and viruses. Mere statistics give only a partial indication of the effort involved. The resulting book is over 600 pages long, some 320 microbiologists participated, and more than 200 co-ordinators were each responsible for producing a section of the eleven chapters. There are over 250 illustrations, most of which are of individuals who have contributed significantly to the subject. A total of

over 1700 people are listed in the index of names, and there is a list of obituaries and biographical memoirs of more than 130 deceased scientists.

This is not an historians' history, but no future historian of the subject can ever fail to study it. It is an absorbing and authentic account of the people, the institutions, the places, the dates, and the important developments covering the period 1788–1988, with no effort spared to ensure the accuracy of the information reported. As is to be expected, the editor had to shorten most of the contributions received from the co-ordinators, but all the extensive material he received, including the photographs, has been deposited in the Basser Library of the Australian Academy of Science, where it is available to future research workers and historians.

Understandably, limits to the subject had to be established, and there are inevitably some gaps. The book stops short of tackling details of immunological theory; and there is no mention of marine diatoms or other plankton — indeed, almost none of free-living protozoa, a subject relatively neglected in this country but now becoming of increasing concern.

The emphasis of the book is on medical and veterinary science and on plant pathology. Each is a large subject but, in spite of this breadth, the writing is easily appreciated by scientists and laypersons alike. The book is divided into chapters dealing with the 'early days', teaching institutions, research institutes, diagnostic and production institutions; then a series of chapters covering Australian contributions to bacteriology, virology, mycology and protozoology, industrial microbiology; and finally chapters discussing national and international activities. The chapters dealing with institutions are largely a recitation of places, dates, incumbents and succession, with an occasional paragraph dealing with significant developments. The amount of detail is voluminous: all institutes of research with an interest in microbiology are described, as are all research staff, with brief comments on their interests and their significant activities. All teaching institutions, and the courses they provided in 1988, are listed. All hospitals with diagnostic facilities in microbiology are similarly treated. The editor admits that some may feel that their work has not received the recognition it deserves, but he says that they will doubtless be better served when the history of the next 100 years is written!

A feature which has greatly improved the

flow of the narrative is the inclusion of a short biography under each photograph of an individual. This arrangement ensures that a large amount of detail is presented unobtrusively. Special attention has been paid to the roles played by individuals in the Society for Microbiology. Given the origins of the document, it is understandable that the Society is given much attention. Every office-holder and every member of the Council has been listed, for example, as well as the topics of the annual general meetings.

There are fascinating, if short, descriptions of an astonishing array of issues and developments. For example, there is an account of the Pasteur Institute's facilities on Rodd Island in Sydney Harbour, of Rupert Best's first purification of Tobacco Mosaic Virus, of Bazeley's production of penicillin during the Second World War, of Burnet's development of methods of viral assays, of the 75-odd arboviruses found in Australia, of the outstanding Australian work on influenza and Q fever, of the pioneering work by Waterhouse and later by Watson on wheat rusts, and of many, many others. Not surprisingly, having been compiled by many authors, these vary in their degree of detail, but skilful editing has ensured that interest is maintained. The extensive and crucial role of microbiologists in two world wars is vividly described.

A number of interesting matters emerge from the eleven chapters. The most obvious is the dominant role of the late Sir Macfarlane Burnet in the development of virology and immunology in this country. There have been many notable contributors to the science, but none has played a role comparable to his. An intriguing commentary on the changes that have occurred in public concern about infectious disease is the account of Burnet's accidental infection with Newcastle disease virus in about 1942. Whereas Burnet 'walked without concern in the streets of Melbourne's suburbs', when in 1987 a similar infection occurred in a technician, her movements from the laboratory to her home caused an uproar in the media, 'even though she was confined to her home and regularly tested until she recovered.'

It may come as a surprise to learn how many disease organisms have been eradicated from Australia. Most people are now aware that smallpox has been eliminated, but few would know that the spirochaete of camels causing surra is no longer present, or that bovine brucellosis, bovine contagious pleuropneumonia, pullorum disease of poultry, and others have all been eliminated by the efforts of the veterinary and other scien-

tists. It is interesting to read that 'studies by Australian plant virologists have been noteworthy for the great number of unexpected and pioneering discoveries of new types of viruses', and a list of nine cases is provided to exemplify this assertion.

