Book Reviews

Export Science

American Science and Modern China, 1876–1936. PETER BUCK. Cambridge University Press, New York, 1980. x, 284 pp. $24.95.

Despite great pioneering comparative works such as Max Weber's *The Religions of China*, Chinese studies in the West have tended to be a somewhat exotic field outside the mainstream of historical and social scientific inquiry. The reasons are understandable: the difficulty of the Chinese written language, profound cultural differences, the humanistic and often particularistic bent of most Westerners who have seriously studied China. But the results have often been unfortunate, not only retarding our understanding of China but depriving us of the valuable insights into our own society and culture that a broader comparative approach might bring.

Peter Buck makes an important advance toward this kind of approach by looking at a specific question in a specific time frame—the transfer to China of American ideas about the organization of scientific work and its role in society during the late 19th and early 20th century. He is not concerned with grand theoretical generalizations à la Max Weber or F. S. C. Northrup, nor is he primarily concerned with Chinese receptivity or nonreceptivity to modern Western ideas and values, one of the matters most thoroughly covered in existing Western studies of China. He is concerned with showing how, from the 19th-century medical missionaries to the philanthropic foundations and research-oriented universities of the 20th century, Americans tried to transplant the practice of science to a very different country and what the difficulties of that attempt reveal about both societies.

It is a story that has been told before, at least in parts, but never with such a rigorous analysis of the social and political ramifications of the practice of modern science. Buck very ably shows how the changing character of American efforts to bring science to China reflects important changes that were taking place in the organization of science and its application to society in the United States. For example, the earlier medical missionaries with their emphasis on clinical practice and voluntary organizations are a world removed from the Rockefeller Foundation's China Medical Board with its emphasis on scientific research and professional standards. Or, on the social thinking behind medical policies, Buck traces the influence of turn-of-the-century concerns about the political divisions of industrial society and science's role in ameliorating them on the formation of the Boxer indemnity fund, which financed the education of the first generations of modern Chinese scientists in the United States. He shows how these American-trained scientists tried to implant in China such American institutions as the association for the advancement of science, the research-oriented university, and the land grant college as purveyor of scientific advances to industry and agriculture. This involves discussion of several key American universities, most fully Cornell, where an unusually large number of leading Chinese scientists were trained.

The author intends his book primarily as a contribution to the study of science and society in America and is interested in the American activity in China "only secondarily because of its bearing on Chinese scientific development." By using the transfer of science to China as his prism it seems to this reviewer that he has been able to cast new light on science in both America and China. On the Chinese side, particularly, he grounds the beginning of modern Chinese science more firmly in its social and institutional framework than most earlier studies of Chinese assimilation of modern science have attempted to do. On the American side, the aspirations and problems of the missionaries, educators, scientists, and philanthropists involved in this enterprise allow us to see American science in a somewhat different light.

But if this book breaks new ground and deserves a pioneer's accolades, it also will provoke some disagreement. It may be laudable to try to give a quantitative underpinning to general impressions about the social background of science and scientists, but when data are so fragmentary one wonders about the results. For instance, how helpful are figures based on an unrandom sample of 27 out of 143 early members of the Science Society of China for whom there happened to be some biographical information? One may also object to Buck's very negative appraisal of American success in building a modern scientific establishment in China. It was not a "total failure," and many of the political and social constraints on faster and more relevant absorption of science were beyond the control of Americans, or any foreigners. The Rockefeller Foundation's decision to concentrate on Peking Union Medical College as an elite institution bringing the highest standards of American medicine to China left China's public health needs unmet, but it was not necessarily wrong, as the legacy of that institution in China's present scientific and medical elite demonstrates. And as for populist objections to elites, scientific or otherwise, that has largely faded in post-Mao China, where key educational and scientific institutions are very much back in favor.

There are many other places where scholars of America or China will find room to argue with Buck, and his own style is often argumentative in tone. The book is not an easy one to read, for the scope is broad, the organization complex, and the prose not always crystalline. But it is an important and innovative book that should be stimulating for anyone interested in the history of science in China or in America, or in comparative history in general.

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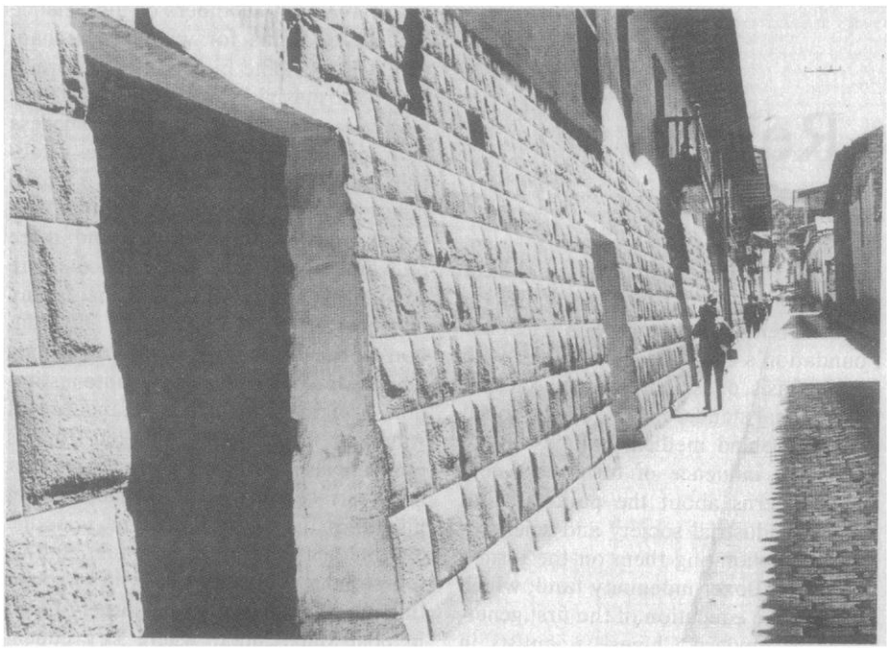
Prehispanic Structures

Inca Architecture. GRAZIANO GASPARINI and LUISE MARGOLIES. Translated from the Spanish edition (Caracas, Venezuela, 1977) by Patricia J. Lyon. Indiana University Press, Bloomington, 1980. xvi, 350 pp., illus. $32.50.

