Book Reviews

LOVES OF ENGINES

Memories and Machines

By Sir Harry R. Ricardo. Pp. 264+17 photographs. (Constable: London, September 1968.) 45*s*.

FEW inventions of modern times have had an impact on our society equal to that of the internal combustion engine. For this reason, if for no other, the memoirs of Sir Harry Ricardo should be of especial interest. They are, in fact, of interest for many other reasons: the pellucid narrative account of historic researches, the thumb-nail sketches (always generous and charitable) of colleagues, many of whom became famous, and the glimpses of domestic felicity and of outdoor pastimes which help to fill in the picture of a remarkable man.

I well remember that, some 45 years ago, Ricardo's book, *The High Speed Internal Combustion Engine*, was regarded as *the* authority, and long did it remain so. I also recall that any lecture by him was a great occasion; one knew that it would describe original work enlivened by the most homely and telling analogies. In fact, anything that Ricardo wrote deserved attention. And now we have his own life story.

There was early evidence of Ricardo's mechanical skill and interest in engines: when at school he converted his pedal-cycle to steam propulsion, which "gave great anxiety to my poor housemaster". His Cambridge years were dominated by close association with Hopkinson, who seems to have been an inspired experimentalist, and who gathered around him many who later became distinguished—a Rutherford of the internal combustion engine. Armed with an optical indicator given to him by Hopkinson, Ricardo was able in 1912 to confirm suspicions which he and Hopkinson had in 1906 that detonation in petrol engines was caused by an explosive wave inside the combustion chamber. Ricardo carried the concept much farther, however, showing the importance of cooling the unburnt "end-gas" and of the chemical nature of the fuel. From this emerged an anti-knock scale, later modified in terms of octane numbers. In 1917 he began a long association with Shell which, in its early stages, resulted in the evaluation of a wide range of hydrocarbons. This, soon after the First World War, led to collaboration with Tizard and Pye and to the classic "Empire Motor Fuels" report.

Ricardo also tells the story of how he came to realize the importance of turbulence, of the development of the turbulent head, and of some exciting litigation which followed in which Sir Stafford Cripps represented his interests.

During the First World War, Ricardo's contribution was the design and development of the tank engine. Such outstanding events were interspersed with other ventures —some successful, others not. Among the latter were his attempts to develop a stratified charge engine, and two engine designs frustrated by extraneous circumstances, one for flying-boats in the First World War and the other for the R100 airship.

It was obviously the author's deliberate choice to concentrate on the earlier phases of his long and distinguished career. The story stops (and many will regret this) well before the Second World War. In fact, the period between the two wars is dealt with fairly briefly, being "telescoped" more and more as the years pass by. The result is that there is all too little reference to Ricardo's great contributions to the development of the high-speed diesel engine for road vehicles, and to the activities of the firm which bears his name.

This autobiography is modestly and beautifully written by a delightful personality who, at 83 years of age, is still fascinated by his early love—the internal combustion engine.

C. G. WILLIAMS

STENO'S PRODROMUS

The Prodromus of Nicolaus Steno's Dissertation concerning a Solid Body enclosed by Process of Nature within a Solid

Edited by George W. White. An English version with an introduction and explanatory notes by J. G. Winter. (Contributions to the History of Geology, Vol. 4.) Pp. vii+169–283. (Hafner: New York and London, 1968.) $12.50.

UNTIL comparatively recently the contributions to science made in the seventeenth century by the Danish anatomist, geologist and ecclesiastic Niels Steensen (Nicolaus Steno) have been somewhat neglected, at least outside his own country. Recent publications by Dr Axel Garboe and Dr Gustav Scherz of Copenhagen have again drawn the attention of historians of science to his work. They have also added considerably to our knowledge of the life of this remarkable man who, had he not forsaken science for the Church, would undoubtedly have gained still greater distinction as a scientist.

Though he made a number of important contributions to the science of anatomy, geologists remember him as the author of a work first published in Latin in Florence in 1669, *De Solido intra Solidum Naturaliter Contento Dissertationis Prodromus*, commonly known as Steno's *Prodromus*. This work, though its title may not indicate it, is one of the great classics in the history of geology. It embodied new and sound conclusions about stratigraphy and the origin of fossils; and it recorded for the first time the observation, important in the history of crystallography, that the interfacial angles of crystals of quartz (rock crystal) are constant, irrespective of any irregularities in the development of individual crystal faces. Steno's contributions to geology, like those of his contemporary Robert Hooke, were so far ahead of their time that their influence on the development of geological science, though not negligible, was less marked than would have been the case had they been published a few decades later.

A translation of the *Prodromus* into English made by Henry Oldenburg was published in London in 1671, but copies are now so rare that it is virtually unobtainable—its scarcity was emphasized recently by an auction price of £700. No other translation into English appeared until that made by a classical scholar, J. G. Winter, published in New York in 1916. This edition included an introduction by the geologist W. H. Hobbs, an account of Steno's life, a bibliography of his writings on anatomy, geology and theology, and an index. An exact reprint of the Winter edition forms the subject of this notice. To this reprint Professor White of the University of Illinois has added a brief introduction and a short list of the more recent publications of Garboe and Scherz that deal with Steno's geological work (the list might, with advantage, have been extended). The Winter edition of the *Prodromus* has long been out of print and is not even available in some major libraries. Its importance is such that this reprint should undoubtedly be welcome to both librarians and historians of geology.

V. A. EYLES