

Joseph Needham—A Publication History

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Introduction

Cambridge dons, like those elsewhere, come with various types of publication profile. Both Wittgenstein and Sraffa changed the direction of intellectual endeavour in their disciplines twice, each time with a single powerful volume, but they published little else. At the other end of the spectrum, Bertrand Russell came close to realising his youthful ambition of publishing a book a year. Joseph Needham, their younger contemporary who devoted his later decades to promoting the history of Chinese science as a field of scholarship, must clearly be placed at the prolific end of the spectrum. As with Russell, his varied publication record reflects the many facets of the author's personality and his diverse talents and interests.

The annotated list of Needham's works below is meant as a guide to his lengthy and somewhat labyrinthine publication trail. For reasons of space, purely scientific articles related to biochemistry, experimental embryology, and experimental morphology have been omitted (a list of these was given by Lu Gwei-Djen in the 1982 Shanghai Festschrift). Otherwise, I list here all publications, spanning his entire career, on which I have data. The list thus

includes all books, as well as all articles and chapters that deal not only with the history of Chinese science, technology, and medicine, but with philosophical and religious topics, with the history and sociology of Western science, and with social and political issues. Though perhaps not directly relevant to the history of Chinese science, these latter works are included here partly because the ideas Needham expressed in them frequently had a bearing on his understanding of Chinese science (as indicated, e.g., by his citing them in his sinological works) and partly to make available as complete a record as possible.

Needham's writings have been designated as entries in the bibliography by means of entry codes constructed by attaching a letter as a suffix to the year of publication. Thus *The Grand Titration* is designated 1969a, while *Within the Four Seas* is 1969b. Cross-referencing is done by means of these codes.

In compiling this bibliography, I have collated and where appropriate revised information given in the partial bibliographies published earlier, including (i) those in the volumes of *Science and Civilisation in China* [hereafter SCC], (ii) that in the 1973 Festschrift edited by Teich and Young, (iii) that prepared for Lu Gwei-Djen and published in the 1982 Festschrift edited by Li Guohao et al., (iv) that published in 1986e by Pan Jixing, expanding on the listings of Lu and of Teich and Young, (v) that compiled for the 1980s by Georges Métailié and published in 1991a, and (vi) the *ISIS Cumulative Bibliography*. I have also collated and included the data available on-line in the winter of 1996-97 from WorldCat, and from the libraries of Cambridge University, the University of Washington, and the University of British Columbia. When possible I have checked the information drawn from these sources against the published works in my possession.

Needham worked and wrote in a broad range of fields. His particular spectrum of intellectual engagement ran from experimental biology and biochemistry through history, politics, philosophy, theology, and of course Asian studies, though the lines between the latter fields often blurred. By disposition and on principle, he sought to clarify how what he found in each field fit into the world at large, and at some stage in almost any study he characteristically focused on identifying commonalities and linkages between modes of experience and across cultures. Another of the characteristics of his career as a writer is that throughout it he worked in a variety of genres: the sweeping multi-volume series; the specialist monograph or article; the free-ranging essay; the edited volume that drew together his own ideas or those of others; as well as book reviews, sermons, and poems. The variety of his interests and means of expression is reflected in the diversity of outlets in which he published, from university presses and the *Proceedings of the Royal Society* to *The Modern Churchman*, from socialist organs like *La Pensée* and *Science and Society* to the *Shell Aviation News*, from the *British Ski Yearbook* to the *Times Literary Supplement* and the *Journal of Asian Studies*.

It has often been said that Needham had two major careers, the first in biochemistry, the second in Chinese studies. His scientific work is represented in the record below primarily by *Chemical Embryology* (1931a), *Order and Life* (1936a), and *Biochemistry and Morphogenesis* (1942a). His standing in the community of scientists is shown in his editing of the two collections (1937a and 1949a) compiled to honour the doyen of Cambridge biochemistry, Sir Frederick Gowland Hopkins. On the other hand, one gets a measure of his political role as an anti-fascist activist in the scientific community from the essays written in the late 1920s and especially during the 1930s—collected in *Time*, *The Refreshing River* (1943a) and *History Is on Our Side* (1946a)—the most influential of which was probably *The Nazi Attack on International Science* (1941a).

