

# Book Reviews

## WHY GALILEO?

### The Grand Titration

Science and Society in East and West. By Joseph Needham. Pp. 350 + 22 plates. (Allen and Unwin: London, September 1969.) 63s.

THE first half of Joseph Needham's massive *Science and Civilisation in China* has either been published or is in the press. That the project has progressed as well as it has is a tribute to not only twenty years of sustained work but the synthesizing powers of an encyclopaedic mind as well. Needham possesses another notable quality. He is so fluent a writer that the gap between his harvesting and the public's consumption of such scholarly fruit is remarkably slim. Within the space of a year, for example, he will have published Volume four, Part three, of the *Science and Civilisation* series and three volumes of essays.

One collection of essays is called *The Grand Titration*. In a series of articles written between 1944 and 1964, Needham has "titrated" the contributions of East and West to the development of modern or "oecumenical" science. More importantly, he has attempted to explain why the scientific and technological achievements of one culture surpass in given time periods those of another.

The strongest (or least controversial) element in Needham's sociological essay is his analysis of the amplitude and depth of the Chinese scientific tradition. Before the Second World War a number of Western sinologists could assert that China had generated little or no science and only a few, albeit significant, technologies. Joseph Needham and his collaborators have since almost singlehandedly destroyed this myth. In ancient and mediaeval China there was a large body of experimental science, all of which rested upon accurate observations, elaborate systems of classification and laboratory instruments of great refinement. Such empiricism, Needham suggests, was the basis for the technical ingenuity of the Chinese. Aided by a number of striking plates and drawings, the reader soon learns that gunpowder, paper, printing, efficient equine harnesses, the stern-post rudder, the magnetic compass and the mechanical clock all originated in China. And the number of examples could be easily multiplied. With such information at his disposal Needham has been able to assist in the breakdown of Europocentrism among Western intellectuals, particularly historians of science.

Perhaps it is just as well that Needham's cosmopolitanism will stimulate few controversies at this date, because his comparative sociology of knowledge will most certainly arouse some hostility. From the very outset of his study Needham has sought the answers to two related questions. First, why was East Asia between 200 BC and 1500 AD far more efficient than Europe in the application of human knowledge about nature for useful purposes? Second, why did modern science originate only in Galilean Europe? For Needham, the soundest approach to both of these problems is to delineate and compare the differing social contexts in which Chinese and early modern science developed. Obvious as such an approach may be, most historians of science have until recently eschewed sociological hypotheses in their work and have preferred instead to concentrate on the intellectual development of specific disciplines. To such "internalists" Needham poses the following dilemma. If you attempt to explain why the

scientific revolution occurred only in Europe and, simultaneously, to deny yourself the comforts of sociology in that explanation, then you must ascribe the phenomenon to either pure chance or European genius (racial superiority). Neither proposition seems very defensible.

How then does Needham relate the scientific traditions of China and Europe to their respective social structures? For a start, he draws our attention to the early work of both Wittfogel on "Asiatic bureaucratism" and Zilsel on Renaissance craftsmen. The former maintains that the rule of imperial China by a non-hereditary elite prevented the formation of mercantile capitalism. The latter argues that the needs of European merchants during the Renaissance brought about between the higher artisanate and educated scholars an interaction which was crucial for the birth of "universal" science. A syllogistic combination of these ideas has led Needham to believe that by its frustration of mercantile interests the mandarin elite also prevented modern science's origination in China. On the other hand, China's bureaucracy gave greater encouragement to proto-science and related technologists than did Europe's rulers between the rise of Rome and the decline of feudalism.

The author is of course aware that at the micro-level the neatness of such reasoning must yield to a number of messy particulars. Among the most difficult is the relationship between a general sociology of knowledge and the development of specific ideas. Thus he concedes that even if a merchant class had come to power in China, it is doubtful whether a Galilean breakthrough in mechanics would have occurred there. Why? Because the Chinese scientific tradition lacked not only a Euclid to geometrize space-time but also a personal God whose laws governed the operations of a rational universe—a proposition of which, *pace* Laplace, seventeenth-century Western scientists had great need.

Needham has much to say about the latter concept in his stimulating piece on "Human Law and the Laws of Nature". He observes that the opposed notions of natural law in East and West reflected very different political realities. Where Western monarchs ruled with the aid of highly codified legal systems, the bureaucrats of imperial China administered justice on a case-by-case basis. The antipathy of the Chinese toward abstract laws was carried over into Taoist reflexions on the inscrutability of nature, a world view opposed in many respects to the ethos of modern science. By the same token, European philosophers were able to reflect very different social and political realities. Needham has thus presented a convincing and important case study in the social origins of natural philosophies. Yet, curiously enough, he has failed to integrate such findings into his more general articles on the sociology of knowledge. He most certainly ought to. Otherwise the Wittfogel-Zilsel-Needham synthesis will lose no small part of its persuasiveness in a scholarly world which still regards science as largely a disembodied set of ideas.

*The Grand Titration* is, in any case, a prolegomena to a new discipline—the comparative sociology of science. Because the book ranges widely and well over topics of considerable historical and contemporary interest, it is deserving of the widest possible audience.

PAUL GARY WERSKEY

## LEIBNIZ UNFULFILLED

### Leibniz

By C. A. van Peursen. English edition translated by Hubert Hoskins with additional matter by the author. Pp. 128. (Faber: London, September 1969.) 30s.

It is difficult to pass an adverse judgment on a work in a few words; one feels that more detailed justification is required than if one's views were favourable. I also face