

## Fuel and its supply

*Energy Resources.* By J. T. McMullan, R. Morgan and R. B. Murray. (Edward Arnold: London, 1978.) Paperback £3.50.

FOUR years ago, in 1975, John McMullan, Roger Morgan and Robert Murray of the New University of Ulster at Coleraine completed a 500-page book entitled *Energy Resources and Supply*, which was published a year later by Wiley. It was a book for graduates and advanced undergraduates, one of the better examples of a genre then burgeoning in popularity. Shortly thereafter the three authors wrote a non-specialist version of the book, only about one-third the length, entitled *Energy Resources*. The paperback version of this second book has now been brought out by Edward Arnold, in their Resource and Environmental Sciences Series, aimed at late school and early university readers. The new book begins with a chapter on energy as an issue; there follow chapters on energy conversion, 'power from natural sources', fossil fuels, nuclear power, and 'inefficiencies'. There is also an appendix on units and an odd and idiosyncratic bibliography.

*Energy Resources* exhibits many of the virtues of its forerunner. It is readable, written with a light touch and generally good at explanations which convey the shape of a mathematical argument while eschewing the mathematics. The authors do now and then adopt a slightly sneering tone, doubtless intended as jocular but not quite coming off. Anyone who presumes to correct the misapprehensions of others would be better advised, in this fast-moving field, to manifest a certain humility. A great deal has happened since the authors first put together the thesis of their earlier book, and even since the text of their second was finalised in 1976. Their viewpoint, while still widely shared, particularly by official planners, has been overtaken by evolving developments, to such an extent that many of their unstated assumptions have since been scrutinised, analysed and found wanting: for instance their uncritical reiteration that the breeder reactor makes it "possible to use all the available uranium" as fuel, or their distinction between 'weapons-grade' plutonium and any other kind (*all* plutonium is possible bomb material). Chapter 3 on 'energy conservation', says virtually

nothing about the most important stage of energy conversion: that which takes place at the point of end-use of the energy. The book devotes ten pages to nuclear fusion—which does not yet even reliably exist as a controlled phenomenon, much less an energy source—while giving less than two pages to thermal insulation, undoubtedly the energy technology of highest current priority. Recent work, notably the report *A Low-Energy Strategy for the UK*, by Gerald Leach (Science Reviews Ltd and International Institute for Environment and Development: London, £7.50; for review, see *Nature*, 277, 162; 1979) demonstrates the starting potential for improvement in the

end-use energy-conversion infrastructure, to make far more use of both ambient and fuel energy. In retitling the slimline version of their book the authors would have been more accurate to refer neither to 'energy' nor to 'resources' in general, as they deal only with the narrow range categorised as 'fuel' and its 'supply'. As our understanding of the true dimensions of opportunity in energy policy deepens and broadens, 'fuel supply' seems likely to become less and less interesting.

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## Global chemistry

THE consequences of the release of chemicals into the environment, including their chemical pathways and their effects on flora and fauna (including man), have attracted a great deal of attention in recent years, which shows no sign of abating. Much of the concern has followed in the wake of the development of methods of analysis which allow chemicals to be detected in ever smaller concentrations, and it is becoming clear that we live in a most complex chemical soup. Whether this necessarily places us at more risk than our immediate ancestors, however, is not at all certain, although this is one of the questions to which the two books reviewed here address themselves.

R. A. Horne, in *The Chemistry of our Environment* (Wiley: Chichester, UK; £19.40) has set himself a much more ambitious task than J. Lenihan and W. W. Fletcher, in *The Chemical Environment* (Blackie: Glasgow; hardback £8.90, paperback £4.50)—that is, to give an account of the chemistry of the total environment beginning with nothing less than the Solar System. On the whole he succeeds well, and there is a great deal to learn from a study of his book. The writing is as concise as can be expected in a tome of over 800 pages and the text is illustrated by many excellent figures and tables; each chapter also includes an extensive set of references for those with the stamina to explore the subject further.

What spoils the book for me were Horne's not infrequent incursions into polemic, although in his introduction he does warn that he writes both to instigate and to provoke. When he does provoke, however, he often also shows the lack of deep understanding which

characterises the instructional parts of his book. Much of the controversial material appears in chapter 12 which deals with "Man's Perturbation of the Biosphere", which includes, in a section entitled "Internal Pollution", an outburst on the evils of drugs, drink and tobacco. Although no-one would suggest that any of these did not present serious dangers to health, I doubt that the present book is the right forum in which to deal with them.

The final section of the book considers whether or not the Earth will survive, at which point Horne finds himself overcome with a sense of futility. Although not convinced that we are all doomed, Horne nevertheless does consider that life on the planet will become very unpleasant indeed, because of man's propensity increasingly to pollute his environment. The pollution he is most concerned with is this context, however, is not chemical but human. Horne believes that the weight of population will finally produce stresses in the environment which are irresistible. This gloomy prophecy seems a long way from the book's original starting point.

The book which Lenihan and Fletcher have edited, in the series *Environment and Man*, is a much slighter work, and although called *The Chemical Environment*, is a highly selective account of some environmental pollutants preceded by an excellent, short survey of the natural cycles of the elements in the environment by Bowen. Those who read Horne's book would do well to use this chapter as their introduction to the subject.

The remaining chapters of this book vary in style and content, but are all interesting and informative and I enjoyed particularly Kipling's elegant chapter on arsenic.

The book does not give anything resembling a complete account of the hazards which chemicals in the environment present to man, nor does it pretend so to do. However, I am surprised that