Provoking thoughts on agriculture

J.C. Bowman

Agricultural Research Policy. By Vernon W. Ruttan.
University of Minnesota Press: 1982. Pp.369. Hbk \$32.50; pbk \$13.95.

In an admirable introduction Professor Ruttan presents his credentials for examining agricultural research policy. For 30 years he has been employed as an economist, mostly in the United States but also in the Philippines and Japan. In recent years the emphasis of his interests has, he says, moved from economics to agricultural research policy, about which he has been a prolific writer.

Professor Ruttan's introduction concludes:

In the book judgements are made about agricultural research policy. These judgements are not confined by any formal philosophical system. They arise out of a combination of scientific analysis, professional experience and my personal perception of responsibility for the results of scientific inquiry and technological development.

He has remained firm to his brief and has not formally reviewed the literature on the subject; indeed there are only a few indications in the text that others may not agree with Professor Ruttan on many of the matters which he discusses. At this stage the reader might be forgiven for some lack of trust in the author's integrity.

Each of the chapters is usually based on one of Professor Ruttan's previous publications or lectures. Whilst the writing is lucid the integration of source material might have been more thorough, reducing the impression that each chapter is an unrelated aspect of a common theme. Another, more serious, criticism is that the distinction between Professor Ruttan's idea of agricultural research policy in general is not always clearly dissociated from his views about American practices. The suspicion lingers until near the end of the book that the author harbours some hope of finding a single optimum solution to the determination and management of agricultural research policy, and that this is not far removed from the current approach in the United States. The last two chapters, however, happily prove such suspicion to be unfounded and make clear the author's continuing pursuit of alternative answers in an international context.

The main purposes of agricultural research might be said to be four-fold: to improve the return on resources used in existing methods of production, processing, distribution, marketing and consumption; to make the final product more acceptable to the consumer in quality and price; to make the existing methods of production etc. more acceptable on social and moral grounds; and to facilitate change in existing processes to meet future needs and opportunities. Such a statement does not appear in Professor Ruttan's

book. Rather he takes these objectives for granted and discusses the achievements of agricultural research in increasing agricultural output per unit of individual and total resource inputs. This is a familiar economic approach. He then tackles some of the factors determining the efficiency of agricultural research, such as the nature of the research institution, national and international systems (with a rather brief reference to Europe and the role of FAO), its funding, and its location and scale.

Professor Ruttan's approach to these topics is somewhat mechanistic. Whilst it is clear that he appreciates the importance of the context in which research is conducted, the effect of the motives of individual scientists on the pertinence and success of a research programme is largely ignored. The desire of research workers to pursue knowledge for its own sake may not always coincide with the objectives held by those who invest in research, and here it would have been interesting to have the author's thoughts on the best means of selecting research managers and scientists, and how best to motivate them.

In considering the respective merits of public and private funding and responsibility, Professor Ruttan sets down the criteria, as he sees them, for the appropriate roles of each in agricultural research. The public sector has been justified, he says, because "in many areas incentives for private sector research have not been adequate to induce an optimum level of research investment", because of "its complementarity with education" and because "it has contributed to the maintenance or enhancement of a competitive structure in the agricultural production, input, and marketing sectors". Where, however, are the arguments that public sector research is needed to safeguard society's interests and to undertake basic research for which the private sector will rarely pay, however much money it has to invest? Did Professor Ruttan omit them because he did not consider them important and because he did not consider them valid within his perceived scheme for an improved agricultural research system?

Another interesting topic discussed at length by Professor Ruttan is the selection of a research portfolio. The peer review system, cost-benefit analysis as well as more sophisticated systems for choosing a research programme are considered. But where are the deficiencies and long-term biases of the peer review method, how can the allocation of funds be determined for basic research, when by definition the

results of the research are not known, and how should the appropriateness of research be judged?

For the reader studying agricultural research policy for the first time this book would not be a good starting point because of its selective, at times self-indulgent, air. Conversely, those familiar with the topic will find the book both provocative and stimulating. In the end even the author is left asking questions about the role of social science in agricultural research, about the responsibility to society of research scientists and about the part non-scientists may play in determining the amount and type of research undertaken. It is a measure of the thought-provoking nature of Professor Ruttan's book that one would like to discuss these issues with him. □

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From fantasy to fact

Fred Rosen

Monoclonal Antibodies in Clinical Medicine.

Edited by Andrew J. McMichael and John W. Fabre.

Academic: 1982. Pp.661. £34, \$63

IN THEIR paper submitted to *Nature* on 14 May 1975 Köhler and Milstein concluded: "Such cells can be grown *in vitro* in massive cultures to provide specific antibody. Such cultures could be valuable for medical and industrial use" (*Nature* 256, 495; 1975). That may prove to be the scientific understatement of the century. Hybridoma technology has fructified to such an extent as to have become one of the keystones of the biological revolution in progress.

McMichael and Fabre have assembled a notable group of contributors to a volume that lucidly shows what hybridomas have done for medicine and biology. This book is a salubrious mixture of fact and fantasy from its introduction by Milstein, who describes the simple and beautiful experiments that produced this wonder, to the rich speculations of H.S. Kaplan *et al.* on what life might be like if only we had a thesaurus of human hybridomas.

