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Reviews

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Harvey J. Marchant, Desmond J. Lugg and Patrick G. Quilty (eds): *Australian Antarctic Science*: *The First 50 Years of ANARE*. Australian Antarctic Division: Kingston, 2003. 622 pp. + illustrations + maps, ISBN: 1876934050 (PB), $95.00.

This is an impressive book and a fine achievement. To mark its fiftieth anniversary in 1997, the Australian National Antarctic Research Expeditions (ANARE) initiated two substantial review publications. One was a jubilee social and political history called *The Silence Calling*: *Australians in Antarctica 1947–97*, written by Tim Bowden and published in 1997 [reviewed by Roy MacLeod in *Historical Records of Australian Science* 12(4), 533–535]. The other was a comprehensive assessment of the Australian contribution to Antarctic research — an appraisal of 'the R in ANARE'. A symposium on Australian Antarctic science was held in Hobart as part of the jubilee celebrations. The final result of that gathering is this book, an exciting and detailed evaluation of a multidisciplinary and logistically demanding endeavour. In the last 50 years, a geographically marginal continent has become intellectually and environmentally central. Antarctic science has made itself fundamental to global concerns about climate change, ocean processes, marine biodiversity and human environmental behaviour, and Australia has played a crucial role in this research. Furthermore, in 1991 there was a decisive policy shift from economic to environmental perspectives with the negotiation of the Madrid Protocol on Environmental Protection and the agreement to a 50-year moratorium on mining in Antarctica. This volume, then, is not only timely in the sense that it commemorates an Australian institutional milestone; it also evaluates one nation's science in Antarctica at a time when the continent has won unprecedented attention in global environmental policy and has become valued as a privileged planetary archive.

This edited collection still reflects some of the spontaneity of the original symposium by including the opening address of the then Governor of Tasmania, Sir Guy Green, and words of welcome by Senator Ian MacDonald, but it also delivers scholarly and substantial summaries of the major fields of science in Antarctica: cosmic ray physics and astronomy, medicine, meteorology, geology and geophysics, terrestrial biology, aquatic microbiology, zoology, glaciology, atmospheric physics, oceanography, mapping and geodesy, and human impacts research. Reflective essays bracket the volume: John Heap on the scope of Antarctic science generally, and Australia's contribution in particular, Phillip Law (Director of ANARE 1949–1966) on developing ANARE research programmes, Patrick Quilty (former Chief Scientist of the Australian Antarctic Division) on the ANARE perspective of Antarctic science, as well as influences on the future directions of research, and Ken McCracken, Neal Young and Ian Bird on changing technologies. The result is a very impressive overview of

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Australian Antarctic Science — and a usefully weighty tome to thump on the table at Antarctic Treaty meetings where science is both the membership ticket and the currency of influence.

The post-war focus of the book — which was demanded by the celebration of ANARE's 50 years — is incidentally a welcome and refreshing approach, for it enables the analysis to skim over the intensively studied 'heroic era' of Antarctic history (Scott, Shackleton, Mawson, etc.) and to emphasize instead the modern era of 'big science' down south. As John Heap observes, the challenge of the post-war period for Antarctic research was no longer to simply find out what was down there, but rather, to integrate sustained Antarctic science into the mainstream of global research. Another challenge, articulated here by Phillip Law, was to build the significance of science in Antarctic culture. Law recalls that ANARE was established by the Federal Government in 1947 'for purely political reasons' — to secure Australia's territorial claim (42% of the continent) and also its right to commercial opportunities. Research was 'a side issue', explains Law. He resigned as Director of the Antarctic Division in 1966 because of continuing problems concerning the status of science in the organization. This book makes it clear that research is no longer 'a side issue', although it remains subject to political, strategic and bureaucratic pressures.

