

Worthwhile science

J. R. Ravetz

Science and Its Critics. By John Passmore. Pp. 102. (Duckworth: London, 1978.) Paperback £2.95.

AN advocate of an unpopular cause could not wish for an interpreter more judicious and sympathetic than John Passmore. Continuing his series of surveys of the deeper problems of our scientific world-view, in *Science and Its Critics* he handles some very controversial matters with unflinching erudition and tact.

Through four themes, he reviews the great variety of criticisms that have been made of science. The easiest to handle is the first, the claim that scientific explanation is defective as a means of real knowing. The many ambiguities in the concept of "explanation" are sufficient for the fragmentation of any line of criticism. The criticism of the destructive potential of science-based technology merits more consideration. Passmore refuses to allow the shelter of ignorance of consequences claimed by "pure" scientists. For our science is too bound up with technology, both in its present practice and in its basic philosophy as announced by Bacon and Descartes. Although the problem of personal responsibility of the scientist is not easily resolved either way, the collective involvement of science in its applications cannot legitimately be denied.

When he comes to "the scientific spirit", Passmore seems at last to be speaking more from knowledge of man than of books. He coins the useful term "aristoscience" relating to the elite practitioners of the elite fields. For that, the "spirit" requiring analysis is *hubris*. He described very compellingly how this affects the style of scientific work, right down to the self-serving criteria of choice of problems, the setting of inappropriate standards for "immature" sciences, and indeed an indifference to the welfare of ordinary people provided that scientists are well fed.

Finally, he talks of "uniqueness, imagination and objectivity", still rebutting metaphysical attacks but admitting the strength of social criticisms. And this seems to be the verdict, as it emerges towards the end. As a social institution composed of people, science is not immune from any weakness or failing. But as an ideal for knowledge, placing man in a particular relationship to the Universe, science, as the successor to the philosophies of the Renaissance and the

Enlightenment, expresses the essential values of our civilisation.

Thus, in a bare hundred pages Passmore has introduced the whole field of criticism of science, including quotes from all the significant authors. Its only defect as an introductory text for students is that the argument flows rather too smoothly from one topic to the next; another edition with sections and break-headlines would much enhance its pedagogical value.

This book was written in response to the crisis of the 1960s; John Passmore might now begin working on the sequel which will be necessary for the 1980s. This epoch has just begun, inaugurated by the nuclear accident at the Harrisburg plant,

Three Mile Island, Pennsylvania. In America the Press carried reflective stories with such headlines as "The Nuclear Experts Can't Be Trusted" and "Credibility Crap": "One of the first casualties of the Three Mile Island nuclear accident was scientific credibility . . ." (*Newsweek*, 23 April, 1979). How "scientists" could be involved in the same processes of prevarication, lies and cover-up as the Vietnam or Watergate politicians, is a problem which, I believe, must be considered urgently by those who would understand and defend what is worthwhile in science in the coming period. □

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Hückel theory

Hückel Theory for Organic Chemists. By C. A. Coulson, B. O'Leary and R. B. Mallion. Pp. 182. (Academic: London, New York and San Francisco, 1978.) £9.50; \$19.65. *Hückel Molecular Orbital Theory.* By K. Yates. Pp. 371. (Academic: New York, San Francisco and London, 1978.) £20.80; \$32.

ORGANIC chemists are beginning to appreciate that an elementary knowledge of molecular orbital theory in its simplest form — Hückel theory — helps greatly in understanding the properties and reactions of organic molecules. These books are not the first to attempt the exposition of Hückel theory for the organic chemist, and they will not be the last; but it is possible that one of them will turn out to be the best and the other the worst.

Charles Coulson was loved by all who knew him, and deeply respected both as a scientist and as a teacher. Hückel's name is given to the theory, but it was Coulson who, first with Rushbrooke and later with Longuet-Higgins, developed it and showed how powerful it could be, for all its simplicity. He lectured on it to organic chemists in Oxford, and in 1971 the lectures were recorded on magnetic tape. Mallion and O'Leary have now transcribed the recorded lectures into print, and although they have been unable to resist the temptation to add some pretty mathematical results of their own, they have confined themselves to appendices and footnotes. The rest is Coulson: precise but not pedantic, simply expressed but not

condescending and always honest and good-humoured. One can quibble about a few matters (is the ω technique of any interest now? Is free valence of any use to anybody?) but this is as thorough and readable an account of the principles of Hückel theory as we are likely to see. There are a few misprints, and a few other irritations, such as the use of "less-approximate" to mean "more accurate" and the pervasive hyphenation of adjectival phrases, as in "reasonable (but-not-exactly-correct) supposition", but these are unimportant. The prospective purchaser may be further encouraged by the knowledge that the royalties will go to the Coulson Memorial Fund at Oxford, to support foreign students of theoretical chemistry.

It must be said, however, that this excellent book has limitations in its coverage, and these limitations will be of particular concern to the very people who are expected to read it. The applications of Hückel theory in predicting reactivity are described only briefly, and the more modern ideas which have flourished in the wake of the 'Woodward-Hoffman rules' are not mentioned at all. The book provides an excellent introduction to the basic molecular orbital theory, but it does not completely serve the needs of the modern organic chemist. It is therefore not surprising that the same publisher is responsible for the book by Yates, which seeks to cover much more thoroughly these important new ideas. It is unfortunate, perhaps, that the books arrived for review almost simultaneously, for the virtues of the one emphasise the deficiencies of the other. An example of the difference is given