As one proceeds through the plethora of contributions to immunology, haematology, genetics, virology, parasitology, bacteriology, neurobiology and oncology, each of which is supported by graphs, tables and photomicrographs, the reader comes to ponder: "Why monoclonal antibodies? Why not goat or rabbit antibodies?" Near the end of this volume the answer is brilliantly presented in a chapter by E. Haber. With the seemingly trivial aim of discussing monoclonal antibodies to drugs such as digoxin or biologically active

peptides such as angiotensin, Haber launches into a scholarly and wonderful discussion of hybridoma technology as a triumph of logic over empiricism. His argument is echoed elsewhere in the book by P. Goodfellow and Ellen Solomon, who describe with great clarity how monoclonal antibodies were critical to the localization of the human gene for the third component of complement to chromosome 19, and by S. Cohen who recounts how monoclonal antibodies can effectively interrupt the successful life cycle of malarial parasites.

At the end of the book there are four practical, useful chapters on how to make monoclonal antibodies, purify them and use them in immunohistology or in the fluorescence-activated cell sorter. The almost simultaneous appearance of cell sorting and hybridoma technologies greatly facilitated the application of the latter and this is well described in a chapter by P.C.L. Beverly.

Finally an appendix contains a list of monoclonal antibodies that were available last year; the list must be doubled in length at least since this book went to press. McMichael and Fabre have produced a volume that is indispensable to biomedical researchers, and have set themselves a high standard for a repeat performance in the near future. □

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Some novel truths of medicine

Douglas Black

Magic Shots: A Human and Scientific Account of the Long and Continuing Struggle to Eradicate Infectious Diseases by Vaccination.

By Allan Chase.

Morrow: 1982. Pp.576. \$17.95.

"A HUMAN and scientific account of the long and continuing struggle to eradicate infectious diseases by vaccination". On seeing that ominous phrase on the front of the dust jacket, I expected the worst of this book — science and medicine made trivial through the guise of a fictionalized documentary. Only on reading it did I discover that the blemishes of fiction are on the surface, whereas the substance of the book is thorough and in some respects potentially valuable.

Before turning to the merits of the book, and its possible value to readers, let me justify by illustration my first rather negative reaction. On p.28 we read, "Casper was not terribly surprised after this to be reassigned from Chicago to a gonorrhoea center in Jackson, Mississippi". And on p.182 we find, "Park was flabbergasted". Such insubstantial grace-notes, however plausible, must surely be conjectural; far from enhancing the interest of the narrative, they marginally diminish both its credibility and the pleasure of reading it.

I must now say that on getting into the book I found it a most worthy piece of popular science. Of course the author has a splendid story to tell, from the early days of Jenner to the possibilities being opened up by current advances in immunology. The historical sections, which make up the greater part of the book, have been carefully researched and are adequately referenced. The information provided on immunology is up to date, including awareness of the potential of monoclonal antibodies in the treatment of cancer and of malaria. This would not, though, be a book which would be bought by microbiologists or immunologists for its scientific content; but such readers could well find interest in its historical sections. As a general physician, I learned much on both these aspects. The most important readership I judge to be twofold — the young who are contemplating a medical or biological career, and who may have become infected by the notion that all the great discoveries have already been made; and the intelligent lay public, who may be culpably unaware that medicine, in both its preventive and its curative aspects, is at its most effective when it is science-based. To be sure skills other than the scientific are still required to ensure the application of

scientific knowledge, whether to the individual or to the population; but the most necessary ingredient of successful communication is to have something which is worth communicating. I have taken quite a number of words to say what Joseph L. Melnick says in a few on the cover blurb — "Magic Shots reads like a novel, but it is all true".

In his perspective of infectious diseases, Chase notes the importance of social factors, but also recognizes the importance from the mid-twentieth century onwards of the treatment of infection in the individual. He nonetheless rightly challenges the view that treatment with antibiotics can be the complete answer to infective illness. The emergence of resistant organisms, and the increased incidence of serious infection in patients with natural or acquired defective immunity, bring new problems, some of which may find their solution in new vaccines based on advances in genetics and immunochemistry. But he also points out that progress in these matters depends on a continuing supply of scientists, and that it is essential to awaken an interest in science at an early stage of education. His strength of feeling on this matter can be gauged from two quotations — "An education that makes science and all other aspects of our culture the legacy of young people should begin early and must continue through and beyond graduate school. It has to be good, and it has to be available to all children of all socioeconomic classes". And, in relation to adverse effects on education of the doubling of military expenditure in the United States, he says "Education, in our angry and malignantly anti-intellectual times, has become expendable".

The book includes a foreword written by D. A. Henderson, the former Director of the WHO Smallpox Eradication Programme. Henderson not surprisingly calls for further support of vaccine research, but in my view on grounds which could be misleading. What he says is "To the extent that we are willing to commit resources to the development of these powerful weapons to prevent illness, the sooner we shall shift our focus from treating the sick to sustaining the healthy". The supporting clause seems to me to misconceive the totality of the medical task. Of course, basic and applied work on vaccines must go on, and increase; but not at the expense of curing when possible, and at the very least caring for those with non-infective diseases. The title of the first chapter in the book, "Prevention is Better", begs the question — better than what? Basic medical science should contribute to both prevention and treatment, and both are essential to medical work. Prevention is important for the healthy, treatment for those who are already ill. □

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