spondents with the ills of their own bodies. But a few colourful references to the life of the time do intrude: for example, in Watt's charming description of a world "full of flying balls" (an allusion, dating from 1783, to the newly invented balloons of Montgolfier), and in his confession of his "abhorrence" of democracy (a confession provoked by his son's disturbing sympathies for the Jacobins). Moreover, first-hand accounts of a group like the Lunar Society of Birmingham and of Edinburgh in the great days of the Scottish Enlightenment could hardly be less than absorbing; and these particular accounts are all the more interesting for the frankness with which Black, Watt and Robison passed judgment on their contemporaries, especially if, like Magellan and the "Gallic philosphers" (or French chemists), the contemporaries had the misfortune not to be Scots.

Many an appetite will be whetted by this admirable volume. It is to be hoped that it will have a success which will justify further publications from the mass of surviving Watt papers, especially from those papers which illuminate Watt's relationship with that other great figure in his life, Matthew Boulton.

ROBERT FOX

REPRINTED CLASSICS

Vegetable Staticks

By Stephen Hales. (History of Science Library: Primary Sources.) Pp. xxi+214. (Macdonald: London; Elsevier: New York, February 1970.) 42*s* boards; 21*s* paper.

THIS book raises the problem of whether it is or is not possible to have too much of a good thing. There can be no doubt whatever that Stephen Hales's *Vegetable Staticks* is a classic of natural science. But is there really a case for publishing it twice in eight years? The price has gone up from 12*s* 6*d* to 21*s* in paperback alone. Otherwise nothing seems to have been changed except the cover design. Well, I suppose the edition of 1961 is sold out, and there is still a substantial demand.

It is, however, to be regretted that the publishers did not choose to give us something new in reprints. I have not heard of any reprint of Hales's *Haemastaticks*: to go no further afield. But there are innumerable classics of the biological sciences that call aloud for republication. Has anybody reprinted Galton's *Natural Inheritance*? His much less valuable *Hereditary Genius* was reprinted in 1962, though much of the interest of reprinting was lost by choosing to reprint the edition of 1892 rather than the original of 1869. So far as I know, Johannsen's *Ueber Erblichkeit in Populationen und in reinen Linien* (1903) has never appeared in English, although it is a work of the first importance. It could well be published with the historical preface to de Vries's *Mutationstheorie* (1901–1903), which admirably explains its context. Then there are Cuénot's papers on heredity in mice, among the best of early Mendelian studies; and as for Correns, who knows that he was not simply one of the three "discoverers" of Mendel, but one of the most interesting geneticists of his time? The list could be continued indefinitely.

J. S. WILKIE

CONTROVERSY RESOLVED

The Conflict between Atomism and Conservation Theory, 1644–1860

By Wilson L. Scott. (History of Science Library.) Pp. xiv+312. (Macdonald: London; Elsevier: New York, February 1970.) 100*s*.

UNTIL recently, most historians of science agreed that the key to historical understanding lies in the continuities which are discoverable in even the most revolutionary moments in science. Philosophical accounts of science and its methodology, in spite of their oversimplifying assumptions, supported this historiography by stressing the cumulative nature of scientific progress. Recent research has led to a re-examination of this view. Its adequacy is now keenly debated. Scientific theories, it is argued, rarely if ever incorporate their predecessors; they are best described as mutually incommensurable. That continuities are discoverable is more a pious hope than historical fact. The history of science, it is alleged, is shot through with developments which can only be described as revolutionary.

Professor Scott's study is an important contribution to this debate. It is also a masterly account of a conflict which for two centuries provided a focus for the physical sciences. Many will welcome his detailed documentation of a period less well served by historians of science than it deserves. Within 300 pages, the author presents, coherently, authoritatively and compellingly, the results of his exhaustive research into a highly complex controversy.

The book consists of three parts. In the first, Scott traces the interaction between the Newtonian theory of matter which postulated hard inelastic atoms, and the Leibnizian impact theory which postulated conservation of *vis viva* (mv^2). Both parties agreed that if two hard inelastic bodies were to collide, they would sustain instantaneous velocity changes. For the Leibnizians, arguing on the basis of a law of continuity, this represented a *reductio ad absurdum* of the concept of hard inelastic bodies. For the Newtonians, it merely demonstrated that *vis viva* is not conserved. Scott pursues the ramifications of this dispute through the eighteenth century, relating it to a variety of achievements in theoretical physics.

Book two shows how French and British engineers contributed to the clarification of the controversy. French engineers developed, with considerable success, Newtonian hard body impact along lines suggested by d'Alembert Maupertuis and Lagrange. British engineers, however, associated themselves with the academic, even metaphysical, Leibnizian conservationists. In so doing, they focused attention on accounting for loss of *vis viva* in terms of conversion to other forms of energy, and, like their French counterparts, provided essential parts of a framework within which the energy conservation law could be expressed and understood.

At the outset of the nineteenth century, coherent physical theory was beginning to replace an intricate web of conflict and confusion. In book three, Scott exposes in four summary but incisive chapters the way in which this synthesis was achieved. Among his themes are the establishment of Newtonian atomic theory in chemistry at the hands of Dalton; its extension to a theory of atomic heat capacity by Dulong; the contributions of Dulong and Joule to the first law of thermodynamics, and the relationships between kinetic theories proposed by Herapath, Joule, Clausius and Maxwell.

As previously remarked, Scott's pioneering investigations will interest those who acknowledge the historical and philosophical dimensions of science. Specifically, the belief that the emergence of energy conservation and kinetic theories represent radical and revolutionary innovations rests, so Scott argues, on a serious underestimate of the case for continuity. It is as a conclusion to a penetrating examination of the physical sciences, rather than as a general and historically contentious premise, that we should understand his remark that "when science loses contact with the context of its past, valuable time is necessarily diverted to the rediscovery of vital ideas and concepts which were clear to a previous age". Nevertheless, little harm would come from an appraisal of its wider implications.

B. S. GOWER