Also observable in these collections, as in Needham's earlier ones (1929a and 1932a), is his lifelong concern with reconciling science and religion as modes of experience and understanding, a concern already evident in his first edited volume (1925a), and one which in the 1930s he rethought within an historically minded Christian socialist framework (e.g., in 1935b, 1935c, 1937d).

Needham's commitment to an historical understanding of science had been fostered in the 1920s through friendship with Charles and Dorothea Singer, and it was stimulated further by the Soviet delegation to the 1931 Second International Conference on the History of Science (see 1971g). Three years later Needham published his *History of Embryology* (1934a), and over the following years he was instrumental in setting up the History of Science Lecture series in Cambridge, which resulted in the *Background to Modern Science* volume which he edited with Walter Pagel (1938a).

In 1942 Needham published his first academic article on China. During the Second World War, having established the Sino-British Scientific Cooperation Office in Chongqing, he toured the scientific, technical, and industrial facilities in the parts of the country not occupied by Japanese forces and published a series of articles for *Nature* and reports which were eventually collected in *Science Outpost* (1948a). These made him the chief interpreter of wartime Chinese science to the West.

After the war he was appointed founding director of the Scientific Division of UNESCO (1946b and 1948b). In 1946 at the opening meeting of UNESCO, he spoke on China's historic achievements in science and technology (1947c and 1948c), a subject on which he continued to work throughout his time in Paris. At about the same time he announced his plan conceived during the war of writing a substantial work documenting the history of science in ancient and imperial China, and analysing China's failure to generate modern science in terms of its particular social and economic structure (1946e). On returning to Cambridge in 1948, he submitted to Cambridge University Press (1996a) a proposal for a one-volume work of 600–800 pages, i.e. somewhat less than

Biochemistry and Morphogenesis. Over the following years he and Wang Ling undertook to prepare this work for publication.

As an outspoken critic of Western involvement in the Korean War, he fell into political disfavour at home and in the United States, especially after participating in the international commission set up to investigate charges that U.N. forces were using biological weapons (1952c). Despite that, *Nature* again turned to him as the war wound down for a report on the current state of Chinese science in the People's Republic (1953c). It would do so again after the Cultural Revolution (1978f), by which time, with Sino-Western rapprochement, Needham was definitively returning to the political good graces of the establishment. In the meantime, he remained throughout the Cold War an outspoken advocate of dialogue between East and West, and an appreciative interpreter of Chinese cultural traditions, as witnessed by the essays and addresses collected in 1969b, several of which were often reprinted and published in a variety of languages over the following decades.

In 1954 the first volume of *Science and Civilisation in China* appeared. Individual volumes are listed separately below. There seems little point in summarising the content of that series for the readers of *Chinese Science*, but a few remarks to recall the structure and evolution of the project may not be out of place. As designed in the early 1950s, the series was planned for publication in seven volumes: the first two were to deal with introductory and philosophical issues; the third through sixth would treat particular fields of scientific and technical activity; the seventh would analyse the social context within which scientific and technical activity was carried out and constrained. By the end of the 1950s, it became clear that the materials for volume IV would require several books. Needham then began thinking of the originally planned volumes as "heavenly" ones, which in reality would be comprised of several "earthly" books, referred to as "parts." Volume IV is thus made up of three parts; volume V, still in progress, is to consist of at least thirteen. In addition, the series was conceived from the beginning as divided into a series of fifty "sections" spread across the seven original volumes and corresponding to what were thought of as logical divisions of the subject matter, as designated by modern, positivistic science: thus, section 19 (Mathematics), section 26 (Physics), section 38 (Botany). Finally, though the series was collaborative from the outset, Needham was actually responsible for writing almost all of the first four volumes. From the early 1970s he came to the view that he needed more assistance in the writing of many sections designated for treatment in the later volumes. He therefore began recruiting other scholars at various stages of their careers to compose full contributions for the series, a strategy that has paid rich dividends.

