The man behind the physics

A PORTRAIT OF ISAAC NEWTON. By Frank E. Manuel. 478 pp. Harvard Univ. Press, Cambridge, Mass., 1968. $11.95

by ROBERT S. SHANKLAND

This fine book is not only a portrait of Isaac Newton but more importantly is a scholarly presentation of rich material from which a careful reader can fashion his own portrait of the greatest of all physicists. Although there is hardly a detail of Newton's science discussed, the man himself, his methods of work and his compelling drive are skillfully revealed.

Newton's career of almost continuous achievement in science and administration spanned not only the Commonwealth and Protectorate, but the Restoration, the Glorious Revolution and through the great age of Queen Anne (who knighted him in his own Trinity College) to the coming of the House of Hanover. England, for all its changes, permitted and encouraged Newton's genius to flourish, first as an isolated scholar in Cambridge and then in governmental positions and public leadership in London.

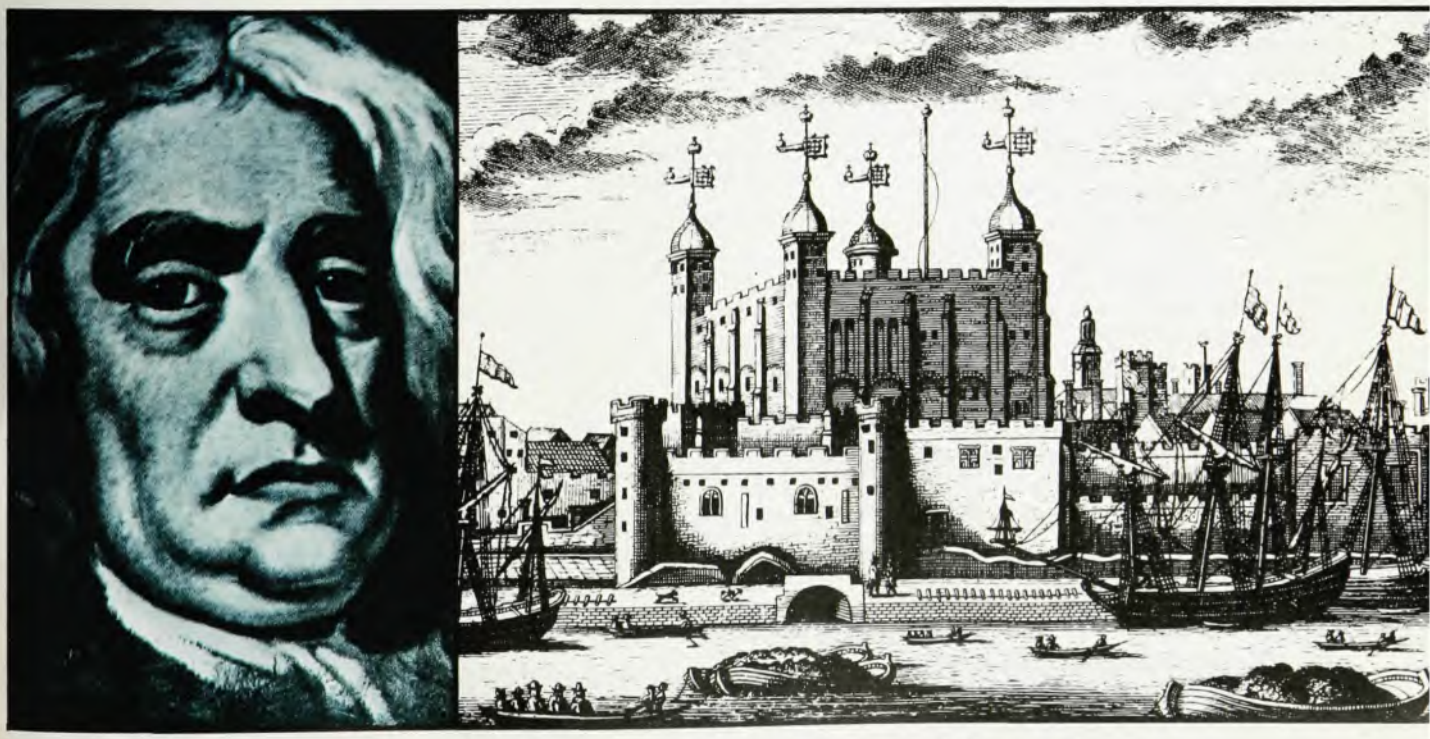
As a student and later as Lucasian Professor at Cambridge University, Newton displayed his enormous capacity for concentration and sustained productive work: Three decades of unending toil gave us our calculus and much mathematics, besides great achievements in optics and the *Principia* with its world system and theory of gravity.