We in Australia have been fortunate to remain free of many exotic diseases, and we have to thank the quarantine services for the vigilance which has made this possible. They are amongst the many noteworthy agencies to whom we should be grateful, and they are amongst the many that receive due recognition in this remarkable book.

Now that the Australian Society for Microbiology has shown what can be done to produce a history of a segment of scientific endeavour, it would be of great interest for other comparable organisations to emulate their effort. The Australian Academy of Technological Sciences and Engineering has already produced a monumental volume dealing with Australian contributions to technological science in *Technology in Australia 1788-1988* (reviewed in these *Records* by Professor George Seddon, 7 (4) (1989), 421-3). The lasting impression from these two volumes is that our scientists and technologists have contributed immensely to the development of this country. We are greatly in debt to those who have documented their contributions so faithfully.

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**R.W. Home (with Paula J. Needham),** *Physics in Australia to 1945: Bibliography and Biographical Register*. Melbourne: Department of History & Philosophy of Science, University of Melbourne and National Centre for Research & Development in Australian Studies, Monash University, 1990. xix + 222 pp., illus., \$55.00.

Scientists who have tried their hand at a piece of history of science will know that it is not as easy as is often supposed. On the other hand, the methods and lessons learnt as a scientist are surprisingly applicable: the collection of data, the forming of hypotheses, the testing of the hypotheses against the data, and the need for detachment, honesty and rigour.

Where and how, then, are we to find the data? Archives are being established or are growing, but they remain generally understaffed and under-resourced. The Australian Science Archives Project, based at the University of Melbourne, has been established to locate, sort, catalogue and find a suitable

home for the papers of distinguished Australian scientists and scientific institutions. The history of science literature is growing fast — in volume and in sophistication. Scientists and their work are being seen in an ever-widening landscape. But where to start; is the raw data readily accessible?

In his Introduction to the present work, Professor Home reminds us that:

Publication is an integral part of scientific research, while research is central to the very notion of being a scientist. A person's publications are therefore the principal source of information available to the historian concerning that person's work as a scientist. Both individually and collectively, the publication record of a scientific community reveals the level of intellectual activity within it. The actual content of the publications in question is of course of greatest interest for what it reveals about the topics of concern to a particular scientist or scientific community at any particular time, the style and calibre of the work being done, and its significance in a larger scientific context. Attending to the works referred to in these publications can tell us a great deal about the access the scientist or scientists under examination had to the ideas of contemporary scientists elsewhere, while the titles and places of publication of the journals in which articles appear can indicate the extent to which their authors are working in an international as against a local context.

Obtaining an accurate list of a scientist's publications can be easy or incredibly difficult. If they have prepared their own list, then it will need to be checked very carefully; if not, then hours and hours of work face the diligent historian. If you are seeking Australian physics or physics-related publications, however, you are lucky, for Home has done the work for you!

Here is a meticulously researched list of publications (from more than 220 journals and other sources), together with brief biographical notes on their authors (414 of them). Users, however, will need to read the Introduction carefully and be aware of the limitations of the work — in content and in time.

The definition of 'physics' is generous: inclusion rather than exclusion has been adopted for borderline cases. Thus one finds publications concerning mathematics applied to physics, physical chemistry (but not chemistry), astrophysics and geophysics (but not positional astronomy or geology), applied physics, and early papers on electronics, elec-

trical engineering and geophysical prospecting.

'Publications' are defined more strictly: in general they had to be openly available to be included, so that preprints, in-house reports, ephemeral and journalistic writings, conference abstracts (except where they appeared in *Proc. Roy. Soc.* and the *Reports of the AAAS*, for example), are excluded.

The phrase 'in Australia' was harder to define. Thus, how were the compiler and his assistants to deal with authors who started their scientific careers in Australia and then left permanently, or who later returned, temporarily or permanently, or who started elsewhere and then came to Australia for a short or a long period? You will have to read the Introduction to find the answers, which are generally sensible and consistent: but the ground-rules need to be carefully understood.

It is also obvious, but equally easy to forget, that this register of Australian publications in physics includes items up to the end of 1945 but not thereafter. The future task of extending it beyond 1945 will be daunting indeed.