In the bibliography below, the individual "earthly" volumes of the series are listed according to their respective year of publication. It is therefore perhaps useful to give a brief skeleton treatment of the series as a whole.

- Vol. I. *Introductory Orientations* (1954), with the research assistance of Wang Ling
- Vol. II. *History of Scientific Thought* (1956), with the research assistance of Wang Ling
- Vol. III. *Mathematics and the Sciences of the Heavens and the Earth* (1959), with the collaboration of Wang Ling
- Vol. IV. *Physics and Physical Technology*
- Pt. 1 (1962), with the collaboration of Wang Ling and the special cooperation of Kenneth Girdwood Robinson
- Pt. 2 (1965), with the collaboration of Wang Ling
- Pt. 3 (1971), with the collaboration of Wang Ling and Lu Gwei-Djen
- Vol. V. *Chemistry and Chemical Technology*
- Pt. 1 (1986), by Tsien Tsuen-Hsuei
- Pt. 2 (1974), with the collaboration of Lu Gwei-Djen
- Pt. 3 (1976), with the collaboration of Ho Ping-Yü & Lu Gwei-Djen
- Pt. 4 (1980), with the collaboration of Ho Ping-Yü & Lu Gwei-Djen, and a contribution by Nathan Sivin
- Pt. 5 (1983), with the collaboration of Lu Gwei-Djen
- Pt. 6 (1991), [JN &] Robin D. S. Yates, with the collaboration of Krzysztof Gawlikowski, Edward McEwen, and Wang Ling
- Pt. 7 (1986), with the collaboration of Ho Ping-Yü (Ho Peng Yoke), Lu Gwei-Djen, and Wang Ling
- Pt. 9 (1988), by Dieter Kuhn
- Pt. 13 (in press), by Peter J. Golas
- Vol. VI. *Biology and Biological Technology*
- Pt. 1 (1986), with the collaboration of Lu Gwei-Djen & Huang Hsing-Tsung
- Pt. 2 (1984), by Francesca Bray
- Pt. 3 (1996), by Christian Daniels and Nicholas K. Menzies
- Vol. VII. *The Social Background*
- Pt. 1 (in press), by Christoph Harbsmeier

Other volumes are in various states of preparation. Five essays by Needham and Lu Gwei-Djen (1962b, 1963c, 1966g, 1980g, and 1988c) have been edited by Nathan Sivin for inclusion in the medical sections of volume VI.

There are full Chinese translation projects underway of the SCC series in both Beijing and Taipei. These are published in multi-volume series as: (a) 1971b, *Chung-kuo chih k'o-hsueh yü wen-ming*, Taipei: Shang-wu yin-shu-kuan, in progress, undertaken under the direction Ch'en Li-fu; and (b) 1975a, in progress, *Zhongguo kexue jishu shi*, Beijing/Shanghai: Kexue chubanshe and Hong Kong: Chung-hua shu-chü.

The Japanese translation of SCC was organised under the direction of Yabuuti Kiyosi (Yabüchi Kiyosü), and the first volumes appeared in 1974

under the series title *Chügoku no kagaku to bunmei* (Tokyo: Shisakusha). The volumes, with year of publication, are: vol. 1. (1974) [= SCC, I]; vols. 2 & 3 (1974 & 1975) [= SCC, II]; vol. 4 (1975) [= SCC, III, section 19]; vol. 5 (1976) [= SCC, III, section 20]; vol. 6 (1976) [= SCC, III, section 21]; vol. 7 (1977) [= SCC, IV, pt. 1]; vols. 8 & 9 (1978) [= SCC, IV, pt. 2]; vol. 10 (1978) [= SCC, IV, pt. 3, section 28]; vol. 11 (1979) [= SCC, pt. 3, section 29].

