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# Book reviews

## The Biotechnology Revolution in Global Agriculture: Invention, Innovation and Investment in the Canola Sector

**Peter W. B. Phillips and George G. Khachatourians (Eds)**

*Biotechnology in Agriculture Series, no. 24, CAB International, Wallingford; 2001; 337pp; bibliography and references*

This book is the latest volume in the CABI Biotechnology in Agriculture Series (series editor Gabrielle J. Persley, Biotechnology Adviser to the World Bank), and intended 'to review advances in the current knowledge in key areas of biotechnology as applied to crop and animal production, forestry and food science.' The book is the product of a collaboration between academics at the University of Saskatchewan, Canada. It stems from the germ of an idea shared by Peter Phillips, Professor of Agricultural Economics, and George Khachatourians, Professor of Applied Microbiology and Food Sciences, regarding the ways in which technological innovations are transforming the agricultural sector into a 'knowledge industry', and the consequences of that change. Canola – oilseed rape that is suitable for human and animal consumption – is used by the authors as a lens through which to examine this phenomenon. The book focuses on the Canadian case because of the importance of canola to the Canadian economy and because of the crucial role played by Canadian government policy and public investment in the unfolding story of canola.

The book describes the historical development of canola from very early times, but particularly focusing on the post-war period. It is divided into 17 chapters in six thematic sections. The main part of the book, sections 2–5, examines innovation in the canola sector; the roles of the key private- and public-sector actors in relation to biotechnological innovation in the sector; the regulatory context at national and international levels; the aggregate gains from canola research, and the distribution of benefits. An overview of this kind is timely and the authors deserve credit for attempting a broad-ranging, interdisciplinary theoretical and empirical analysis. However, the book is only moderately successful in achieving this end.

Although it involves the collaboration of microbiologists the book is dominated by economists and has a strongly economic flavour. The brand of economics on offer here draws most heavily on institutional approaches that go some way towards explaining the role and importance of social, political and legal institutions in structuring the market and addressing instances of inefficiency and market failure. Unfortunately however, the authors do not

rigorously distinguish 'institutions' from 'organisations' and at least partly for this reason, neglect to examine the importance of power relations in the canola story. Consequently the analysis is at times descriptive and one-dimensional, and some of the most interesting issues and critical policy challenges that emerge from the study are glossed over or relegated to the conclusion.

The transformation of agriculture into an innovatory 'knowledge industry' is not just a story about science or venture capital or corporate strategy. It is also tied intimately to public policy processes and decisions by governments, and framed by private and public international relations and market forces. For example, it is clear that the canola story was significantly affected by factors such as shifting global consumption patterns for edible oils, the agricultural and trade policies of foreign governments, Canadian science and technology policies at federal and regional level, and the emergence of new legal norms and institutions to regulate intellectual property. Regrettably, these factors are treated as incidental features of the story and not explored in detail. The book would have been strengthened measurably if the collaborators had included one or two specialists in a discipline such as political science, international relations or law to examine these issues more thoroughly.

Stylistically, the editors seem to have been unsure how best to target the book for its intended audience, with the result that the book wavers uncomfortably between the didactic style of an undergraduate primer, the technical language of a scientific paper and the spare, generalising manner of an executive briefing. The book would have benefited from tighter editing, which would have produced a more concise and digestible book.

The key insights of the book come at the end, as the editors discuss the gains from canola research, the distribution of benefits and policy implications. The distribution of benefits is largely about power relations,

and it is unfortunate that by neglecting power the authors have largely handicapped themselves from analysing the causes and consequences of certain market inefficiencies that seem to be emerging. Nevertheless, two key observations from the study deserve wide attention. Firstly, the authors calculate that the rate of social return to investment seems to have declined in recent years, as the amount of private investment in canola research and development has increased dramatically and overtaken direct public research expenditure. The authors comment simply that perhaps too much investment is now entering the sector and that a correction may be required. It seems plausible, however, to suggest that an inefficient allocation of resources to research is inevitable when research is undertaken by competing private actors, each pursuing similar research priorities, and where there are incentives not to cooperate with others by sharing knowledge and technology. As the authors hint, the emerging intellectual property regime may actually be creating inefficiencies and inhibiting innovation.

