# Book Reviews

## Chinese Achievements

**30 Years' Review of China's Science and Technology (1949–1979)**. Translated from the Chinese. World Scientific Publishing, Singapore, 1982 (U.S. distributor, Heyden, Philadelphia). x, 314 pp., illus. $69.

This is a useful book with a somewhat mysterious genealogy. It was published in Singapore, which is a most unusual birthplace for such a volume. It is a translation from Chinese, but of what? From the foreword by the Chinese editor one can surmise it is a translation of *The Nature Journal Yearbook 1979*—"the first yearbook of natural science in our country." In the short preface by the editors of the English edition, it states that this volume is based on "articles provided by the Shanghai Scientific Press." This need not be a contradiction, but one usually expects a translation to include a more precise identification of the original source. It is also curious that, although it bears a 1981 copyright, those of us who closely follow all the publications on Chinese science had not heard of this book until it appeared in the editorial offices of *Science* in 1983. Of course, none of the foregoing has any direct bearing on the contents of this expensive, illustrated, near "coffee table" edition.

As the English title indicates, this is indeed a review of China's science and technology (primarily science) by some of China's most prestigious scientists—most of them "of the older generation" and foreign-trained. Listing chapters makes for a dull review, but since each chapter stands by itself it seems only fair to let the reader know whether his or her particular discipline is covered. The first chapter is a general review of policies, developments, and achievements in Chinese science. The last chapter is by Zhou Peiyuan, China's elder statesman of science, in which he commemorates the birth of Albert Einstein by telling "Einstein's life story, his scientific contributions, his philosophical thinking and his noble qualities." The chapters in between cover the following fields: nuclear science, acoustics, semiconductors, laser research, biochemistry and molecular biology, paleoanthropology, paleontology, mathematics, polymerization of silicic acid in aqueous solution, theoretical organic chemistry, astronomy, weather prediction, earthquake science, marine research, psychology, and traditional Chinese medicine. As one might expect, the sciences and fields that were chosen are those in which new research has been done and success stories can be told.

Presumably each contributor was asked to review his field, but chapters vary in coverage and length, reflecting not only the science but the personality of the author as well. The chapters on mathematics and paleontology, for example, give a broad view of developments in the past 30 years, whereas the two chapters dealing with chemistry are highly technical, consisting almost entirely of equations and structural formulas that would be of interest only to the specialist. Contrarily, many readers will surely be absorbed by the historical information provided by some contributors, as in the fascinating sections on ancient acoustics, history of seismological research, and some of the fundamental theories in Chinese traditional medicine.

Over the past 30 years, China's science policy has been in an almost perpetual state of flux, and many changes have occurred even since these chapters were written in 1979. Because the authors stick almost exclusively to the science itself, most of the research in the fields that are covered is not affected by the current drive to make science serve economic development. As a matter of fact, with the exception of the general overview and perhaps the chapter on psychology, there is a complete void of polemic in the text, which is indicative of the new mood in the sciences.

The review chapters cover half the book; the second half consists of a variety of useful reference materials. There is a 78-page section entitled A Chronicle of Events in Science and Technology, which highlights all the important events and developments over the course of 30 years. Clearly showing the effects of the Cultural Revolution, the list contains only five entries for the 1967–70 period: four nuclear tests and the launching of China's first artificial earth satellite. Next is a listing of 260 science journals divided by subject and giving information on the publishing institution, periodicity, former titles (if any), and other, often hard-to-come-by, information.

There are three additional sections in the reference part of the book, namely, lists of 1955 and 1957 members of the Chinese Academy of Science; biographical sketches of 86 outstanding scientists who have died since 1949; and another list of scientists who won awards in the natural sciences in 1956. There is no clear answer to the obvious questions: why not the current membership of the Academy, the most recent list of recipients of scientific awards, and biographies of prominent living scientists? It seems, however, that this regression captures the character and spirit of both the volume and the Chinese culture. In the final analysis the book is a story of the survivability of scientists, who managed to live through the abuses of their persons and their science during the Cultural Revolution and return to serious research. In the process of reminding the world of their survival and productivity, the contributors thoughtfully pay tribute to their friends and colleagues who did not live long enough to enjoy the current renaissance in Chinese science.

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## Economic Prehistory

**Early European Agriculture**. Its Foundation and Development. M. R. JARMAN, G. N. BAILEY, and H. N. JARMAN, Eds. Cambridge University Press, New York, 1982. x, 284 pp., illus. $42.50.

*Early European Agriculture* is the third and final volume produced during the past decade by members and associates of the British Academy Major Research Project in the Early History of Agriculture. The earlier volumes, *Papers in Economic Prehistory* (1972) and *Paleoeconomy* (1975), were edited by the late E. S. Higgs, to whom the present work is dedicated. In those works, as well as in more than 50 papers published in various archeological journals, the members of the project espoused an explicitly quantitative approach to the reconstruction of past economic systems. Relying heavily on the analysis of land-use possibilities, environmental reconstruction, faunal and floral assemblage

interpretation, geology, pedology, and ethology, these papers served as statements of current research into prehistoric human subsistence and lifeways in general, as parts of specific site reports, and as practical how-to documents on techniques such as sieving, froth flotation, faunal analysis, and site catchment studies. As a summary volume, essentially written by committee, *Early European Agriculture* differs in both structure and function from its antecedents. Rather than a series of disparate papers, it is an integrated volume that attempts to generalize from the prior work of the project rather than to break new ground.