For the Korean translation of SCC by Yi Sok-ko, see 1985b.

Given the monumental reputation of SCC, it is perhaps worth recalling that when Needham first proposed it for publication (see 1996a) he described it as an exploratory excursion into the history of Chinese science, rather than a final statement, and over the following decades he continued to see it in that way.

Many of the articles and essays that make up the bulk of the bibliography below were either meant for inclusion in SCC or related closely to materials published there. If one allows for a lag of up to several years from submission to press to time of publication, an idea of the order in which Needham wrote on various subjects emerges from the publication dates of SCC volumes I–IV and V, pts. 2–7. The publication record of articles reflects the fact that Needham and his collaborators would publish the results of their research in article form as the drafting proceeded for various sections of the series; article publication thus sometimes preceded the publication of SCC volumes and at other times was more or less coincidental with such publication. One of the characteristics of Needham's research style was that, while concentrating on a major subject in a given period, he would often also be working up other materials as well, with the result that articles on diverse subjects not infrequently appeared close together in time.

Of the many works on the history of Chinese science published by Needham outside of the SCC series, a few can be singled out for special mention here. The influential *Development of Iron and Steel Technology in China* (1958a), published by the Newcomen Society, and challenging notions that Asian cultures were exclusively spiritualistic, opened the door to appreciating the specifically technological achievements of ancient and imperial China. This point was pressed home in the monograph *Heavenly Clockwork* (1960a), devoted to the magnificent astronomical clocks of the Song dynasty capital at Kaifeng and reprinted in 1986 in conjunction with the publication of *The Hall of Heavenly Records* (1986c), which dealt with similar Korean instruments of the fourteenth to eighteenth centuries. The essays collected in *The Grand Titration* (1969a) probably still remain, together with his essay with Ray Huang (1974f), the best statement of Needham's views on the character and dynamics of what he called "traditional" Chinese society, the subject meant to be treated in volume VII of the SCC series. *Clerks and Craftsmen in China and the West* (1970a), on the other hand, brought together articles and essays, some published for the first time, on a wide range of specialist topics within Chinese science, from astronomy and the structure of snowflakes, through mechanical and

nautical engineering, to alchemy and medicine. *Celestial Lancets* (1980b) explored the history of acupuncture and moxibustion as therapies and considered recent neurological physiological investigations of them. Finally, in works such as *History and Human Values* (1975g) and *Three Masks of the Tao* (1979a), Needham recommended traditional Chinese philosophies as offering insights valuable for the building of a saner world, as he had indeed done since the 1940s.

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Regarding the technical aspects of the bibliography that follows:

- As a rule, entries have been given for all separate publications, including republications of the same work, except for straightforward reprints. This method has been adopted to facilitate identification of individual works and their relation to other works in the list. (In some cases different works have appeared with the same title from different publishers, and conversely a single work has appeared under different titles.)
- Stand-alone publications have their title in italic typeface and their entry code marked by an asterisk; article and chapter titles are in quotation marks. One of the characteristics of Needham's career is that a large proportion of his publications were given as named lectures and published in booklet form by the sponsoring body. To distinguish between such works and book-length studies, page numbers are supplied for stand-alone publications.
- Cross-references have been supplied to indicate relations between different works, and to indicate which essays are included in the various edited collections.
- In principle, the order of presentation of titles within a particular year is: books; other stand-alone publications; journal articles; books reviews; and interviews. Works by Needham alone generally precede co-authored works, except that volumes of SCC take pride of place.
- Festschriften and congratulatory volumes are listed separately in the third part, after the main list.
- Translations of works on Chinese science are generally listed as separate entries, with cross-references to and from the original publication. Unfortunately, I have not had access to copies of the Chinese and Korean translations of SCC, so these series are listed only under the initial year of publication.
- Titles of translations in East Asian languages are listed in romanised form. For purposes of convenience in locating such works, I have retained Li-

brary of Congress Wade-Giles romanisation despite its drawbacks, but have supplied pinyin romanisation as well for works published in the People's Republic of China.

