

Book Reviews

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.

Juanita Burnby
Enfield

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

siblings (with whom they have equal genetic similarity), etc. The conflicting heritability estimates fall nicely into place on this hypothesis, but do not and cannot converge on a single better estimate. The reason is that, once different figures for environmental similarity are required for different kinships, the heritability equations become underidentified; there are more unknowns to solve for than there are equations, and no single estimates can be made. The only confident conclusion, Taylor states, is the tautological one that “the heritability of IQ is somewhere between zero and 100 per cent (p. 206)”.

The ordering of kinships on environmental similarity is only one of the many provocative and insightful analyses that Taylor offers. He clearly sets out the logic and the problems in most of the main attempts to estimate IQ heritability by comparing kinships two, three, and many at a time. He shows both the strengths and the limitations of the currently popular path analysis methods. He exposes a shocking number of simple arithmetical errors in the writings of many of the leading figures in the IQ controversy. Finally, but not least important, he combines a high level of mathematical sophistication with an ability to write clear, simple, and accurate non-technical summaries. The book, nevertheless, is not without its faults. In the chapter on “The myth of the separated identical twins”, Taylor rightly points out that such twins often have very similar environments, but then confuses “uncorrelated” environments with “minimally similar” ones. He argues that only those twins raised in the latter should be included in the calculations of the IQ correlation for identical twins raised in random, uncorrelated environments. However, truly random allocation of twins would have to result in as many going to high-similarity environments as to low-similarity ones, and calculations based only on the low-similarity environments would be very misleading. Taylor acknowledges the problem in a footnote, but does not resolve it. Again, in his otherwise excellent discussion of the assumptions involved in analysis of variance models for estimating heritability, Taylor is unclear about the relationship between the assumptions of additivity, linearity, and non-interaction. Viewed in the context of the total work, however, these blemishes are minor. Taylor has produced a book that is at the same time the most rigorous and sustained challenge to specialists in the field of IQ heritability, and the clearest and most comprehensive introduction to the problems of the field for non-specialists.

Brian Mackenzie

Department of Psychology, University of Tasmania

MAURICE GOLDSMITH, *Sage. A life of J. D. Bernal*, London, Hutchinson, 1980, 8vo, pp. 256, illus., £8.95.

J. D. Bernal confronts the historian of science with perhaps the greatest challenge of any major scientist of the twentieth century. There are his many-faceted interests and activities, difficult adequately to encompass; there is the curiousness of his scientific career – brilliant, even seminal work in crystallography, but never quite realizing the awesome potential to which all his contemporaries testify; there is, of course, his political and social radicalism, carried through to the end of his life, and inevitably eliciting controversy now, as it did during his life.