thrown out with a lot of bathwater.

Moore gives a useful sketch in Part II, "Darwinism and Evolutionary Thought", of the actual scientific and philosophical issues at work in his period, showing Darwin's difficulties, methodological criticisms, the influence of Herbert Spencer, and the differences that transformed Darwin's Darwinism into neo-Darwinism. (His account of the influence of Paley on Darwin, later in the book, is especially valuable.) Unfortunately, he adopts Morse Peckham's distinction of Darwinism and Darwinisticism — Christian Darwinism "understood Darwin's theory and left it substantially intact, neither emasculating it nor adulterating it with foreign ideas in the interests of dissonance reduction" and Christian Darwinisticism (unpleasing term) "either misunderstood, misinterpreted, or modified Darwin's theory, adulterating it as they had need with non-Darwinian ideas". (Surprisingly, these definitions are not in the index.) It comes as a shock to the student of evolution to find Lamarckism labelled Darwinisticism.

Lastly, in Part III, "Theology and Evolution", Moore makes his most valuable contribution, with sketches of 28 Christian controversialists, American and English, their intellectual predispositions, development and final attitudes. Most are substantial figures, well worth analysing. A few are more reminiscent of Elderess Polly, Elderess Antoinette and Newman Weekes, in Matthew Arnold's bland and devastating account of religion in America. Moore shows that some more orthodox Christians, especially Calvinists, had far less difficulty in accepting natural selection and the struggle for existence as the true cause of evolution than did most liberals, and that much of what has been written on the period shows a complete lack of understanding of Protestant stances.

It would require a far more massive exposition even than Moore's to do justice to these great themes. Moore has much to say on progress, providence and criteria of explanation. Yet his treatment of theological themes omits, rather surprisingly, all useful mention of the Fall, and not too much is said of the creation of Adam and Eve. The theologically orthodox positions he discusses (and the reader is sometimes not clear about *which* orthodoxy he is discussing) are mainly of Dissent; Catholics and Anglicans feature prominently but are not as well analysed as Congregationalists, Unitarians or Presbyterians. A more serious weakness is superficiality in the analysis of some of his characters. For example, Frederick Temple is commended (rightly) for his "generous and incisive" sermon to the British Association the day after the famous encounter of Huxley and Wilberforce, and his *Relations Between Religion and Science* (1885) is quoted as reducing natural selection to "one partial expression" of the original properties impressed on matter by the Creator. (This, of course, is the old fallacy that if you can write an equation for something, then the equation being devoid of emotions, so should we be in contemplating the thing.) Moore also quotes Aubrey Moore's correct criticism that Temple's attitude although he was an Anglican clergyman (and later Archbishop of Canterbury) was pure Deism, not Christianity. But he does not point out that Temple's *Relations* is one of the worst examples published of using the then ignorance on certain scientific subjects to insist that God must have acted directly in these matters. Huxley's correct criticisms of Lord Kelvin on the age of the Earth disproving evolution by natural selection are dismissed in quoted words as to be "praised more for their vigor than their strength", although a divine making the same point is referred to without qualification. (It is not always clear whether the book is an analysis of attitudes, in which case it should be more trenchant, or a demography, which requires a greater coverage of people.)

This book is a 'must' for historians of ideas, useful for students of evolution and theology, and quite interesting enough to recommend to the public generally. □

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Better buy a pair of climbing boots

Fred Dainton

Scientific Productivity: The Effectiveness of Research Groups in Six Countries. Edited by F. M. Andrews. Pp.469. (Cambridge University Press: Cambridge, UK, and New York; UNESCO: Paris, 1979.) £20.

REMINDED by the title of this book of currently fashionable productivity deals in wage bargaining and on the evidence of a photostat of the title page, the list of comments and the editor's explanation of the purpose of this book, I undertook to myself to review it in a matter of two or three weeks even though I have a rule that all reviewers have an inescapable duty to read every word the author puts before them. I failed in the task not because of any physiological inability to reproduce on my retinas faithful images of the words in front of me nor because of any lack of interest in the subject (wouldn't we all like some philosopher's stone which would enable us to improve the productivity of research units?), nor because of any unwillingness to learn the techniques of the sociologist, so abundantly deployed here, if that were the necessary price of wisdom, but simply because of a great weariness of the flesh induced by perusal of the pages.

As I hacked my way through the verbal undergrowth, pausing to absorb the significance of each of the numerous qualifying clauses, worked my way through complicated diagrams and then re-read in order to made sure that despite all appearances there must be gold somewhere, I longed for the experience, common sense and humanity of a Medawar to tell us in plain words how scientific productivity can be increased. My prayers were answered for on the 28th February his *Advice to a Young Scientist* was published and happily fell into my hands, and, though this latter book contains no figures, no tables and less than one-fifth of the verbiage of *Scientific Productivity* and is not explicitly directed to this subject, Medawar has far more of value to say to scientists, scientific administrators, and science policy makers and watchers at one-quarter of the cost.