- Books published by Cambridge University Press assume Cambridge, England, as place of publication.

I have opted to present as much information as I have on all items, even when certain data are lacking. Page numbers have been clarified whenever feasible, but I have at points been unable to provide complete data. Despite the length of this list, certain other gaps still remain. In particular, Needham was an indefatigable reviewer of books, and it has not been possible to track all of his book reviews. Journal articles from before World War II have in certain cases been listed only by publication in an edited volume. In addition, radio and television interviews—including those conducted by Studs Terkel in the 1970s and by the BBC and NHK in the 1980s—though they have been broadcast, are not publicly available, and are not listed. Nor is that conducted by Prof. Harry Bradford for Imperial College, London, regarding Needham's biochemical career.

Publications by Joseph Needham

- 1924a.* *Chart to Illustrate the History of Biochemistry and Physiology* (with the assistance of J.M.D. Olmstead). Wall chart sketching key contributors and intellectual influences in anatomy, physiology, chemistry, and philosophy in 1400–1900. The first published example of many such flow-charts constructed by Needham to depict intellectual lineages. *ISIS Cumulative Bibliography* lists as 1929 CUP publication.
- 1925a.* (ed., with a contribution) *Science, Religion, and Reality*. Introduction by Lord Balfour; conclusion by Dean Inge. London: Sheldon; 2nd, corrected ed. jointly published with Macmillan, New York, 1928 (6 + 396 pp.). Repr. of 1926 ed., New York: Braziller, 1955 (with an introductory essay by Georges Sarton) (355 pp.); repr. of 1925 ed., Port Washington, NY: Kennikat, 1970. Needham organised this work as a young scholar; he later took some distance from it. It includes contributions by some of the leading intellectuals of the day including B. Malinowski, Ch. Singer, A. Aliotta, Arthur Eddington, J. W. Oman, W. Brown and C.C.J. Webb. Needham's chapter is "Mechanistic Biology and the Religious Consciousness," a French translation of which is in 1991a.
- 1925b. "The Philosophical Basis of Biochemistry." *Monist*, vol. 35, no. 27.
- 1926a. "Recent Developments in Biochemistry." *Outlook*, vol. 58, no. 1486, pp. 184ff.
- 1927a.* *Man a Machine: In Answer to a Romantic and Unscientific Treatise Written by Sig. Eugenio Rignano and Entitled "Man Not a Machine."* London: Kegan Paul, Trench & Trübner (111 pp.). American ed. published in 1928 (New Modern Science series), New York: Norton (103 pp.). 1975 republication of the Norton edition (Ann Arbor, MI: University Microfilms). A critique of neo-vitalism based on analysis of the history of biological theory and philosophy, and focusing on the work of La Mettrie.
- 1927b. "Lucretius Redivivus; The Hope of a Chemical Psychology." *Psyche*, no. 27, pp. 3ff. Republished under the title "Biochemistry and Mental Phenomena" as an appendix in Charles E. Raven, *The Creator Spirit, A Survey of Christian Doctrine in the Light of Biology, Psychology and Mysticism*. Noble Lectures, Harvard, 1926; Hulsean Lectures, Cambridge, 1926–27. London: Hopkinson, 1927. Also included in 1929a.
- 1928a. "Organicism in Biology." *Journal of Philosophical Studies*, vol. 3 (Jan.), pp. 29–40.
- 1928b. "Recent Developments in the Philosophy of Biology." *Quarterly Review of Biology*, vol. 3, pp. 77–91.
- 1929a.* *The Sceptical Biologist*. London: Chatto & Windus (5 + 288 pp.); New York: Norton, 1930 (270 pp.). Collected essays and addresses, with preface; includes (i) "The Sceptical Biologist"; (ii) "The Limitations of Optick Glasses" (1927) [included in 1976b]; (iii) "Organicism in Biology"; (iv)

