

the role of institutions in science and society. On a practical level, she seems unaware of such interesting historical issues as the difficult birth of Kew Gardens and its struggle for pre-eminence with the Botany Department of the British Museum. Kew prospered because of its decision to concentrate on economic botany, an area in which the British Museum was unable to operate. The question of the autonomy of government science – as reflected in the Ayrton affair – gets scant treatment, as does the whole topic of professionalization: it is surely wrong to assert that Joseph Hooker inherited an established professional domain (p. 92), when in fact he spent nearly ten years searching for employment and did much to create that domain when, at last, he found it. At a deeper level, Brockway fails to make use of the rich and varied literature on the sociology and history of science, literature which would have transformed and illuminated her thesis. To analyse the political effects of scientific research, and to describe the metamorphosis of botanical knowledge into profit and power, it is not sufficient to skim over the “general intellectual background” and the “personal connexions of the Kew circle”. Scientific knowledge may indeed be the ultimate economic resource, but one has to do more than simply admire the Palm House. Brockway should throw a few stones.

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T. D. WHITTET, *Clerks, bedels and chemical operators of the Society of Apothecaries* (The Gideon Delaune Lecture for 1977), London, Society of Apothecaries, 1981, 8vo, pp. 88, illus., £2.30 (inclusive of postage). (Copies available from Apothecaries' Hall, Black Friars Lane, London E.C.1.)

It is not often that a new source-book becomes available to historians of pharmacy, medicine, and chemistry, so Dr. Whittet's comprehensive work will be much appreciated. Little is known and still less has been written about the officers of the Worshipful Society of Apothecaries, despite its fine collection of records.

It is a continuing tradition to denigrate the apothecary; either he made too much money by overcharging for his drugs (refuted by Adam Smith), or else he lived by doubtful means in squalor (according to William Shakespeare), or he was inadequately trained, and, of course, committed the vulgar crime of indulging in retail trade. Members of the Royal College of Physicians of London in the later Stuart period, as Charles Goodall relates, vented their spleen against their all-too-successful and insubordinate rivals: “We have to deal with a sort of men not of Academical, but Mechanick education; who being either actually engaged in the late Rebellion, or bred up in some mean and contemptible trades, were never taught the duty they owe to God or their Sovereign, to their Native Country or the Laws thereof.”

In fact, almost the reverse is true. The apothecaries were men of substance and standing in the community; the younger sons of county families did not feel it to be beneath them to join their ranks; they were keenly interested in the contemporary intellectual pursuits; and they particularly contributed towards advances in medicine, chemistry, and botany. Douglas Whittet relates the newly discovered story of the Society's close involvement with the development of the Newcomen steam engine, a linchpin of our early industrial advancement. He tells us of the distinguished career of

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W. T. Brande, superintending chemical operator for nearly fifty years, and of many lesser-known officers such as Nicholas Staphorst, the translator of Rauwolf's *Botanical travels*.

There are two small criticisms. An index, or at least the page numbers of the chapter headings, would have been useful; and there is rather a large number of typographical errors which lead to obscurities.

The book is profusely illustrated, the six pages of drawings of the retorts and crucibles in the old laboratory (c. 1810) being particularly interesting. It is essential reading for those who study the history of science, and it represents excellent value.

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HOWARD F. TAYLOR, *The IQ game. A methodological inquiry into the heredity-environment controversy*, Brighton, Sussex, Harvester Press, 1980, 8vo, pp. xiii, 276, £18.50.

Over the past fifteen years, the heredity-environment controversy has most often turned on the question of the heritability, or proportion of observed variance accounted for by genetic factors, of IQ scores. Unfortunately, the poor quality of the data, and the complexity of the equations needed to define and measure heritability, have led many of the participants in the controversy to play what Howard Taylor, a sociologist at Princeton University, calls "the IQ game". The IQ game is "the use of assumptions that are implausible as well as arbitrary to arrive at some numerical value for the genetic heritability of human IQ scores on the grounds that no heritability calculations could be made without benefit of such assumptions (p. 7)." Taylor surveys the state of play in this game, and in doing so provides the most comprehensive and closely argued criticism of heritability estimates for human IQ that has yet been made. He shows that the quality of the IQ data from which heritability is calculated is often very poor: the tests are sometimes poorly standardized, data from studies that would yield low heritability estimates are simply ignored, the "separated identical twins" that are so conceptually appealing often turn out to have been hardly separated at all, etc. He clearly derives the major heritability equations in common use and highlights the usually unstated assumptions that they most often require. The most implausible of these is that the extent of environmental similarity is the same across kinship categories (i.e., that identical twins have no more and no less similar an environment than ordinary siblings). Taylor then surveys the estimates that have been calculated for the heritability of IQ in white English and American populations, and stresses their inconsistency. He finds estimates ranging from .40 to .98 in a large survey by Christopher Jencks; when Taylor adds data sources that Jencks overlooked, he finds estimates (using the same model) ranging from .06 to .97. When data from individual studies are used for the calculations (instead of pooled data from many different studies for each kinship), meaningless estimates often result of "heritability" less than zero or more than 1.0. Taylor is able to bring some order to these conflicting figures with the simple hypothesis that environmental similarity in intact families increases with overall (not merely genetic) closeness of kinship. Thus, identical twins have more similar environments than fraternal twins, fraternal more than ordinary