The author has warned readers that his rules may lead to the omission of some publications of interest, of some physicists (a notable example is Harrie Massey, who produced only two unpublished conference abstracts before his permanent departure overseas), of important papers on war work appearing after 1945, or of biographical data which could not be confirmed. The number of such omissions, however, is quite small as far as I have been able to discover.

Will this collection be useful? I certainly believe so. For the work of individual scientists/physicists it is clearly invaluable; having been asked recently to prepare an *Australian Dictionary of Biography* (ADB) entry for Henry Herman Leopold Adolf Brose, I have already found it a godsend. Here are reminders of Thomas Laby, William Sutherland, Philip Bowden and a host of others. I mention these three because they are at the top of this 'hit parade' — with 81, 76 and 64 publications respectively — and yet all await a detailed, modern biographical study (although excellent ADB entries exist or are forthcoming). Equally important are the smaller players who comprise the bulk of this collection; here even the author has been unable to pin down E. Josephs, D.N. Linnett, R.J.W. Kennell or L.S. Thomas.

The index of 322 entries contains signposts to Australian publications on a wide variety of topics. Readers seeking the publications of particular institutions will not find them there (with three exceptions), but this

is not a serious problem. Reference to the biographical notes and to the index under entries such as astronomy, radio, cancer etc. will uncover the work of the observatories at Parramatta, Hobart (Rossbank) and Mt Stromlo, the several divisions of CSIR, the Radio Research Board and AWA, or the Cancer Research Committee of the University of Sydney.

Much information on the profession of physics in Australia, and on its social history, may also be gleaned from these pages.

Having started on a project such as this purely for the purposes of his own research — as the author did — no historian pushes on to such a meticulous and complete final product without a high level of generosity and commitment to the history of science in Australia. Rod Home and his assistant deserve our gratitude. It is to be hoped that both historians of science and practising scientists will repay them by using the book for the many projects it silently suggests.

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**Lyndsay Gardiner, *E.V. Keogh: Soldier, Scientist and Administrator*.** Melbourne: Hyland House, 1990. xvi + 176 pp., illus., \$25.00.

This is a beautifully-written, heart-warming book about an influential but not so well known figure in Australian medical and public health history. It is, first of all, a very human story — of a shy, homosexual man who, though initially of radical and anti-militarist sympathies, became, among other things, the director of preventive services for the Australian Army in World War II, a strong guiding influence on the direction of Australian medicine after the war and, in the 1950s, the re-vitaliser of the Victorian Anti-Cancer Council, the latter since becoming one of the most successful bodies of its kind in the world.

Keogh was born in 1896. His father, then prospering in Melbourne real estate, was given to drunkenness; five years later he fell on hard times and deserted the family. His mother, a woman of great spirit and conviction, struggled over the subsequent years to educate her four children. Keogh remained devoted to her; and to his sister Lesbia, throughout their lives. His schooling included periods at Catholic boarding institutions in Mornington and at Bathurst, before he won a scholarship to Melbourne Grammar — bringing him to the midst of upper-middle-class Edwardian society. At Grammar he

failed to prosper in the academic, sporting and social 'ratings' of the day; but in his last two years of school and his first at university (enrolled in agricultural science) he was undergoing great inner maturation under the influence of Lesbia. She was four years older, a law student and a member of radical literary and political circles including such figures as O'Dowd, Esson, the Palmers and a de-frocked Presbyterian minister called Sinclair, who combined charisma with socialist and pacifist convictions. By 1914 Lesbia was 'not only a promising poet but also, defiantly, a nonconforming radical'.

At the outbreak of World War I, Keogh's hatred of war tussled with his sense of group loyalty: he enrolled as a non-combatant with the Light Horse Field Ambulance. Serving on Gallipoli between May and December 1915, he 'changed his mind about war'. On return to Australia in 1916, he applied for transfer to a combatant unit and served in France, where he was twice decorated. As for many of his generation, the return to civilian life was not easy. In 1922 he enrolled in medicine at Melbourne University, a decision that he later claimed was made in the thrall of Freud's *Interpretation of Dreams*. The first three years were not easy, and he only got through in anatomy (as he later told a class of Monash graduating students in 1967) by the intervention of an examiner who had known him in the Middle East. He did a brief residency at the Alfred Hospital before commencing a career as a research pathologist with the Commonwealth Serum Laboratories. Through the 1930s he was a keen supporter of the Contemporary Art Society, an enthusiastic and systematic gambler on the horses, and an avid reader of literature. At the CSL and at the Hall Institute he did good research on immunity and infection.