Perhaps the clearest example of the changing role of science in this period is provided by the fitting centrepiece to this volume, a long essay on the Antarctic ice sheet by William Budd. In the early years of Antarctic continental exploration, the ice sheet was a testing ground for physical endeavour, a source of beauty and fear, and to some extent a frustrating obstruction to scientific observation of the Gondwanan rock beneath. In its early years, ANARE had no glaciologists, and it was believed that Antarctic ice was no more than a few hundred metres thick. But during the second half of the century, the ice itself became the focus of intense scientific study and glaciology became a sophisticated discipline. The extent and depth of the ice sheet (up to 4 km thick) was mapped and it was discovered to have a history. By measuring ice thickness, ice accumulation rates and ice velocities, scientists assessed the mass balance of the ice sheet — was it growing or diminishing, and what changes were due to human industry? Recent, observable changes in the sheet became anxiously monitored. As Stephen Pyne put it (in his book, *The Ice*, 1986), by the end of the twentieth century 'the preservation of Antarctica's ice sheets joined the protection of its penguins and whales as a test of human character'. Antarctica emerged as a sensitive barometer of global health, and the ice also furnished a long-term climate record. Budd describes how Australians studied the accessible Law Dome (less than 200 km wide, near Casey Station) as a microcosm of the whole East Antarctic ice cap. They also developed a modified ice drill in the late 1980s, which enabled the capture of a deep ice core from Law Dome Summit with a record of 120,000 years of atmospheric history through the last Ice Age and beyond. ANARE made the Amery Ice Shelf (situated between Mawson and Davis stations) the most studied ice shelf anywhere, and (as Ian Allison explains) research also revealed the Mertz Glacier polynya (open water amongst pack ice) to be a crucial site in the formation of Antarctic bottom water, which drives much of the vertical circulation of the world's oceans. McCracken, Young and Bird summarize the change in Antarctic science in this way: 'In the old era of Antarctic research, people used their knowledge of the rest of the world to find out what was in Antarctica. In the new technological era, we use our knowledge of Antarctica to learn about the rest of the world.' (p. 27)

We have also come to use Antarctica to learn about the rest of the universe. Marc Duldig describes how Antarctica's cold, dry, stable atmosphere makes it the best surface location for infra-red astronomy. There 'the stars simply do not twinkle as much.' (p. 58)

Antarctica's defining moment of colonization came in 1957 and 1958 when a global scientific program associated with the International Geophysical Year oversaw the transformation of earth science into planetary science — this was an inventory of the solar system beginning with Earth. Antarctica was no longer just the end of the Earth; it became a gateway to the solar system, a privileged human window on outer space. Antarctica's dry valleys have been used as analogues for the Moon and Mars. And, as Des Lugg's fascinating chapter on medicine reveals, ANARE has collaborated with NASA in the study of the psychology of isolated communities as a preparation for long-term space travel.

There is not sufficient space to do justice to all the chapters in this rich and important collection — they are all of high quality and are written by experts in their disciplines. A welcome addition to the symposium and book would have been an essay by an historian reflecting on the changing culture of Australian science in Antarctica. But this book already achieves much, and the editors are to be congratulated for using a jubilee occasion to make an enduring and very substantial contribution to disciplinary and public debate about a vital and exciting field of Australian scientific endeavour.

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Frank Fenner (ed.): *The First Fifty Years*. The Australian Academy of Science: Canberra, 2005. 549 pp., BW illustrations, ISBN: 085847221X (PB). [Copies available from the Academy on request.]

Frank Fenner has served the Academy positively across its half century. This is the third history 'edited' by him at timely intervals of twenty-five, forty and now fifty years. Except for the generous list of those who offered information for these volumes, however, individual contributions are incorporated within his uniformly clear prose. So the editor is really the narrative's author. The book is carefully and logically arranged. I noticed only one minor blemish, where the omission of a comma on p. 181 appears to link Fenner himself with 'atomic energy and weapons', an unlikely outcome.

As a frequent moving spirit in Academy affairs, Fenner's name bulks larger in the index than any other Fellow, and not because the editor has promoted himself. This thick volume divides into two sections. There are 300 pages of narrative under eighteen subject chapters, followed by 200 pages of a further eighteen appendices. These latter and several in-text statistical tables provide an indispensable source of data for ready reference and research. This book is an important record of the important contribution made by the Academy to Australian science.