- "The Hunting of the Phoenix"; (v) 1927b; (vi) "S. T. Coleridge as a Philosophic Biologist"; (vii) "Julien de La Mettrie"; (viii) "William Harvey and the Witches"; (ix) "Anaxagoras; or, Science and Purpose"; and (x) 1929b.
- 1929b.* *Materialism and Religion*. Affirmations: God in the Modern World Series, London: Benn (32 pp.). Included in 1929a.
- 1930a. "Philosophy and Embryology: Prolegomena to a Quantitative Science of Development (I) Physico-Chemical Embryology." *Monist*, vol. 40, no. 2, pp. 193–210 and no. 3, pp. 339–60. This publication in the journal edited by Paul Carus attests to Needham's early affinity to neo-positivism.
- 1931a.* *Chemical Embryology*. 3 vols. Cambridge Univ. Press (2021 pp.). Repr. New York: Hafner, 1963. Divided into three main parts: pt. 1, "The Theory of Chemical Embryology" (pp. 7–40); pt. 2, "The Origins of Chemical Embryology" (pp. 41–230); and pt. 3, "General Chemical Embryology" (pp. 231–1668), which begins in vol. 1 and continues into vol. 3. Pt. 2 in expanded form appeared independently as 1934a.
- 1932a.* *The Great Amphibium: Lectures on the Position of Religion in a World Dominated by Science*. London: SCM Press (179 pp.). Four lectures given at the General Conference of the Student Christian Movement, July 1931, and published previously as articles. Includes (i) "Religion in a World Dominated by Science"; (ii) "The Inadequacy of Scientific Deism"; (iii) "Biology as a Field of Contest Between Aristotle and Plato"; and (iv) "Religion and the Scientific Worker." See 1976b.
- 1932b. "Biology (Today and Tomorrow)." Chap. in E. V. Hubback (ed.), *Science Today and Tomorrow* [Morley College Lectures]. London: Williams & Norgate.
- 1932c. "Laudian Marxism." *Criterion*, vol. 12, no. 46, pp. 56ff.
- 1932d. "Biology and Mr. Huxley: A Review of *Brave New World*." *Scrutiny*, Cambridge, vol. 1, no. 1, pp. 76–79.
- 1933a. (with A. L. Peck) "Molly Dancing in East Anglia." *Journal of the English Folk Dance and Song Society*, (3rd ser.), vol. 1, no. 2, pp. 79ff.
- 1934a.* *A History of Embryology*. Cambridge University Press (xviii + 274 pp.). Second ed. 1959, revised with the assistance of Arthur Hughes, Cambridge Univ. Press, and New York: Abelard-Schuman (303 pp.); repr. New York: Arno Press (History, Philosophy and Sociology of Science series), 1975. Russian tr. by A. V. Yodinci & V. P. Karpova, Moscow, 1947. Revised and expanded version of 1931a, pt. 2; revised for delivery as Univ. of London lecture series entitled "Speculation, Observation and Experiment as Illustrated by the History of Embryology." The period covered runs from ancient Egypt to the beginning of the nineteenth century.
- 1935a. "Limiting Factors in the Advancement of Science as Observed in the History of Embryology" [Carmalt Memorial Lecture at the Beaumont Medical Club of Yale Univ.]. *Yale Journal of Biology and Medicine*, vol. 8, no. 1. Repr. in 1943a. French tr. in 1991a.

