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Book Reviews

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Antarctic Bioprospecting

Edited by Alan D. Hemmings & Michelle Rogan-Finnemore
Gateway Antarctica Special Publication, Christchurch, 2005
ISBN 0-476-01647-9, 351 pp, NZ$65

Bioprospecting is the search for commercially-valuable biochemical and genetic resources in plants, animals and microorganisms. Although common in other parts of the world, and apparently increasingly common within the Antarctic Treaty Area, bioprospecting is a controversial and complex issue still awaiting extensive and robust debate within the Antarctic community. These are the proceedings of the 'Bioprospecting in Antarctica' workshop held at the University of Canterbury 7–8 April 2003. As the editors write, '*Bioprospecting rattles the bars of many cages*' since it cuts across claimant and non-claimant states, developed and developing countries and the interactions between the Antarctic Treaty and other international agreements. The editors and authors faced a considerable challenge to put this array of conflicting interests into an easily understandable and readable format; fortunately they succeeded on both counts.

Although this workshop was almost five years ago, there has been little progress in resolving the issues around bioprospecting within the Antarctic Treaty System. As a result, the great majority of the volume is still valid and, if anything, increasingly relevant. The slow progress, may, in part, be due to the complexity and ambiguity of the topic, and the lack of a single resource that lays the Antarctic-specific issues out in a clear and manageable manner. This book fulfils the latter requirement, and will be of interest to those new to the topic as well as those already familiar with the debate. The book provides an excellent introduction to the many arguments and the authors present the topic in a digestible, yet comprehensive, manner.

With the overwhelming majority of attendees at the workshop from New Zealand and Australia it is interesting to speculate as to whether the content and conclusions of this book would have been substantially different if a greater diversity of nations had been represented. Interestingly, the book provides at least three different definitions of the term 'bioprospecting', reflecting the lack of consensus that exists on the topic. In the first chapter, Rogan-Finnemore sets the scene, describing the political, legal and environmental challenges brought about by Antarctic bioprospecting. In Chapter 2, Farrell & Duncan describe the variety of Antarctic ecosystems suitable for bioprospecting, examples of biochemicals derived from Antarctic biota, the exceptionally high cost of getting a novel biological product to market (estimated to be in the region of $800 000 000) and the exceptionally low chances of commercial success. Bioprospecting and the associated work leading to patents are, by their nature, secretive and it may take many years to develop products that are commercially available. Johnston & Lohan suggest in their chapter that the absence of clear rules within the Antarctic Treaty Area is stifling work by nervous industrial partners who need to know who 'owns' an organism or isolate before investing vast sums of money. They go on to review bioprospecting activities in Antarctica with industry involvement (including the European Commission funded Micromat consortium) and patents filed for Antarctic biochemicals. The patenting and legal aspects of bioprospecting are also covered by contributors in other chapters. Several chapter authors discuss the actual or potential implications of the conventions and treaties that concern bioprospecting (e.g. Protocol for Environmental Protection to the Antarctic Treaty, Convention on Biological Diversity, UNCLOS, etc ...), which does lead to a little repetition. Indeed, legal aspects of bioprospecting are discussed in detail by authors in relation to patents and benefit sharing (Connolly-Stone), the Antarctic Treaty Area (Hemmings), the Southern Ocean (Rothwell), and the general legislative background (Johnston & Lohan).

The interval between the workshop and delivery of the book for review makes little difference to the impact and relevance of much of the contents as developments in bioprospecting since 2003 have been slow - at least those developments in the public domain. Nevertheless, some chapters do suffer as a result of this time lag. For example, Hemmings skilfully distils the history of discussion of biological prospecting within the Antarctic Treaty into one chapter entitled '*A question of politics: bioprospecting and the Antarctic Treaty System*'. The story begins with a largely ignored information paper presented at Antarctic Treaty Consultative Meeting (ATCM) in Lima in 1999, then goes on to discuss developments until the XXVII ATCM in Cape Town in June 2004. Then abruptly the story ends. The reader is left wondering how the discussions within the Antarctic Treaty System have developed since.

Alistair Graham provides a thought-provoking chapter entitled '*Environment, ethical and equity issues*'. In particular his description of the development of legislation on mineral prospecting (The Convention on the Regulation of Antarctic Mineral Resources Activities (CRAMRA)), provide us with valuable insight into the potential ethical and equity challenges. He also highlights the ethical dilemmas faced by Antarctic scientists who are under increasing pressure from state-funders to generate supplementary funding from external sources, which inevitably includes commercial partners and industry. As a

consequence, Graham suggests that the distinction between Antarctic scientific research and commercial activity is extremely cloudy and may as well be considered together in regard to equitable benefit-sharing and environmental protection. Rather, bioprospecting could be considered as 'information harvesting' and he points out that merely controlling access to minute quantities of Antarctic biological resources cannot deliver either equitable benefit-sharing or environmental protection.