Fenner describes and documents the course of Academy affairs touching on numerous significant events and decisions without examining most of them too closely. There are many occasions when divided courses of action or negative decisions by the Fellowship or council are mentioned, but detailed reasons for the contrary views are rarely provided. An independent reader must conclude that both the Fellowship and council proved unduly cautious, even conservative, particularly during the first decades. In a commemorative volume such as this the reader

cannot expect revelations of personal prejudices and ideologies, but this means that a definitive appraisal of the Academy must await future researchers independent of the institution.

As a Fellow of the Australian Academy of the Humanities I have been an interested Canberra observer during the tenure of twelve of the fifteen presidents of the Academy of Science. I am indebted to several Fellows for their substantial advice and co-operation, just as I have felt frustrated by temporizing policy decisions on occasion. I recall addressing council's executive during the Franklin dam crisis, to be told that science could not intervene in politics. I found it difficult to isolate the Franklin as only a political issue. I note that two years later Barry Jones, Minister for Science, lamented that scientists were 'wimps' for failing to support him over budgetary shortfalls (p. 78). That the President recently wrote to government on the scientific values of Recherche Bay suggests that today the Academy adopts a more relaxed approach to 'politics'.

Another indication of prudent change concerns the number of Fellows elected annually, matters touched on in this text. Between 1959 and 1971 only six scientists were elected, rising to nine until 1992, then twelve annually to 2000, and sixteen subsequently. Given the number of scientists in Australia and the Academy's eleven electoral divisions (nine until 2003), the total of 517 Fellows elected during half a century seems restrictive. It would be easy to name deceased biologists whose claims surely merited election; and another biologist whose election as FRS preceded FAA. Then there is the attitude towards applied science, which Ann Moyal in 1980 described as 'marked condescension' (p. 248).

About twenty years ago I raised with the Academy council the problem of those scientists whose research spanned disciplines, especially those relevant to archaeological studies, but whose research involved the concerns of both the Science and Humanities Academies. There was no resolution, so Humanities acted unilaterally and accepted such scholarly interdisciplinary candidates as earth scientists and physical anthropologists. Although not discussed in this volume, the growing popularity of interdisciplinary and cross-cultural research may force the Academy to resolve this issue.

Whatever one concludes of the merits of maintaining rigid boundaries, it seems extraordinary that in the total Fellowship of 517, only 27 women have gained election in fifty years. (The comparable Humanities Academy figures, still not ideal, are 84 women in a Fellowship totalling 512.) Is it due to uneasy consciences that 52 female non-Fellows have been interviewed on tape? (p. 182). Given these statistics, an outsider marvels that one female actually became President.

It must be inferred that some Fellows rated the interests of their own specialisms above the potential for general scientific progress or innovation. For example, that present Australian science icon, astronomy, was judged unduly costly by seven eminent biological science Fellows (p. 111). Is it relevant, therefore, that Bart Bok, director of Mount Stromlo Observatory, was elected to the Fellowship only after he left Australia? (p. 371). During my service on the 1974–1975 Inquiry on Museums and National Collections I encountered attitudes that seemed directed to preserve a scientific *status quo* against the common scientific good.

On a more positive note, this history provides numerous instances of impressive Academy stands or initiatives that have benefited Australian science and met educational needs. Mark Oliphant spoke prophetically in the fifties: 'It is possible that no country is so critically dependent upon science for its future as is Australia' (quoted p. 255). Unfortunately government policy changes, inaction, or its failure to

provide services for voluntary working groups (p. 160) blunted the application of Academy initiative, such as the National Conservation Strategy (p. 174). In the case of advice concerning radiation hazards from the Mururoa nuclear tests, it was exploited politically in a manner unintended (p. 169). Fenner enunciates an essential problem with the populist approach by government:

> A further cause for concern, which is particularly acute with environmental problems, is that verifiable evidence from scientists is sometimes given no greater credence by governments than the unsubstantiated views of vocal individuals and pressure groups (p. 152).

In the case of diet and coronary heart disease, sound Academy recommendations in 1975 were inadequately followed up (p. 163), as were other initiatives. Attempts during the 1960s to foster Australian biological research moved slowly, though in this case the Academy council perhaps failed to heed Sir Frederick White's realistic advice, that it was essential to get support first from the states 'at both scientific and political levels' (p. 134).

