Another Lucasian Professor

The Mathematical Work of Charles Babbage. J. M. DUBBEY. Cambridge University Press, New York, 1978. viii, 236 pp. $26.50.

One spring afternoon in 1828 the bells of St. Mary's, Cambridge, rang out for the election of a new occupant of England's most prestigious chair of mathematics—the Lucasian professorship, once held by Isaac Newton himself. But the man so honored, who was in Italy at the time (he learned the news from a Rome newspaper), hadn't even asked to be considered, and his immediate reaction was to decline the post. His friends talked him out of this. In the event he held the chair for ten years, during which time he never lived in Cambridge and never gave a lecture (although he did participate in examining). This strange scholar was Charles Babbage, whose name is familiar today as the pioneer of computer logic and technology.

When younger (he was born in 1791), Babbage had helped brew up a storm over the out-of-dateness of the mathematical sciences in English universities by contrast with what was happening in Europe. (In illustration: it wasn't until the 1830's that Laplace's tremendous *Mécanique Céleste* was available in English. Then two translations appeared—one by Bowditch the navigator, who was an American, and the other by Somerville the aristocrat, who was a woman and therefore nonacademic by definition.) So it seems odd, to say the least, that when presented with this golden opportunity to revitalize the teaching of mathematics Babbage should pass it up. The main reason was that his zeal had flagged; he had become wholly absorbed in his calculating machines, the construction of mathematical tables, and allied topics. His work in these areas has been discussed in many places in recent times. But Babbage the pure mathematician has not been properly examined, and this book makes good that omission.

Dubbey points out that Babbage's original work in mathematics "began in 1813, continued at a prolific rate, producing three books, two unpublished books, three papers of considerable length, fourteen other papers, two long encyclopedia articles, and then came to an abrupt end in 1821." The unpublished books are "The History of the Origins and Progress of the Calculus of Functions," belonging now to the Museum of the History of Science at Oxford, and "The Philosophy of Analysis," now in the British Museum. The author has consulted both these manuscripts.

In a fresh and illuminating appraisal Dubbey persuades us that Babbage's potential as a creative mathematician was greater than had been realized and that his treatment of the calculus of functions was novel and forward-looking. What he lacked in rigor was compensated by his ingenuity. Especially notable is his concern with the all-important matter of notation. This was a leitmotiv in all his work, going back to his earliest attacks on the English sanctification of Newton's defective symbolism in the differential calculus.

Here we have what is required reading for anyone seriously interested in the progenitor of the computer age. A pity, though, that the volume, which is small and quite ordinary (physically speaking), is so expensive.

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A Provincial Scientific Community

Science in Victorian Manchester. Enterprise and Expertise. ROBERT H. KARGON. Johns Hopkins University Press, Baltimore, 1978. xiv, 284 pp. $16.

The most abiding historical image of Manchester has undoubtedly been as the shock-city of the first British industrial revolution: it symbolized the harsh problems of urban industrial society. At the same time, however, its energy and wealth made it a place where science could be pursued and patronized with a success unequaled in other parvenu provincial manufacturing towns. Its renowned heroes, such as Dalton and Joule, remain secure in the scientific pantheon. At the institutional level, too, it was the setting for notable innovations: the Literary and Philosophical Society (founded in 1781) is Britain's oldest surviving provincial scientific society, and Owens College (founded in 1851) rapidly became the prototype British provincial science-based university. Science in Victorian Manchester is therefore an important and enticing theme.

As Kargon's bibliography confirms, the multiplicity of sources facing the Victorian urban historian is daunting. Rather than be overwhelmed by his data, Kargon has shrewdly chosen to portray the evolution of Mancunian science using various typologies concerning scientists and science. He organizes his material around five kinds of scientist: the gentleman who pursued science as leisured polite learning; the devotee dedicated to a scientific career on which he was not dependent financially; the civic who practiced science for money under a utilitarian banner that proclaimed both public good and private profit; the academic who served Manchester's industrial and commercial needs; and the university scientist committed to international success by way of research. In a related way Kargon uses the two conceptions of science as enterprise and as expertise. By these he means the views that scientific knowledge, indeed scientists, can be produced like goods and that science, being the supreme form of human knowledge, is fruitfully applicable to social and other problems.

These typologies enable Kargon to interweave deft accounts of scientific institutions and of scientific careers. He resurrects societies, like the Manchester Geological, that are usually dwarfed by the "Lit and Phil" and gives welcome attention to individuals, such as Binney and Leigh, who are normally condemned to lurk in the shadow of their contemporary Joule. In thus depicting Manchester's changing scientific community, Kargon rather surprisingly does not try to buttress his general case by exploiting prosopographical techniques: he relies mainly on shrewd qualitative portraiture. One wonders, too, how Mancunian activities in statistics and phrenology fit into his synoptic survey: after all, the Manchester Statistical Society (founded in 1833) was the first in Britain devoted to that subject, which in its numerical aspects fell under the rubric of science. Sometimes the stress on typology leads to an unbalanced account: though it is indisputable that in the 1860's Owens College, led by Roscoe and Balfour Stewart, displaced the "Lit and Phil" as Manchester's leading center of scientific activity, Kargon virtually ignores the latter after 1870. That same stress on typology, progressively interpreted, explains the startling gaffe of representing Manchester in 1840 as a scientific backwater.

These are, however, not disabling faults in a work that generally succeeds in giving a reliable and perceptive account of a scientific community. Without in any way displacing the important work of Thackray on Mancunian science in its cultural context, Kargon's book-length account lifts the study of that science to a new level. In his penetrating