Towards the end of the book the editors provide a synthesis which highlights the different issues posed by bioprospecting in Antarctic. This chapter does not present easy solutions, and freely admits that the bioprospecting issue has '*no referee, apparently no rules and uncertainty whether some conventions of behaviour are relevant or not*'. However, their clear listing of effects that bioprospecting may have on the Antarctic Treaty System may be a useful blueprint with which to initiate more concerted explorations of the issues in the future.

The last chapters gives a brief summary of the sessions held by each of the breakout groups at the meeting, namely '*Science and Commercial Issues*', '*Environment, Ethics and Equity Issues*' and '*Legal Issues*' and, since they cover material well presented in the chapters, could have been omitted without loss. The book ends with an extensive appendices section (82 pp) that contains copies of several Antarctic Treaty System and international treaties and conventions that are referred to in the book. Many of these legal documents are readily available on the internet, so it may have been adequate to refer to reference sources rather than include this information. The book ends with details of the 'Bioprospecting in Antarctica' workshop including a list of participants.

The editors must be congratulated on pulling together the wide-range of views and issues associated with Antarctic bioprospecting in such a comprehensive and reader-friendly manner. I know of no other resource that deals with the topic in such a complete and thought-provoking way and recommend it to anyone requiring an informed insight into Antarctic bioprospecting.

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Antarctic Ecology: From Genes to Ecosystems. Part 2: Evolution, Diversity and Function

Edited by A.D. Rogers, E.J. Murphy, A. Clarke & N.M. Johnston
Philosophical Transactions of The Royal Society Series B, **362**, 2183–2378, 2007.

If science books are on the wane, then thematic issues of journals seem very much to be in vogue. A healthy science community needs opportunities to compile, critique and synthesise understanding of key topics, and thereby identify those which have been satisfactorily resolved, those which have not, and those which are genuine priorities for future work. When done well attaining a breadth and depth which lies beyond individual review papers, this is a role which historically books, both monographs and edited volumes, have long and effectively fulfilled. However, with research funding, promotions and esteem for many scientists depending increasingly heavily on the impact factors of the journals in which they publish and the citations that their papers accrue, a heavy selection pressure has fallen against this approach. Short-sighted as this pressure undoubtedly is when applied so severely, one rather obvious response is to publish such work in the journals themselves. The solution is far from perfect, but well executed it should make for many stimulating thematic issues.

Antarctic Ecology: From Genes to Ecosystems. Part 2: Evolution, Diversity and Function is the second of two thematic issues published in *Philosophical Transactions of The Royal Society Series B*, aiming to integrate new developments in understanding of the evolution and functioning of Antarctic ecosystems. The first (Antarctic ecology: from genes to ecosystems, Part 1 *Philosophical Transactions of The Royal Society Series B*, **362**, 3–166) was concerned with patterns of abundance and diversity and ecosystem function at large scales in Antarctic marine ecosystems, evidence for climate change, and its likely consequences in Antarctica. The present volume, edited by the same quartet, addresses "the evolution of the terrestrial and marine biota of the Antarctic, and explores the relationships between genome function, physiology and ecology".

With nine main papers plus a brief introduction from the editors, this volume is perhaps a little shorter but not that different in size from a typical edited science book. It includes amongst the contributors several key active researchers in the field of Antarctic biology. Taking them simply in their sequence in the volume, these papers consist of reviews of the molecular evidence for the evolution of the Antarctic biota and determinants of its spatial distribution (Rogers); the ecophysiology of the Antarctic icefishes (Cheng & Dietrich); thermal specialization of Antarctic ectotherms (Pörtner *et al.*); molecular diversity and genomics of Antarctic marine microorganisms (Murray & Grzymski); biodiversity and ecology of Antarctic lakes (Laybourn-Parry & Pearce); impacts of global changes on above- and below-ground biotic interactions in the Antarctic Dry Valley systems (Wall); spatial and temporal variability of terrestrial Antarctic biodiversity (Chown & Convey); fisheries in the Southern Ocean (Kock *et al.*); and environmental forcing and marine predators in the Southern Ocean (Trathan *et al.*).

This coverage does not, and makes no claim to, provide a comprehensive overview of the evolution of the Antarctic