The authors are fully aware of the problems inherent in trying to synthesize a decade of work that at times seemed to be going off in many directions under the general rubric of "economic prehistory." As a central objective they have chosen "to arrive at principles of economic behaviour which are stable in the long term, and which have far-reaching evolutionary importance" (p. viii). Restricted time and resources have forced them both to be selective in the regions covered and to narrow their focus primarily to the relationships between the subsistence base of prehistoric groups and their site locations. Thus European Russia, East Germany, Czechoslovakia, and Yugoslavia are not covered. Moreover, although economic interpretations are given of faunal assemblages, subsistence strategies, and site location preferences, the only attempt made to indicate the societal implications of the economic strategies is in terms of sedentarism or mobility of the group.

*Early European Agriculture* does not deal primarily with agricultural origins, or with problems of population replacement, culture contact, or diffusion in the spread of agricultural technology into Europe. It is a frankly paleoethological work, which applies principles derived from studies of animal behavior to human groups. Social behavior is seen as dependent on economic behavior, which is considered to be of primary importance among the long-term determinants of human behavior. The economic behavior of human groups is determined through "natural selection": "The economy is the primary adaptation whereby life is maintained and populations survive and grow. It is thus a biological linchpin exposed to the full force of natural selection, and as such it is to be expected that the impact of economic necessity or advantage will be widespread and profound in human behavior" (p. 5). To maintain this evolutionary position, the authors must posit a reason for the "selective advantage" of rational economic behavior. Although admitting the "woefully inadequate" time depth of most ethnographic studies, they assume that "human populations, like those of other animals, frequently exert considerable pressure upon their food resources" (p. 9). This further develops into the assumption that "population pressure has been a constantly repeated factor in human development" and that "it will have conferred a substantial advantage upon those communities with more rather than less productive economies" (p. 11).

This biological evolutionary paradigm structures the argumentation of the book. For example, dietary regimes are studied to assess the constraints and directives they place on economic activities, site locations, population levels, and, "ultimately, on the evolutionary development of the human species" (p. 18). To forestall the charge that they rely too heavily on a "demographic *deus ex machina*" in their insistence on the significance of population pressure, the authors note that at least "it is a conscious and intentional emphasis which we have given, and not merely an oversight" (p. 71). While the explicitness of their commitment is laudable, it does not mitigate the problems of this approach. The biological mechanisms of natural selection and adaptation only loosely fit so cultural a set of behaviors as economics. Without denying the obvious ethological parallels, one nevertheless is hard put to explain the "selective advantage" of one economic system over another in terms of differential reproductive success, viability, or adaptation (as the term is used in population genetics). Using biological evolutionary terms for paleoeconomic behavior produces a Lamarckian, rather than a Darwinian, evolutionary paradigm—intuitively and logically one knows that there is a relationship between the animal form (or cultural economic behavior) and its food sources (or site location choices), but the explanatory mechanisms for that relationship are lacking or based on questionable assumptions such as conscious effort (or rational economic behavior).

As a summary statement, *Early European Agriculture* cannot deal at length with the wealth of recent data pertinent to specific sites and regions. This is most evident in those sections of the book that treat major European physiographic zones (coasts, lowlands, uplands) as study units to delineate the regularities of long-term economic behavior. Heavy reliance is placed on summaries of works published elsewhere (often in the other two volumes from the project), which specialists will find more useful and complete. Those sections that are not summaries suffer from an apparent limitation of the method of analysis: paleoeconomic analysis of site exploitation territories is most useful on the single-site or micro-regional level; above that the regularities fade into obvious generalities. The techniques used to assess subsistence constraints and concomitant environmental interaction seem better suited as guides for framing paleoeconomic hypotheses than as synthetic principles.

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## The Physiology of Hibernation

**Hibernation and Torpor in Mammals and Birds.** CHARLES P. LYMAN, JOHN S. WILLIS, ANDRÉ MALAN, and LAWRENCE C. H. WANG. Academic Press, New York, 1982. xii, 320 pp., illus. $37.50.

This concise yet easy-to-read book is an excellent synopsis of hibernation research, complete enough to provide an entry into the field, extensive enough to provide a useful review for workers in the field, and stimulating enough to suggest many exciting research challenges for future workers.

The first two chapters are an introduction by Lyman to the ecology and evolution of hibernation. Chapter 1 deals with what endothermy is and why and how it evolved and with why hibernation might have evolved as a subsequent adaptation to offset the high energetic cost of endothermy under conditions of limited resources. Chapter 2 surveys the species that hibernate. Hibernation is widely distributed among the various families of birds and mammals and appears to be of polyphyletic origin. We can thus expect species diversity in the physiological and biochemical mechanisms underlying hibernation. Lyman excludes from consideration seasonal dormancy in ectotherms and its possible homologies with mechanisms of hibernation in endotherms.

Chapters 3, 4, 5, and 7, by Lyman, and chapter 6, by Willis, are an excellent review of the studies that have characterized the systems physiology of hibernation. The authors emphasize cardiovascular controls and thermoregulation. They convincingly demonstrate that hibernation is not a failure or abandonment of normal homeostasis but an adaptive extension of the range over which the