Scientific productivity is a difficult concept, raising questions of volume, intellectual or experimental excellence, magnitude and nature of the impact of the research unit's output on the development of the subject (some developments seen as exciting at the time they are published are later shown to be inhibitors rather than catalysts of progress, a point not really brought out in the book), applicability to economic or social ends etc., etc. Moreover the weight to be attached to each of these many factors might be expected to depend not only on time but on the social and political viewpoint of the assessor. So one has great sympathy with the team of investigators in their methodological difficulties. Therefore the reader tends to concentrate on the conclusions to see if they are so much better and more useful than widely held views and opinions that, as that rock of common sense Ralph Waldo Emerson predicted "The world will make a beaten path to his [in this case the authors'] door". I fear the world will not, for who will want to read so much to arrive at conclusions like the following. I quote from Part 1: "The social position of the individual within the social hierarchy of a research unit proves to be one important correlate of differences in performance at the individual level and the size, age and scientific exchanges of the research unit are additional factors that relate to group productivity", "The results from academic research units seem to be in accord with the 'human relations thesis' that is, that the idea that good leadership

leads to a high group morale and that high morale leads to increased productivity by group members", "that human resources are more significant than [financial resources or access to information]", "The results show that higher levels of effectiveness tend to occur where there is more communication" and "That higher performing units tended to have more dedicated professional members with more diverse working roles and intellectual resources".

But one must have some sympathy for the authors. It seems that a questionnaire, reproduced in an appendix, was sent out to a large number of workers in many European research units. 11,000 of them in 1,200 units distributed over six countries responded. Those who devised the questionnaire are also the authors of the 14 chapters which comprise the book and they had at their disposal all the information elicited by the questionnaires. Apart from the first two chapters (in many ways the best in the book) describing how the International Comparative Study on the Organisation and Performance of Research Units was conceived and mounted and the resultant data analysed, each chapter is by a different author or group of authors. Full freedom was given to each to use his or her own methodology and to exercise personal judgements, and no attempt was made to draw them into a symposium at which differences and common features of their conclusions could be collectively explored. Indeed there seems to have been a perverse pride in avoiding this useful device and also in inexplicably arranging the chapters in an order "alphabetical by the authors' national or international affiliation". I expect that, like myself, other sociologically illiterate scientists would have been grateful to have had some guidance provided by a consensus of the consortium members as to the weights to be attached to the various findings. Nonetheless several chapters do have some useful reviews of past work, and some conclusions are drawn from this and from the empirical data yielded by the enquiry.

It is sadly ironic that the book appears under the imprimatur of Cambridge University where so many highly successful research units have been established either by administrative fiat or more often have evolved from a happy coincidence in time and place of an opportunity and those capable of seizing it. This prompts the questions as to whether Max Perutz, when building up and running the highly successful Laboratory of Molecular Biology in Cambridge, and indeed others with similar track records, would have done better if they had had all these conclusions firmly embedded in their consciousnesses and, more importantly, whether those charged with the responsibility for establishing units in the future would make better decisions after reading this book. The answers must remain a matter for conjecture but I am quite certain that they would have been even better advised to read Medawar and then ask themselves a series of questions: for example "Would a research unit in this field offer a reasonable prospect either of a significant advance in knowledge or of meeting some societal need? How can I identify and appoint the highest quality person(s) to lead it and procure the necessary material resources for them? What is the best intellectual environment for the unit to flourish?" And perhaps of greater importance "How can the inevitable tension between the paymaster and the research unit be mediated so as to maximize the freedom of the Director and his staff which is necessary for high creativity and productivity without giving them a licence grossly to ignore the terms of reference under which they operate?" Then there is finally the most difficult question as to how one is to know when the research unit has served its purpose or has lost its quality and should be closed. There is little in this book which helps with the resolution of these practical problems and what there is is difficult to quarry without reading the whole book for there is no subject index.

Of course this is not the only book which fails such tests of practical utility to the decision makers but which may nonetheless be of value to the community of scholars to which the authors belong, in this case all those interested in sociological enquiry. I am not competent to express any opinion on this latter question, and in any case this is perhaps of less relevance because the Foreword by UNESCO makes it plain that the work was the outcome of that body's Nineteenth General Conference and the same Foreword refers sympathetically to ". . . citizens in many countries asking for more public accountability. They want to know the use to which their resources are put and they demand that the programs that they support shall be both efficient and effective". That these desires should be gratified is unexceptionable. This principle can equally be applied to the UNESCO programme of which this book is the visible and ponderous product. All the more pity that we are not told how much the whole enterprise cost and thus be able to judge whether the expenditure was justified. I have a strong feeling that if those scientific directors of research units who spend £20 on this book were each to buy, at slightly greater cost, a pair of good mountaineering boots and, after salubrious daily scrambles, to confer on this topic in the evenings throughout a week spent at some delectable Alpine centre they would bring down from the mountain more useful tablets than this book. □

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