

plained and are presented in obscure sentences. She says, "In addition to looking at workplace issues this book extends the traditional limits of environmental history. Work in this field, began out of moral concern for the planet, has recently been shaped by endemic, structural issues of more long term and global significance" (p. 4) or, "This story begins in the late nineteenth century, when attention to occupational health was rooted in an understanding of working people's material condition" (p. 7). Neither of these general sentences is supportable. Sadly her misunderstanding of environmental and occupational health history detracts from an otherwise commendable book.

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Enriching the Earth. Fritz Haber, Carl Bosch, and the Transformation of World Food Production. By Vaclav Smil. Cambridge, Massachusetts, London, England: The MIT Press, 2001. xvii + 338 pp. Illustrations, appendixes, notes, index. \$34.95.

Fertilizers are unlikely heroes. But they can be dealt with in this vein, as Vaclav Smil's book on the discovery of ammonia synthesis and the subsequent rise of nitrogen fertilizers demonstrates. In some parts at least, this book reads like nothing short of a celebration of nitrogen fertilizers. One full chapter is devoted to the question how many human lives have been saved because of the use of nitrogen fertilizers. Other chapters describe how nitrogen fertilizers revolutionized traditional agriculture, how dependent we are on their use, and how, over the course of the nineteenth century, scientists gradually came to understand the importance of nitrogen fertilizers, leading up to the "brilliant discovery" (p. 61) of ammonia synthesis by Fritz Haber in 1908. Few of the issues that relate to the topic are overlooked in this book, making it something like a synthesis on a synthesis: If this book were published under a title like "Everything You Ever Wanted to Know about Nitrogen Fertilizers," few readers would find this presumptuous. However, this approach has its problems as well as its merits.

First, the merits. Smil assembles a wealth of information in his book. At some points, one might question his sources, and at other points, one would hope for more interpretation and less statistical information; but that should not cause one to overlook that one can learn a lot from this book. The core of the book is a detailed narrative of Haber's discovery, but its scope is much broader in more than one sense. Smil deals with the history of science as well as the history of the fertilizer industry, he spans his narrative from preindustrial agriculture to the present, and he uses examples from all over the world. One does not have to share Smil's enthusias-

tic proclamation that the synthesis of ammonia is “the most important technical invention of the twentieth century” (p. xiii) to come away from reading this book thinking that one previously had not given enough thought to the issue.

The deficits of this book are directly related to its merits: This encyclopedic approach relieves him of the duty to formulate guiding questions. Smil does not make clear what he seeks to explain (except that fertilizers are important), nor does he present a key argument that would structure the narrative. Consequently, Smil falls back on a rather traditional style. This is history of science as it used to be written: a story of steady advances by numerous clever minds ultimately leading to a brilliant discovery, which brings about scientific progress, which in turn is a blessing to mankind. Compared with the recent biography of Fritz Haber by Margit Szöllösi-Janze (*Fritz Haber: 1868-1934, Eine Biographie*, Munich: C.H. Beck, 1998), this book leaves much to be desired.

Therefore, *Enriching the Earth* provides a mixed balance as a history book. However, as an environmental history book, it is clearly a disappointment. To be sure, these aspects are dealt with, but always in an optimistic mode: there may be environmental problems associated with the use of nitrogen fertilizers, but one should not worry too much about them. For instance, Smil mentions the problems of eutrophication, but he concludes by saying happily that “there are many effective ways to improve the efficiency of fertilizer use and to reduce undesirable losses through better agronomic practices” (p. 197), ignoring the hot political battles that have been waged on precisely this issue. Smil also flatly recommends that sub-Saharan Africa should quintuple its nitrogen use within the next decade “in order to ensure the region’s food security” (p. 146), disregarding marginal issues like costs and agricultural practices. Smil mentions the explosion of ammonium nitrate and ammonium sulfate stored in a silo at the Oppau chemical plant in 1921 which killed 561 people, to this day the worst industrial accident in German history—but gladly adds in the very same sentence that “in spite of this setback, that year’s output of ammonium sulfate surpassed 190,000 t and in 1922 rose to 303,000 t” (p.111). And last but not least, his general tendency to provide a heroic narrative seems ill-conceived as a matter of principle. The time for heroes’ tales is clearly over in environmental history—even if the protagonist is something as inconspicuous as fertilizer nitrogen.

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