The diversity of physics revealed

R.H. Dalitz

Encyclopedia of Physics. Edited by Rita G. Lerner and George L. Trigg. Pp.1,157. ISBN 0-201-04313-0. (Addison-Wesley: 1981.) $99.50, £49.50.

THE publication of a new encyclopaedia of physics is an important event. The subject is growing rapidly, not only in accuracy of measurement and detail of understanding but also in scope. A well organized volume can quickly bring the reader up to date about developments in areas outside his own speciality where new viewpoints and techniques may have become established, and, overall, can significantly speed up the progress of physics itself.

This volume contains about 450 entries, some long (18 pages on symbols, units and nomenclature; 11 on elementary particles) and some short (a few less than a column). They range from instrumentation (particle accelerators, photomultipliers, transistors, thermocouples and so on), through classical physics (analytical dynamics, thermodynamics, acoustics, geomagnetism etc.), to quantum physics (liquid helium, atomic spectroscopy, nuclear structure, Josephson effect and so on). The articles are all by well-known physicists. They show great diversity in both objective and style, and there is considerable overlap between them.

How well will this new encyclopaedia meet our needs? Many of the major entries are really excellent — for example those on elementary particles, liquid crystals, vision and colour, and non-equilibrium thermodynamics, to mention just several. For greatest effectiveness, each major article should really provide a substantial reference list, but not all do. That on nuclear reactions, two pages long, provides an excellent classification of work in this subject but gives only one reference, whereas other articles, such as those on electronics, the Hubble effect, and relativity (special theory), give a wide range of graded references; perhaps this is overdone for solar energy, with one and a half pages of references for a six-page entry.

With a variety of viewpoints of the contributors, the multiple coverage could be a strength, but some consolidation would have obvious advantages. To give one illustration, the entries for baryons, hadrons, hyperons, and mesons, each about a page in length, could usefully have been combined into a four page article on hadrons, the other three entries each being reduced to one line, cross-referenced to hadrons. In addition, the coverage of different topics is not always in proportion to their relative importance. For example, the rather detailed contribution on weak neutral currents is given five pages, without any corresponding counterpart for weak charged currents. Also turbulence, one of the least understood areas of physics, receives only one and a half pages.

Many of the articles read strangely for a newly published book, as if one is recalling a past time, some four or five years ago. For instance, quantum chromodynamics, our deepest and most promising theory of elementary particles, receives only one paragraph in each of the contributions on elementary particles, quantum electrodynamics, and unified field theory, despite the fact that it has provided an underlying basis for most of the theoretical work in elementary particle and high-energy physics over the past three years. The editors of an encyclopaedia face great difficulties, of course, but in this case they might have noted that a few of the articles called for some revision at the last moment.

The operational test of a reference book of this sort is whether information can be located rapidly. For this, the general index serves fairly well. I found that Higgs mechanism, radiocarbon dating, and Peierls stress were in the index, as was Umklapp process, although with reference to p.732 where only articles on partial waves and partons are to be found. There is no entry for current algebra but the article on currents in particle theory is indexed nearby and led me to my goal. However there is no entry for Thomas precession, nor for photon multiplier, nor even for the Wigner–Eisenbud theory of the R-matrix and its application to resonance processes.

This encyclopaedia has a great deal to offer to scientists and engineers in general, as well as physicists. The underlying plan is sound and the articles generally authoritative. With so many first-rate contributions, it should have an assured place in all science libraries. It could be substantially improved, in my opinion, but, as things stand, it is the best compilation of its type available for physics today. □

R.H. Dalitz is Royal Society Research Professor in Theoretical Physics at Oxford University.

This is psychology?

John C. Marshall

Mindwatching. By H. and M. Eysenck. Pp.224. ISBN 0-7181-1937-1. (Michael Joseph: 1981.) £10.50. To be published in the USA by Doubleday.

THERE'S an old joke about how to select candidates for admission to psychology courses. The hapless individuals are asked the simple question "Why do you want to study psychology?" Those who reply "Because I want to *understand* people" are advised to read history or English literature; those who reply "Because I want to *help* people" are told to train as surgeons, farmers, garbage collectors or tax lawyers. Any other response secures admission to the psychology department.

Hans and Michael Eysenck would, I presume, disapprove. For them, the goal of professional psychologists is "to understand why people behave as they do, so that it will be possible to predict and change their behaviour"; this goal is to be achieved by controlled experimentation, the results of which are sometimes counterintuitive and thus undermine the sceptic's claim that my grandmother knew as much "psychology" as it is possible (or wise) for any mere mortal to comprehend. The Eysencks have accordingly produced this coffee-table volume in which the purported achievements, theoretical and practical, of experimental psychology are laid out for interested bystanders. Two questions therefore arise: First, to what extent are we presented with a fair summary of modern psychology? Second, are the social implications of current work outlined in a responsible fashion?

The authors employ the stylistic device of describing in each chapter a so-called "key experiment", supplemented by anecdote and speculation. This is not in itself a bad strategy but it does lead the Eysencks into letting vaudeville prevail over rationality. For example, a section on "Attractiveness and jury decision-making" is introduced by the story of a famous nineteenth-century trial in which a woman accused of poisoning her lover was somewhat lucky to obtain a verdict of "not proven". The Eysencks speculate that since the defendant was "young, vivacious, and beautiful", these attributes may have influenced the jury and "helped to save her from the gallows". An experiment is then described in which mock juries who consider hypothetical cases of a relatively minor nature do indeed seem to be swayed a little by the physical attractiveness of the mock defendants. But the section then concludes with the claim that "most of the available research suggests that physical attractiveness has little or no effect on juries when serious crimes are involved". I can only make sense of this information by assuming the Eysencks believe that murdering one's lover is not a serious crime.

On other occasions the authors are unable to resist the temptation of a spectacular but fatally flawed study. They thus feature Rosenham's report in which a group of normal people were admitted to mental hospitals after falsely complaining that they heard voices and asking to be admitted. Following an average stay of 19