The Academy's successful activities in encouraging science education merit praise and are detailed here. It produced many publications. *The Web of Life*, which sold around one million copies between 1966 and 1986, was outstanding. On budgetary issues, it is evident that there were periods of quite inadequate funding. In comparison with the Australian Academy of the Humanities, however, Science has been fortunate in receiving generous donations and bequests. This is a significant reflection on the contrasting status of science and medicine in Australian cultural life with the humanities. It would be a pipe dream to imagine private funding for a Humanities Dome! Possibly this reality is reflected in the shift to overseas posts by Humanities Fellows. This serious brain drain is suggested by the 41 Fellows now domiciled overseas, compared with only 14 overseas residents in the Academy of Science ranks.

Chapter 14 surveys the moves by the Academy to bridge the gap between it and the other Academies. This is an illuminating study. It began with the ill-fated Botany Bay Project. Evidently many Fellows concluded that joint operations were impractical, so that a timely and appropriate proposal concerning drought was shelved (p. 247). Sir Frederick White was responsible for an important project, the Protection of Prehistoric Places, which involved close and positive collaboration between all Academies (p. 249). The contributions of White and President Lloyd Evans were crucial to its success.

Through the 1990s the Academy expanded its role in collaboration with other Academies, especially since 1995 with the establishment of the National Academies Forum (NAF). It is NAF rather than individual Academies that is being requested to advise government. This book documents the evolution of these significant and mature developments. The broadening of collaboration between the Academies bodes well for intellectual and cultural health across the next half century.

John Mulvaney
Yarralumla

Tim Sherratt, Tom Griffiths and Libby Robin (eds): *A Change in the Weather*: *Climate and Culture in Australia*. National Museum of Australia Press: Canberra, 2005. vii + 216 pp., illustrated in full colour, ISBN: 1876944285, $49.95.

If the English like to talk about the weather, it seems that Australians prefer to hold forth on the climate. Perhaps this simply indicates greater ambition and abstraction in Australian conversation. More likely, our fascination with climate reflects deep currents of anxiety and per-

plexity about the potential long-term impact of the antipodean environment on Europeans — on our bodies, culture and morality, and our prospects for a permanent prosperous settlement in apparently hostile circumstances. The same underlying apprehension and curiosity may also help to explain why the environmental and ecological sciences have flourished in Australia. We European Australians want to know what is going to happen to us and our society in a place that can, after all, still seem enigmatic and challenging, even uncanny at times.

A Change in the Weather gently and refreshingly — like a Fremantle doctor, perhaps — takes us through more than two centuries of speculation on the character and human significance of Australian and other southern climates. It is hard to imagine any other national culture producing a collection of essays as climatically obsessed as this. All sixteen essays are brief and engaging, ranging from historical studies of El Niño–Southern Oscillation (ENSO) to an ethnographic account of Aboriginal 'meteorology', with others on topics as diverse as cloud seeding, the nomadic strategies of birds, and seasonal infant mortality in nineteenth-century Melbourne. Attractive images and quirky descriptions of various objects loosely related to climate are interpolated between the essays. It is hard to do justice to such abundance. The editors should be congratulated on drawing together the work of an impressive array of cultural and environmental historians, anthropologists, meteorologists and policy analysts. When these scholars turn their attention to a common topic, the cumulative effect can be revelatory. The various treatments of ENSO constitute a good example. Neville Nicholls describes the recent development of ideas about ENSO; Richard Grove examines, and sometimes exaggerates, the possible ENSO impact on economic and political events between 1788–1795; Deborah Rose and Janet McCalman mention it in passing; while Tony McMichael touches on the phenomenon in his speculations on the effects of climate on human health. Similarly, concern about climate change shapes Ian Lowe's essay on solar energy and sustainability, as well as McMichael's explanation of disease ecology, M. A. Smith's cautious yet evocative account of paleoclimatology, and Clive Hamilton's impassioned condemnation of 'growth fetishism'.