But it is the London years that contribute most to the portrait. He left Cambridge because he thought his work there was completed, and also because it had become an intellectual desert. His London post was due not only to his scientific fame but also to his political role—he represented Cambridge at the Convention Parliament that brought William of Orange to the throne.

Once in London he soon became the "great man," first as warden of the Mint and then as master. In these positions Newton proved to be an administrator of rare ability and a power in the British government. He revised the coinage and put an end to counterfeiting and "clipping," often pursuing the guilty by his detailed presentation of the criminal evidence. Probably no great scientist in history has had such influence in the inner circles of government.

It was also the London years that witnessed his chief services through the Royal Society. While at Cambridge he had contributed his optics experiments, his reflecting telescope and in an unobtrusive way enriched the meetings. But once in London he gradually displaced Robert Hooke to assume the leadership and to become president from 1703 until his death at 84 in 1727. During these years English science came of age not only through the work of Newton and his contemporaries, but through the relation of science to government. The Royal Society had a central influence in governmental affairs and in the development of industrial and maritime supremacy.

Also during this period much of



NEWTON AND THE TOWER OF LONDON. As warden of the Mint, Newton pursued clippers and counterfeiters and interrogated the suspects in the Tower with his detailed presentation of the evidence.

Newton's scientific work was published under the Royal Society auspices and with the great help of his younger colleagues, Edmund Halley, Roger Cotes and others. These included the second and third editions of the *Principia*, the works on optics, on fluxions and other mathematical achievements. This book presents an engaging picture of the process by which these great masterpieces were at last published.

Until prodded by his fellow scientists, Newton always appeared reluctant to publish his discoveries for fear of controversy; yet once challenged on priority he spared no exertion in asserting his own rights and in refuting and discrediting all others who dared claim even a small share of his achievements. Here the book shows Newton as his most formidable self, bent to crush and humiliate his opponents, but also showing the kindest regard for the group of brilliant younger disciples who aided him.

It is now probably of little concern if Leibnitz deserves more credit for the calculus than merely his improved notation. But when Newton felt this rivalry from the accomplished intriguer, he loosed all his skill through the agency of his scientific friends to refute and ridicule the claims so successfully that Leibnitz died soon afterwards. It has often puzzled students of Newton's optics why he did not use the wave theory of light to explain the phenomenon of Newton's rings; the reason may well be in his abiding resentment and hostility towards Huygens for his support of Leibnitz. Newton never sought help, and he never forgave.

Physicists will be grateful that Frank E. Manuel does not often intrude to explain Newton's profound and complex nature from the viewpoint of his professional field of philosophical history. On the occasions that he does the conclusions and the relationships often are unconvincing to the physical scientist. He is more assured when he lets the impressive historical material speak for itself.

I will not comment in depth on Manuel's detailed discussion of Newton's alchemical experiments, on which he lavished such great effort but that led to so little. His chronology of the ancient kingdoms is another major story that the author treats well.

This book is exceptionally well printed and is illustrated in a most appropriate manner. Although written in a rather involved style, it should appeal to physicists, mathematicians, astronomers and all those interested in the history of science.

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Axiomatic thermodynamics

THERMAL PHYSICS. By Edward A. Desloge. 363 pp. Holt, Rinehart and Winston, New York, 1968. $9.95

by GARRISON SPOSITO

Edward A. Desloge has produced in this book a companion volume to his earlier work, *Statistical Physics*. The present tome is a relatively complete introduction to thermodynamics for advanced undergraduates, which has been heavily influenced by the axiomatic school of Laszlo Tisza and Herbert Callen. Readers who favor this view will not be disappointed to find themselves once again in the friendly milieu of energy and entropy postulates, partial Legendre transforms, mnemonic diagrams and Jacobians.

Moreover, they will not find that *Thermal Physics* is just a condensed "Callen," for its author has gone to great lengths to motivate empirically and justify the postulates he presents. In a very real sense Desloge has attempted to synthesize the laws and the axioms of thermodynamics by showing, in 73 pages of fundamental discussion, that law and axiom are but two faces of the same distillation from experience.

On the pedagogical side, the book has a number of valuable attributes. Its chapters are short, averaging about nine pages a piece, and are well endowed with worked examples and rel-

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