Secondly, the authors' calculations suggest that Canada has failed to capture a fair return on its substantial investment in canola research. Although Canadian canola has captured a large global market share, the gains have been shared largely by the foreign transnational biotechnology firms that developed the new canola varieties, and consumers in export markets. Therefore there are very real and troubling questions to be asked about whether it is right for public authorities to invest public money in the apparatus of grants, tax incentives and infrastructure projects designed to promote biotechnology research and development, when the return to taxpayers is so unclear.

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## The Biotech Investor's Bible

**Georgg Wolff**

*John Wiley, Baffins Lane, Chichester, May 2001; 0 471 41279 1; 336pp; hbk US\$29.95*

So, was this the book that I had been waiting for all these years? After over a decade of managing biotechnology investments, suddenly I had in my hand 'The Biotech Investor's Bible'. Would it reveal how we should have been doing it? Would I now understand the basis of all of those 'investment mistakes'? I settled down in the aircraft seat to read the tome, flying back from the USA where I had attended a biotechnology investors' conference. By the time I landed, I would be raring to go.

First things first. I checked the book's index for my name! No sign! I looked for familiar names of other venture investors of fund managers. They weren't there either! That made me feel better, but I did think it curious that they were missing, since it is usually a worthwhile indicator of quality when a known, experienced venture capital group has been involved in the financing and development of the company being scrutinised as a prospective investment.

Back to the book's index. Look up something I know about – Ribozyme – since I have been on the Board of Directors of Ribozyme Pharmaceuticals for a number of years. Unfortunately, the information presented was incomplete, particularly in respect of the current direction of clinical development at the company. Of course, this highlights how books such as this can date quite quickly and also how difficult it is to be accurate over such a substantial universe of companies.

Back again to the index! What about the companies mentioned – were they mainly based in the USA? The answer appeared to be 'yes'. No mention of Celltech, for example, but in fairness, most companies

that were mentioned were as illustrative examples of some drama or other. Perhaps Celltech has had a drama-free existence so far! In the main, though, this is a book that is most at home addressing the public biotechnology market in the USA. The NASDAQ is the clear reference exchange for the reader.

What about data sourcing? A useful reference section covers the major sources of information, but strangely omits BioCentury, which I believe has the most complete perspective on what is happening around the sector. Also not spoken of is the substantial flow of informative material from the specialist bankers and brokers. While we might all feel we detect a certain amount of bias in the individual company reviews, the overviews of certain areas of technology development or disease treatment provide well-informed, and well-researched material that can certainly help in building an investment thesis.

Any review of an investment opportunity in this sector needs to take into account the nature and size of the market to be addressed by the new therapy. This point is covered in the book, but only in a manner that highlights the issue, rather than offering advice on how this might be accomplished by the reader.

No mention is made of the management of these enterprises – what to look for in background experience and skill among the senior management team. Some comment on what has been shown to work in successful companies might be appropriate, as well as some thoughts on how the membership of the Board of Directors can be a good guideline regarding the rigour, or

otherwise, of the company's development programmes.

The author does address the life cycle of these companies in the biotechnology sector, as they progress from preclinical to clinical demonstration of their technology, and also covers some of the key areas of science, disease and therapy on which most of the universe of biotechnology companies are based. However, in this fast-moving sector, such material runs the risk of becoming dated rapidly, as do comments concerning individual companies. The recently written epilogue, dated early in 2001, highlights the problem, since it already requires updating.

So who is the book for? And is it truly a bible? For me, it does not quite live up to that epithet, but nonetheless represents a useful introduction for private investors seeking guidance on the sector. It reminds me, too, of the complexity and detail that one needs to go in to in order to investigate

and evaluate the target company whose shares one is considering buying. To do all the work on your own, and to understand and make sense of the data generated, is tough for any individual. This is why some have concluded that collective investment vehicles specialising in the sector are a more rational approach, where the managers can be expected to do much more in-depth study of individual companies than would be possible for a single private investor, and then keep the companies under review. Such funds, and they do exist on both sides of the Atlantic, were given little attention in the book.

So – not a bible. But definitely a couple of chapters out of the Book of Revelations.

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