Interestingly, Nicholls, in his essay, traces the decline of climatology in the 1930s, with a shift in meteorology toward weather forecasting, followed by the eventual resurgence of climate studies in the 1980s, stimulated in part by the discovery of ENSO and predictions of global climate change. Briefly repressed, it seems that climate has returned to haunt us.

I especially appreciated the studies in the cultural history of climate, or rather, of adaptations to it. Libby Robin, in one of the few essays that focuses on deserts and aridity, comes close to convincing this reader that birding might have some merit, though 'thinking like a banded stilt' remains imponderable. Tom Griffiths takes us on an exhilarating ride on the roaring forties, the screaming fifties, and the whistling sixties (and no, I am not referring to decades). Following Geoffrey Blainey, Griffiths evokes European perceptions of the winds of the southern hemisphere, and the significance of having mastered them in the nineteenth century. In contrast, Janet McCalman describes consequences of the failure of some poor Melbourne mothers to adapt to hot winds from the inland that periodically seared their city. Venturing into the horse latitudes, David Walker looks again at the how whites first imagined and then coped with the 'curse of the tropics'. 'Redeeming the Australian climate from the negative associations of tropicality,' as he puts it, 'was an important dimension of the nationalist project' (p. 97). This is an old theme now,

but Walker brings to it new illustrative material and insight, writing with verve and panache about the transition from tropical peril to tropical tourism. Both McCalman and Walker dwell on the perceptions (and realities) of harshness in the environment, yet other historians here emphasize more the variability and unpredictability of the Australian climate, especially when they consider arid regions. Thus Janis Sheldrick points out that Goyder's Line, which influenced settlement patterns in South Australia, was an estimate of rainfall variability and not aridity *per se*. Nineteenth-century climatologists, who generally sought to define and fix distinct climates, often found such variability troubling, making Australia a particularly tough case. But evidently the climatologists who emerged in the 1980s have come to expect such dynamism in their models of ENSO and climate change.

As in most environmental history, there is a tension in these essays between evocation of the perception of natural conditions, or the climate mentality, and explanation of the impact of surroundings on bodies and cultures. That is, some writers, such as Walker, explore the environmental imagination of Australians; and others, including Grove, grant greater agency and influence to the environment. The problem of agency and control is a complex one. The earlier the period studied, the more likely it is that climate looms implacable and determinate. In contrast, most essays on the interactions of Australians and their environment in the twentieth century emphasize our increasing power to insulate or alienate ourselves from our environment, or even to transform our climate for better or worse. Thus Walker implies that after the First World War the technological sublime trumps the tropical sublime, as more sensibly dressed northern residents genuflect to the electric fans in their cooler houses. R. W. Home tracks efforts after the Second World War to seed clouds in order to modify climate. The prevailing attitude, he argues, is that 'we have to overcome nature rather than live within the constraints it imposes' (p. 78). And of course, numerous essays lament our evident ability now to change the global climate.

Even when postulating the regional 'telecommunications' of ENSO or the 'global' scope of climate change, it is remarkable the degree to which the subject of each of these essays is still Australia. We learn that ENSO was, in a sense, revealed in Australia, and the continent is centrally affected. We read too about the woefully inadequate Australian policy response to climate change. Australian nationalism is an omnivore, consuming even the climate. This is perhaps the most common feature of Australian inquiries into climate, yet one of the less frequently recognized. White Australians have for centuries now defined themselves, and later the nation, in relation to the climate as they understood it. That is, the climate has been, and still is, another way to imagine the nation — and to extol it, to disparage it, or to foretell its future. Recently, historians have shown how white Australians saw themselves in opposition to Aboriginality and distinguished themselves from Asians. But these essays demonstrate forcefully that white Australians were also thinking about their bodies and morale, day after day, in relation to their multiply challenging natural circumstances. The coming man and the Australian legend both emerged as figures in this specific, chancy environment, as Blainey and J. M. Powell long ago recognized.

This is a beautifully produced volume, though the publishers might have allowed many more maps. In any case, I have no doubt that after reading this collection of essays, those Australians who want to continue the national conversation on climate will have a lot more to say.