The outbreak of World War II found Keogh in the USA. He enrolled, and by mid-1943 he was Director of Hygiene and Pathology to the Australian Army. His organizing genius was apparent in the hospitals of the Middle East and later in Papua New Guinea. He helped to organize the Australian manufacture of penicillin. In 1945 he became Medical Adviser to the Australian Military Mission to the US, and he used the opportunity to begin arranging for Australian doctors to be trained after the war under the auspices of several foundations: Rockefeller and Carnegie in the USA as well as Wellcome in the UK.

In 1950 Keogh saw clearly what was needed to implement the new technologies for tuberculosis control, and he became Director of Tuberculosis for Victoria. Five years later, with the incidence of new infec-

tions going as he predicted and his essential task accomplished, he resigned. During this period he was also involved with Macfarlane Burnet and Frank Fenner in the successful implementation of the anti-polio campaign based on locally-produced Salk vaccine.

The final appointment of his public life was Medical Adviser and Secretary to the Anti-Cancer Council, from July 1955 to May 1968. He saw its essential need for funds. He selected a businessman to head the Appeals Committee and arranged for him to be sent to the USA to study fund-raising techniques. The resulting 'door-knock' and subsequent funding-raising provided the material support for a remarkable expansion of the Council's activities. Bill Keogh died in 1970. He had never possessed real estate and had \$8,000 in his savings account.

Although the book has had to be written with the aid of almost no personal papers, enough is said to leave one in awe of the personal qualities of this man. His intellectual independence and integrity endured. The youth who was convinced of the evils of war marched, over fifty years later, to oppose Western intervention in Vietnam. In the meantime, despite holding high military rank, he remained suspicious of authoritarian structures. He was generous and compassionate — perhaps too much so to bear the strains of clinical practice — and what made him so significant as a public figure was his uncanny capacity to recognize what needed to be done, by what means, and to choose the persons most likely to accomplish it.

For students of public health, perhaps the most wonderful thing about this impressive little book is the effortless way it moves between the private world of a very private man, the institutions of civil society which formed him and which he in turn influenced, and the formal institutions of the state. It is in the complex dynamics of these three realms that the true determinants of the 'health of nations' lie, and case studies such as this help illuminate processes which are undeniably important but which largely escape the net of quantitative research.

Consider, for example, tobacco smoking. In November 1987 the Victorian Parliament passed a strong Tobacco Act, banning outdoor advertizing and imposing a special ten percent 'surtax', the proceeds of which are dedicated to public health purposes — including 'buy-outs' of tobacco company sponsorship of sport and culture. The Anti-Cancer Council was the sponsor of this legislation, and without the support of their organized public constituency it is hard to imagine such effective state action against a well-organized and

powerful industry. (I am writing this review in Berlin; West Germany had, for example, no such constituency and no such action). As this book makes clear, the Anti-Cancer Council is what it is only because persons like Keogh have found in such work an expression of their innermost humanity. And so the three realms — private, civil and state — become effectively connected to transform the norms and structures of social life in a direction protective of health. Abundant other evidence suggests that it is complex transformations of this kind — and not the effectiveness of disease control technologies 'as such', or state public health action 'as such', or material betterment 'as such' — that underlie the major transformations of the health of human populations.

There is, for me, a final virtue in this book. It provides a precious link for 'post-1968' radicals with the oft-observed radicals of earlier generations. To one who has been dismayed by the pervasive racism and authoritarianism of Australian public health in the inter-war period, it is wonderful to discover a contemporary figure in whom compassion and integrity were combined with such a powerfully developed human sensibility.

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## Erratum

K. Marsden and Ian D. Rae, 'Nuclear Magnetic Resonance in Australia 1952–1986', *Historical Records of Australian Science*, 8(3) (1990), 119–150.

The final section of Table 2 (pp. 134–5) was inadvertently omitted from this article. The complete Table is reproduced here.