- 1935b. "Laud, the Levellers and the Virtuosi." Chap. in John Lewis, Karl Polanyi, & D. K. Kitchin (eds.), *Christianity and the Social Revolution*. London: Gollancz; pp. 35ff. Repr. in 1943a. Needham was one of three people listed as on the editorial board for this volume which represented an attempt to build a centre-left United Front at the academic level.
- 1935c. "Science, Religion, and Socialism." Chap. in John Lewis, Karl Polanyi, & D. K. Kitchin (eds.), *Christianity and the Social Revolution*. London: Gollancz; pp. 416-41. Repr. in 1943a and 1976b. See 1935b.
- 1936a.* *Order and Life* [Terry Lectures, Yale Univ., 1935]. New Haven: Yale Univ. Press (x + 175 pp.). Italian tr., 1946d. Repr. with new author's foreword and bibliography (xvii pp.), Cambridge, MA: M.I.T. Press, 1968. The three lectures, dedicated to the [Cambridge] Theoretical Biology Club, are entitled "The Nature of Biological Order," "The Deployment of Biological Order," and "The Hierarchical Continuity of Biological Order."
- 1936b.* (translator) *Adventures Before Birth* [from the French of Jean Rostand]. London: Gollancz (155 pp.).
- 1936c. "The Geographical Distribution of English Ceremonial Dance Traditions." *Journal of the English Folk Dance and Song Society*, (3rd ser.), vol. 3, no. 1, pp. 1ff.
- 1937a.* (joint ed. with D. E. Green, with two contributions) *Perspectives in Biochemistry: Thirty-one Essays Presented to Sir Frederick Gowland Hopkins by Past and Present Members of His Laboratory* [F. G. Hopkins Seventy-fifth Birthday Presentation Volume]. Cambridge Univ. Press (viii + 361 pp.). Repr. 1938 & 1939.
- 1937b.* *Integrative Levels: A Revaluation of the Idea of Progress* [Herbert Spencer Lecture, Oxford Univ., delivered 27 May 1937]. Oxford: Clarendon (59 pp.). Repr. Cambridge Univ. Press, 1941, and Ann Arbor, MI: University Microfilms, 1979. Also published as an article in *Modern Quarterly*, 1938, no. 1, pp. 3ff. Republished in 1943a and 1976b.
- 1937c. "The Dances of Podhale (Poland)." *Journal of the English Folk Dance and Song Society*, (3rd ser.), vol. 3, no. 2, pp. 117ff.
- 1937d. "Christianity and Communism." *The Modern Churchman* (Conference Number).
- 1937e. "Thoughts of a Young Scientist on the Testament of an Elder One (John Scott Haldane)" [from "A Discussion of Religion" (with C. Lamont)]. *Science and Society*, vol. 1, no. 4, pp. 487ff. Repr. in 1943a.
- 1938a.* (joint ed. with Walter Pagel) *Background to Modern Science: Ten Lectures at Cambridge Arranged by the History of Science Committee, 1936*. Cambridge Library of Modern Science, with an introduction by the editors (pp. vii-xii), Cambridge Univ. Press, and New York: Macmillan (xii + 243 pp.). Repr. New York: Macmillan, 1940, and New York: Arno Press, 1975. The fruit of Needham's "agitation" for serious treatment of the history of science in the university context. Contributors include: Ruther-