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Keith Farrer: *To Feed a Nation*: *A History of Food Science and Technology.* CSIRO Publishing: Melbourne, 2005. 244 pp, illus., ISBN: 0643091548 (PB), $39.95.

Eminent food scientist and historian Keith Farrer has written an extraordinarily detailed account of the changing nature of Australian food science and technology. *To Feed a Nation*: *A History of Food Science and Technology* offers rich insights into the history and contemporary reality of the scientific and technological processes delivering food from paddock to plate, and is an invaluable resource for people interested in the history of Australian food science and technology.

Food science, Farrer explains, 'seeks the full explanation of what happens in food raw materials and the processes to which they are subjected, in the confident expectation that such understanding will bring greater control of, and important improvements in, quality and safety'. Food technology, however, 'is concerned for the most part with making raw foods edible, and with the transfer of food from a time of plenty to a time of want and from a place of plenty to a place of want'. As food science emerged as a distinct scientific domain in the nineteenth century, Farrer comprehensively demonstrates, food scientists in Australia and elsewhere began transforming the technologies of food processing and distribution.

Arranged chronologically, *To Feed a Nation* is a confident narrative of scientific and technological progress. The story begins in the first chapter with methods of food storage, preparation and trade by Aborigines and Torres Strait Islanders — both groups labelled by Farrer 'unsophisticated peoples' — and ends in the late twentieth century with the genetic modification of food and associated controversies. It is a triumphal account of technologists, industrialists, legislators and scientists working together to bring safe and sophisticated foods to consumers.

Like any other historical account, the particular historical and cultural position of the storyteller has shaped this history. Over the course of his career, Keith Farrer played a prominent role in the domain of food science in Australia. His closely personal implication in the history he tells both enables and disables understanding of the various and complex physical, cultural and economic processes bringing food to our tables now and in the past. Farrer writes as an insider. After graduating from the University of Melbourne in 1938, he started his career as a research chemist with the food giant Kraft Foods Ltd. For more than twenty years Farrer was manager of research and development within the company, and in 1976 was appointed chief scientist.

Farrer's personal professional history perhaps contributes to the confident, progressive tone of the book, and seemingly defined the topics and questions the author chose to explore. For example, in the final chapter Keith Farrer reflects on consumer demands in recent decades for more information about the food they eat. The central concern expressed by consumers is for food safety, Farrer asserts, and food scientists and technologists must attempt to carefully inform and reassure a populace he portrays as flighty. Farrer writes of the 'bemusement' that he and other food technologists and scientists feel towards the 'modern cult of so-called "organic" foods'. To bring rationality back into the choices made by consumers, his profession 'must hasten slowly, with care and explanation, in the introduction of anything really new', he concludes.

Where do the foundations of the various concerns consumers have about food really lie? Instead of facing this difficult and significant question, Farrer asserts an unquestioning faith in the empirical knowledge and reliability of his profession. His confident and dismissive tone reveals an unwillingness to consider the

depth of thinking and legitimate feeling underlying the concerns of consumers about an intensely industrialized and corporatized food production system. In our modern, industrialized world, supermarket shopping can be an experience in alienation. Packaging and labels rarely reveal exactly where our food comes from, nor who grows it. Modern systems of food production, processing, marketing and distribution work to deny consumers information that might enable them to make ethically responsible connections with the land that nourishes them.

In the domain of food, as the historical accounts told by Farrer clearly show, science and industry are part of the same dynamic. The knowledge pursued by food scientists is primarily those 'truths' useful to commercial interests. Similarly, the techniques and devices developed by food technologists are geared to generate profits. Wider realities are easily obscured. *To Feed a Nation* shows clearly and comprehensively how a reductionist approach to food science can enable extraordinary developments in food processing and distribution. A narrow focus enables detailed science and intricate technologies, but may blind us to the broad cultural and historical dynamics shaping our world.

