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Continuity, Chance and Change: The Character of the Industrial Revolution in England. *By E. A. Wrigley* • New York: Cambridge University Press, 1988. viii + 146 pp. Charts, tables, notes, bibliography, and index. \$29.95.

Reviewed by Rick Szostak

This short book comprises the Ellen MacArthur lectures presented by E. A. Wrigley at Cambridge in 1987, with the addition of footnotes and tables. It marks the return of a noted demographer to his early interest in the Industrial Revolution. The book is intended more as a program of further research than as a well-documented revision of past research, "as much intended to provoke as persuade" (p. 2).

Wrigley comes down solidly in favor of the idea that the Industrial Revolution should be the most exciting and interesting topic in economic history. He correctly describes it as being the point of transition between a period of almost imperceptible income growth, in which economists and others were sure that there were severe limits to how high average incomes could ever rise, and a period of steady per capita income growth. The relative lack of attention paid to the Industrial Revolution in the literature (and indeed the active downplaying of its importance by many) is attributable to the lack of "description much less explanation" (p. 3). Attempts to provide new insights into the Industrial Revolution are thus highly desirable. Wrigley runs through the semantic debate; industrial need not mean that all of the change occurred in industry, and revolution does not imply that the transformations were rapid or that the periods before or after were unchanging. It is regrettable that engaging in such a debate is still necessary. However, one must counter the widespread view that the simple existence of substantial structural change in the preceding era implies at best the inevitability and at worst the irrelevance of the Industrial Revolution.

Unfortunately, the revolution that Wrigley describes is not the traditional Industrial Revolution. To Wrigley it comprises two distinct, and only casually related, growth processes. The first temporally he terms the advanced organic economy, to signal its reliance on products of the soil. He extends the time frame of the revolution backward a couple of centuries to include the sort of economic changes that Adam Smith and the other classical economists wrote about. Along with the well-known wider market-division of labor arguments, he discusses urbanization and the forces behind increasing agricultural productivity. These elements have generally been left outside the standard

description of the Industrial Revolution. Since Wrigley himself recognizes that there were limits to the growth of the organic economy, and since he hints at only slight causal links between it and his second growth process, it is not clear why he considers this phase part of the Industrial Revolution.

The second process is the inorganic. Coal and iron's replacing wood, inorganic chemicals, and bricks freed industrial output from the restrictions that a fixed amount of land implies. Diminishing returns, which dominate classical economic thought, can be overcome only when the economy moves away from almost total reliance on organic materials. Later, the application of inorganic fertilizers and pesticides will allow even agricultural yields to increase dramatically.

As the utilization of inorganic materials can occur only after the development of technology that allows their exploitation, this approach might be viewed as little different from much of the previous literature, which had long posited that technological change was the cornerstone of the Industrial Revolution. Wrigley, however, redirects the focus. Rather than concentrating on the productivity effects of technology in output markets, as is appropriate for much of the new textile machinery, he recognizes the importance of the productivity improvements in input markets. The shift to inorganic materials permits the simultaneous expansion of output and reduction of costs due to economies of scale. As well, Wrigley's dichotomy serves to highlight the fact that the Industrial Revolution was not an inevitable result of the previous centuries of growth and structural change. The law of diminishing returns had not been subdued in the late eighteenth century and could have reasserted itself.

In emphasizing the special importance of inorganic energy supply, Wrigley asserts that the centralization of workers did not result from the pressures of division of labor or in order to allow supervision, "except to a minor degree," but from the requirements of the new technology (p. 76). He thus casually ignores the voluminous literature that has established over the last decades that the very earliest centralized workplaces across a range of industries used the same technology previously employed in cottages. (He also downplays the potential of water power.) In so doing, he ignores the possibility that workshops might themselves have induced much of the technological innovation observed.

The timing of the second growth process is also problematic. Coal had been exploited on a large scale for centuries before the Industrial Revolution. Wrigley notes that technological changes will have a noticeable effect on GNP only to the extent that the sector(s) they affect loom large in total output. From this he concludes that the inorganic revolution should be dated from the point in the nineteenth century when per capita incomes start to rise appreciably and steadily (p. 82). It might be thought that such a point marks the end—or at least the middle—rather than the beginning of the revolution. This is especially so since he elsewhere attributes stagnant incomes in the later eighteenth century to the opposing forces of declining organic and rising inorganic economies (pp. 115–17).

Wrigley relates the changes in economic theory that occur in the eighteenth and nineteenth centuries to changes in economic structure. Concentration on steady states and diminishing returns is natural in an organic economy. More optimistic theory emerges in the nineteenth century. He notes that there is a long lag between reality and theory, however (p. 23), so that Smith's failure to mention it does not indicate that the Industrial Revolution was not already well under way.

This book provides much food for thought for scholars of the Industrial Revolution and, as Wrigley suggests throughout, all economic historians should share an interest in that phenomenon. Although intended for a general audience, this brief work is best suited to those already familiar with the relevant literature.

Rick Szostak is assistant professor of economics at the University of Alberta. He is the author of, among other works, "The Organization of Work: The Emergence of the Factory Revisited," Journal of Economic Behavior and Organization (1989), and a forthcoming book, The Role of Transportation in the Industrial Revolution: A Comparison of Eighteenth-Century England and France, for McGill-Queens University Press. He is at present working on a microeconomic history of the Great Depression.

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The Arkwrights: Spinners of Fortune. By R. S. Fitton • New York: Manchester University Press, 1989. xiv + 322 pp. Maps, illustrations, charts, bibliography, and index. \$70.00.

Reviewed by Michael Huberman

Vilified by Karl Marx, lionized by Andrew Ure, Sir Richard Arkwright played a leading role in the history of the Industrial Revolution. A full-length biography of the inventor of the water frame and the creator of the factory system has been long overdue, but the task seemed unenviable, if not inconceivable, because the records relating to Arkwright and his business dealings are fragmentary and scattered. R. S. Fitton's definitive study of Sir Richard and his son makes the long wait worthwhile.

Drawing on the labors of years of research on the Arkwright family, Fitton expands on themes raised or suggested in his earlier study, written with A. P. Wadsworth, *The Strutts and the Arkwrights: A Study of the Early Factory System* (1959). Unlike the first book, which has individual chapters on product and labor markets and technical change, the organization of *The Arkwrights* is chronological. Fitton begins with an account of Arkwright's years in Bolton, where he was known as an "ingenious man," proficient in many trades including "bleeding and toothdrawing" (p. 8). His abrupt move into the textile industry was a natural step. Arkwright was a man of rapidly changing moods and he was always willing to make quick and often inexplicable decisions.