Since the 16th century, professionals and amateurs alike have been struck by the very high quality of Inca architecture and engineering. The old truism that you can't slip a knife blade between the courses of Inca masonry is indeed true for the finest Inca work. The conquering Spaniards compared it to the best in their homeland, and modern sensationalists have evoked lost chemical formulas to soften the stone and technologically advanced visitors from outer space to account for its high quality. Such explanations do an injustice to the Inca



Inca *kancha* walls, Cuzco, Peru, with new doorways and upper story with Spanish flavor, "an example of spatial and temporal historical stratification and continuity of life in the city." The concept of the *kancha*, "a walled rectangular block enclosing groups of one-room buildings destined for dwelling and other uses . . . was widely used by the Incas. . . . After the Spanish conquest, these great spaces suffered multiple divisions and distributions. . . . Doorways were opened in the enclosure walls . . . and a second story was added in the Spanish formal tradition." [From *Inca Architecture*]

craftsmen, and by implying lack of ability smack of racism as well.

The authors describe and illustrate a wide variety of this Inca construction and have produced by far the best and most comprehensive description of Inca architecture yet to appear in print. The book should appeal to professionals working in Andean archeology, to amateur archeologists, and to persons interested in the history of architecture and technology. With admirable care, the authors bring ethnohistorical data from the chronicles and ethnographic analogy from modern peasant construction to bear on the archeological remains, arriving at painstaking reconstructions of the buildings themselves and suggestions as to their functions, which in some cases may have been multiple. Especially noteworthy are the carefully qualified drawings reconstructing some of the destroyed parts of buildings, notably the roofs and their supports, which were built of perishable materials. It is here that the authors' knowledge of architecture and engineering is particularly valuable. Most important, the authors describe the architecture and its functions within the context of the political and economic organization of the Inca state. This is imperial architecture, and it functions in a symbolic as well as a normally practical way. Yet its imperial nature also explains in part its sometimes monotonous regularity by comparison with other architectural traditions such as that of the Maya.

The 324 illustrations, crucial in a book of this sort, include photographs, plans, drawings, and occasional reproductions of older illustrations that give evidence of features now destroyed. They are of outstanding quality, far superior to the average "record" shot. I could quibble with a few details such as some redundancy, but it is hardly worth the trouble given the breadth of the selection. The book is enhanced by a foreword by John Murra, in which he places the work within the context of Andean research.

I do not wish to give the impression that this book is the final word on Inca architecture. Persons wanting greater detail on any particular site for research purposes will still have to consult the primary sources. Moreover, as the authors themselves admit in the preface, the data are remarkably limited, and much work remains to be done. New details will be added and interpretations will change as excavations continue. For the present, however, this book provides an outstanding and up-to-date introduction to Inca architecture as an expression of Inca culture.

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The Invisible Universe

Cosmic Landscape. Voyages Back along the Photon's Track. MICHAEL ROWAN-ROBINSON. Oxford University Press, New York, 1979. x, 150 pp. $12.95.

Astronomy is a science that appeals to our visual senses, and Michael Rowan-Robinson makes this appeal the theme of his book of "voyages back along the photon's track." In this he opposes the trend in scientific writing away from the descriptive and toward the analytical. Rather than organize his material around such specific objects as quasars or black holes or such themes as the birth and death of stars, Rowan-Robinson paints dazzling word-pictures of the universe as seen in different wavelengths of radiation.

The revolutions in astronomy of the past three decades have derived in large part from the opening up of the invisible wavelengths. Often, the newly revealed sky has been remarkably different from the visible universe that had been studied since the time of Galileo. For instance, when radio astronomers first mapped the heavens they "saw" the familiar sun and the Milky Way, but no stars—what were at first called "radio stars" turned out to be bizarre and often immensely distant objects, such as exploding galaxies. Only later did understanding increase to the point that some of the gaps between spectral regions could be bridged. There still remain major gaps, of course—for instance, in the infrared and submillimeter part of the spectrum, where no comprehensive sky surveys have been carried out, or in the realm of the gamma rays, where the events that generate brief bursts of energy are as mysterious to us as the visible stars were to Babylonian astrologers 4000 years ago.

Rowan-Robinson's book, written for "someone who might never have read anything about astronomy," presents us with six cosmic voyages, each exploring a different spectral region. They are ordered not by wavelength, but approximately in the sequence in which the appropriate astronomical tools were developed: visible, radio, ultraviolet, x- and gamma-ray, infrared, and microwave. In each voyage, we begin with objects in the solar system, take a look at the sun and nearby stars, and then expand our horizon outward in distance and backward in time. Some classes of objects are noticeable in only one or two bands, whereas others, such as the quasars or the neutron-star supernova remnant of the Crab Nebula, appear again and again