The emergence of mutually nourishing relationships between land and people depends on perceptions of food production and processing as embedded within complex and shifting ecological and cultural dynamics. Our food choices and consumption habits shape places and lives across rural regions here and overseas. But without imaginative and cultural ties to the country that nourishes them, how can consumers know and respond to its needs? *To Feed a Nation* will probably appeal greatly to those with a specialist interest in the history of Australian food science and technology. Keith Farrer should be commended for recording such a detailed and valuable work of reference and history. Those seeking broader perspectives of the ecological and cultural dynamics of the food we consume are advised to look elsewhere.

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R. Quentin Grafton, Libby Robin and Robert J. Wasson (eds): *Understanding the Environment*: *Bridging the Disciplinary Divides*. UNSW Press: Sydney, 2005. xviii + 229 pp., illus., ISBN: 086840912X.

This book is an important attempt to get disciplines to communicate for the sake of the environment. Each chapter is an introduction to environmental research, written by an academic from their unique disciplinary perspective (all are members of the National Institute for Environment at the Australian National University). They share the common goals of trying to understand human interactions with the environment and attempting to solve problems that arise from the interactions.

The book is composed of chapters from ten disciplines sandwiched between an introduction and summary written by two of the editors (RQG and LR). They include history, anthropology, economics, human health, policy, ecology, earth science, hydrology, mathematics and geography. Each discipline-based chapter defines the discipline, describes its origins, and explains its approach to understanding environmental issues and how concepts such as sustainability, variability and scale are interpreted. Several chapters describe the most topical controversies within the discipline. Each strives to emphasize the importance of its contribution to the practical and pressing needs of environmental problem solving.

Reading it, one is exposed to the mind set, jargon and disciplinary biases and nuances of a broad spectrum of

professionals. The level of detail is roughly commensurate, maintaining the flow from chapter to chapter. The chapters are written at a level that is accessible to beginning-level undergraduates. Their content and orientations are cohesive, a consequence of the effort the contributors took to participate in workshops that preceded the writing.

The independence of the chapters makes for some interesting contrasts, perhaps the most useful feature of the book. For example, the geographer states 'human–environment interactions cannot be reduced to formulae' (p. 169) while the mathematician states in counterpoint that mathematics is based on elaborate metaphors, 'the means by which the abstract is made concrete...codifying the natural world...' (p. 152). It is such contrasts that the editors were hoping to elicit.

Many chapters made over-arching claims. For instance, the geography chapter claimed to be the 'inter-disciplinary glue' (p. 182), the policy chapter claimed that it is through policy that 'pressing issues can be resolved'. In my experience such claims are largely true. They are not mutually exclusive. They reflect the potential of a discipline and give it a place in the interactions between disciplines.

I felt it may have been beneficial to have provided some interactions between authors. The concluding chapter provides a synthesis but I would have liked to have seen the reaction of the earth scientist to the ecologist's chapter, and the geographer to the mathematician's (and vice versa).

The set of disciplines is broad but not complete. While the editors did not intend to be complete, perhaps the most telling was the omission of a chapter on environmental law. The other notable omission is a sustained attempt to reflect diversity of views, assumptions and approaches within disciplines. Some chapters addressed controversies that go some way towards this, but other chapters did not.

These are small points. The book is a valuable contribution, a worthwhile attempt to communicate. It helps us to understand one another's language and assumptions. It succeeds in its objective of outlining 'world views' and will foster cooperation.

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Aant Elzinga, Torgny Nordin, David Turner and Urban Wråkberg (eds): *Antarctic Challenges*: *Historical and Current Perspectives on Otto Nordenskjöld's Antarctic Expedition 1901–1903*. Royal Society of Arts and Sciences: Göteborg, 2004. 330 pp., illus., ISBN: 9185252646. [Available from the Royal Society, Göteborg.]

