

which were overshadowed by his later work), we meet the humanist Father of Vaccination. From 1796, until his death in 1823, Jenner constantly and doggedly promoted his discovery in the face of persistent opposition.

Some of these encounters seem to me to have almost as much force as if they were face to face. We feel Jenner's exaltation, for example, when he learns of the successes of vaccination in Copenhagen and Ceylon, and of the spectacular expedition dispatched by the King of Spain under Francisco Xavier Balmis which brought vaccination to Spanish territories around the world:

A few days since, I rec'd from Madrid a Document respecting Vaccination which fills me with more astonishment than anything that has yet reach'd me on that subject . . . Would to Heaven the British Cabinet had shown the same Philanthropic Spirit as that of Spain! [p.31].

We also share his exasperation and frustration at the cost in lives and suffering as a result of the antivaccinists in his own country, while much of the rest of the world adopted his discovery with thankful alacrity:

One would think the statement of Facts, as they now stand before the Public from every quarter of the Globe would blow away such stuff as these abominable people produce, like Chaff, but it is not so, or the Bills of Mortality would not exhibit weekly such horrid scenes of devastation from the Smallpox [p.70].

No biographer or historian could convey Jenner's feelings during this period of his life better than he does himself in these letters.

The format of the book is well chosen. The annotated letters are presented in chronological order, except for the six which are of unknown date. Miller introduces the correspondents, and other persons as they are first mentioned, with short biographical sketches. In helpful but unobtrusive footnotes, she also explains various phrases, objects, practices and so on which are unfamiliar to us. Easy access to the contents is assured by means of an index, and by the table of contents in which Miller lists the letters in order, with the name of the correspondent and the key subject(s) discussed in each.

Fifteen other documents which are included in the 20-page appendix, we are told, "constitute the remainder of the unpublished Jacobs material relating to Jenner or to contemporaries involved with vaccination" (p.xxvi).

My only real disappointment after reading the book is a direct result of its effectiveness: I came away yearning to see all of Jenner's letters compiled and published in a single work. Until then, however, this collection will do very well. □

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## All of physics

R.H. Dalitz

### McGraw-Hill Encyclopedia of Physics.

Editor-in-chief Sybil P. Parker.

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*The McGraw-Hill Encyclopedia of Science and Technology* is a well-known publication, unique in its coverage of all fields of science. It has been revised about every five years, the most recent edition being the fifth which was published in 1982 (for review see *Nature* 229, 283; 1982). Its articles have developed over the years, so that they are now well pruned of excess material and unusually free from errors.

This *McGraw-Hill Encyclopedia of Physics* has been made up by selecting 760 articles dealing with aspects of physics and mathematics, taken from the 1982 edition of the larger work. About 40 per cent of these articles are quite short, occupying less than a column but with ample cross-reference to the longer pieces in which they find a natural place. About 12 per cent are more substantial, occupying more than 8 columns each. Some of these are much longer, for example *gas dynamics* (15 columns), *superconductivity* (17), *radioactivity* (35) and *ultrasonics* (15). To categorize the articles in this way is perhaps misleading, however, since some large topics have been broken up; thus for fluid flow we have *fluids* (4), *fluid dynamics* (1), *fluid flow* (9), *fluid flow principles* (2), *fluid mechanics* (3) and *fluid statics* (1), not to mention *hydrodynamics* (8), *turbulent flow* (5), *magnetohydrodynamics* (11) and *gas dynamics* (15). On the other hand, *particle accelerator*, amounting to 50 columns, is a single entry but has seven sections, each with a different author. Perhaps more of the shorter pieces could have been grouped together in this way, although this might have made them appear forbidding to inexperienced readers.

Many of the articles are excellent. Plasma physics and nuclear physics are particularly well-served, the accounts being quite up to date and clearly illustrated, but the areas of elementary particle physics and condensed matter are also very well covered, as are more traditional topics in articles such as *units of measurement*, *sound*, *molecular physics* and *gravitation*. The mathematical articles are compact but generally quite accessible. Their style varies considerably; for example *combinational theory*, *graph theory*, *statistics* and *trigonometry* are clear and readable whereas a few of them, while being excellent and authoritative, are rather technical for the average physicist, let alone a high-school student. All but the shortest pieces have an adequate bibliography, two to five sources being quoted, generally covering standard books on the subject as well as one or two recent

review articles. The articles are well cross-referenced, often paragraph by paragraph, and at the end of the volume there is a detailed index.

The reader will generally start with the index, which will offer a possible article. In reading this, he will find cross-references to related articles. By proceeding systematically in this way, he will generally be led to what he needs. For example, I tried the term *eigenvalue*, for which there is no article. The index referred me to *quantum mechanics* and to *eigenfunction*, while the latter referred me to the former and to *non-relativistic quantum theory*, so I quickly reached my goal. However, it is possible for topics to slip through this overlapping net. For example, spontaneous decay of the proton, a central topic of current research, is not in the index. The article *proton* does not mention it. The index for proton lists *proton radioactivity* but this turns out to be nuclear decay by the spontaneous emission of a proton. After some looking around, I found the topic contained in the *baryon* article under the subheading *proton stability*, and in the *elementary particle* article under the subheading *grand unified theories*. Another example is cosmic radiation, although this subject may perhaps be considered more a part of geophysics or astrophysics. The index led me to *bremstrahlung*, in which proton emission by cosmic ray particles is briefly mentioned. This article gives a cross-reference to *cosmic rays*, but there is no article of that title. The basic facts about cosmic rays really merit a place in this volume, since they have been historically of immense importance and still give the highest-energy nuclear collisions available for study.

It is natural to ask how this encyclopaedia compares with the *Encyclopedia of Physics* published by Addison-Wesley in 1981 (for review see *Nature* 290, 657; 1981). The main difference is that the latter is really intended for other physicists, or at least for scientists in neighbouring fields, who seek enlightenment on a topic peripheral to their own area of expertise. It has fewer articles but they are longer, on average, and considerably more technical, with equations being used freely. However, it seems that many of the articles of the Addison-Wesley encyclopaedia were written not later than early 1977, so it is not up to date on topics in areas of rapid growth. The McGraw-Hill version would appear to be the most suitable available for the audience to which it is directed — high schools and colleges. But all concerned with mathematics, physics, chemistry or engineering will find much of interest to them in its pages, laid out in an attractive and easily digestible form. □

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