At the very beginning of the twentieth century there was a scientific assault on the little-known continent of Antarctica, with German, English, Scottish, Swedish and French expeditions south. Otto Nordenskjöld's Swedish Antarctic Expedition of 1901–1904 is famous for its drama of survival: their ship was crushed in the ice and three parties of men were marooned in different locations on the Antarctic Peninsula and eventually rescued by an Argentine ship. The aim of this stimulating collection of essays is to look at the science behind the saga. The book refuses to get distracted by the heroic narrative and tells the famous and familiar story only briefly and obliquely. Instead, the collection systematically unpacks the expedition's intellectual motivations and legacies: Nordenskjöld's geology and intimations of Gondwana, Carl Skottsberg's botany on the Antarctic Peninsula and sub-Antarctic islands, the relationship between whaling, exploration and science (especially in the career of Carl Anton Larsen who was captain of the expedition

ship, the *Antarctic*), cartography, oceanography, glaciology, meteorology and zoology, as well as gender aspects of the expedition's narratives. This is a beautifully produced and skilfully edited book that uses one expedition as a window on a whole era of scientific curiosity.

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Peter Doherty: *The Beginner's Guide to Winning the Nobel Prize: A Life in Science*. The Miegunyah Press: Melbourne, 2005. xvii + 282 pp., ISBN: 0 522 85120 7 (HB), A$34.95.

This book has two titles but, apart from a tongue-in-cheek final chapter that is an attempt to justify the publisher's spin, it is neither a guide to winning a Nobel Prize nor, in any serious sense, an autobiography. It is, instead, a thoughtful and thought-provoking series of essays on serious themes, bound together by regular references to the Nobel Prize environment and previous winners, particularly those in physiology or medicine.

The book begins with brief reflections on Doherty's journey, from a resonant description of conditions during the 1950s to insightful observations such as, 'yes, it's true that many innovative research scientists are stuck in a state of perpetual adolescence' (p. 6), and 'We did some rather simple experiments and advanced what was at that time a revolutionary explanation for our results' (p. 8). There are interesting and amusing observations on the Nobel celebrations and their aftermath: on the trauma of broken elastic, on the unflappable Swedes who have dealt with everything, including 'two laureates who turned up with three wives, past, present and future' (p. 13), and on subsequent responsibilities, often weighing heavily on recipients.

The seven chapters that follow are the heart of the book. 'The Science Culture' is an attractive review of the historic journey to present-day science, with passionate appeals to develop better communication with the general public and political leaders, to value science teachers — and pay them — more highly, and to accept genetically modified organisms, address global warming, and abandon gas-guzzling cars. 'The Scientific Life' is an account of life in the laboratory, enlightening I am sure to the book's focus group, 'a general readership'. There are interesting side-lights: twenty-four Nobel laureates from the New York City public school system, with five from the Bronx Science High School, and the mistaken observation that there have been few Nobel families (the Curies, Braggs and Eulers), whereas there have been a number (these plus J. J. and G. P. Thomson, Niels and Aage Bohr, and Manne and Kai Siegbahn), a phenomenon that merits investigation.

The history of immunology is followed through its Nobel laureates; and there are then two chapters with contrasting approaches to the future health of science, especially in Australia. These reflect Doherty's own tension between a softly-softly and a front-on approach. In chapter five he believes that 'diplomacy, discussion, persuasion and compromise can be much more effective than going in with every gun blazing'; whereas chapter six suggests a more much vigorous approach, noting Australia's poor level of support (1.6% of GDP compared with the UK's 1.9% and the USA's 2.7%), and saying 'Australia, with its small population and its South Pacific location, needs ... to create a greatly enhanced, high technology industrial base. ... This book is aimed at generating greater awareness around this issue' (pp. 187–188). All this is valuable and deserves attention.

Chapter seven, devoted to science and religion, is predictable; while chapter

eight, entitled ‘Discovering the Future’, admits that ‘scientists are really no better at guessing the future than anyone else ... novelty and radical change can take everybody by surprise’, but does offer interesting views that ‘Some of the challenges for the health and longevity of both individuals and the planet are, however, already obvious and ominous’ (p. 216).

While not designed for readers of this journal, the book deserves our attention and raises publishing questions. For example, I cannot imagine why ‘Scientific Terms’, mostly abbreviations, are at the front of the book, whereas ‘Abbreviations’ are at the back! More worrying is the cover, with the misleading titles, silly assessments by two respected media identities, and a photo of Peter Doherty as a very young boy on a tricycle, presumably designed to attract general readers and sell copies. I believe it belittles both the author and the significant content of the book.

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