- ford, F. M. Cornford, Sir William Dampier, W. L. Bragg, F. W. Aston, Sir Arthur Eddington, J. A. Ryle, G.H.F. Nuttall, R. C. Punnett and J.B.S. Haldane, each recounting developments in their area of expertise over the previous four decades. Italian tr., 1942d.
- 1938b. "The Rise and Fall of Western European Science." *Manufacturing Chemist*, vol. 9, no. 2.
- 1938c. Foreword to Marcel Prenant, *Biology and Marxism*. C. D. Greaves, tr. London: Lawrence & Wishart.
- 1938d. Review of R. K. Merton, *Science, Technology, and Society in Seventeenth Century England*, in *Science and Society*, vol. 2, no. 4, pp. 566ff.
- 1939a.* (under the pseudonym of Henry Holorenschaw, with a foreword by JN) *The Levellers and the English Revolution*. London: Gollancz (96 pp.). American ed., New York: Fertig, 1971. Russian tr. by S. M. Raskinoi & B. F. Semenov, Moscow, 1947. Italian tr., 1957f. Published under the pseudonym because non-scientific writing was frowned upon by the scientific establishment as indicating lack of serious commitment to science.
- 1939b. (under the pseudonym of Henry Holorenschaw) "Voices from the English Revolution." *Modern Quarterly*, vol. 2, no. 1, p. 35. See 1939a.
- 1939c. "The Springtime of Science." *Chemical Practitioner*, no. 12, pt. 2, p. 17.
- 1939d. (with six others) "Biologists' Manifesto at the Seventh International Genetics Congress, Edinburgh." *Journal of Heredity*, vol. 3, no. 9 (Sept.). Excerpts reproduced in Ruth Benedict, *Race and Racism*. London: Routledge & Kegan Paul, 1942 and (2nd edition) 1983; pp. 170-71.
- 1941a.* *The Nazi Attack on International Science*. The Thinker's Forum, no. 41. London: Watts & Co. (41 pp.). Also published as an article in *Biology*, vol. 6, no. 3, pp. 107ff. Included in 1946a. Repr. in J. D. Bernal et al., *Science, Internationalism, and War*. New York: Arno Press, 1975. First delivered as the Schiff Lecture at Cornell Univ., 1940.
- 1941b. "Biological Science in the U.S.S.R." *Nature*, vol. 148, pp. 362-63. Republished in 1942c.
- 1941c. "Matter, Form, Evolution and Us." *World Review*, 1941 (Nov.), vol. 15; collected in J. R. M. Brunwell (ed.), *This Changing World*. London: Routledge, pp. 27ff.
- 1941d. "A Biologist's View of Whitehead's Philosophy." Chap. in P. A. Schlepp (ed.), *The Philosophy of Alfred North Whitehead*. Chicago: Northwestern Univ. Press. Repr. in 1943a.
- 1942a.* *Biochemistry and Morphogenesis*. Cambridge Univ. Press (xxxiv + 785 pp.). Repr. 1950. Second ed., enlarged, revised and with a new foreword, 1966; repr. 1980 (xvi + 787 pp.). Published the year after Needham's election to the Royal Society, this survey was the result of ten years of work by Needham on the roles of morphogenetic hormones following their discovery in 1931. It is organised in three main sections: the "Morphoge-

- netic Substratum," "Morphogenetic Stimuli," and "Morphogenetic Mechanisms."
- 1942b.* (ed.) *The Teacher of Nations: Addresses and Essays in Commemoration of Jan Amos Comenius, Comenius, 1641-1941* [with a chronological table showing the events in the life of Comenius by R. Fitzgibbon Young, and select bibliography of his work by A. Heyberger]. Cambridge Univ. Press (99 pp.). Wartime commemoration of the 1641 visit to England of the great Czech humanist, educator, and internationalist. Opening contribution by exiled Czech president Eduard Beneš; other contributors include Ernest Barker, J. D. Bernal, J. G. Crowther, J. B. Conant, Oskar Kokoschka, Henry Morris, J. O. Odlozilik, J. L. Paton, Dorothea W. Singer, and R. F. Young.
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- 1962f. "Frederick Gowland Hopkins" [Royal Society Centenary Lecture]. *Perspectives in Biology and Medicine*, vol. 6, no. 1, pp. 2-46. Also in *Notes and Records of the Royal Society of London*, vol. 17, no. 2, pp. 117ff.
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- 1962-63a. "The Pre-Natal History of the Steam Engine" [Newcomen Centenary Lecture]. *Transactions of the Newcomen Society*, vol. 35, pp. 3-58. Included in 1970a.
- 1963a. "Poverties and Triumphs of the Chinese Scientific Tradition." Chap. in A. C. Crombie (ed.), *Scientific Change: Historical Studies in the Intellectual, Social, and Technical Conditions for Scientific Discovery and Technical Invention from Antiquity to the Present* [History of Science Symposium, Oxford, 1961]. London: Heinemann; pp. 117-53. Republished in 1969a. Revised version in 1964f; abridged versions 1964g and 1993c. French tr., 1963e. Needham's paper is accompanied in the Crombie volume by the comments of his discussants (W. Hartner, P. Huard, and Wong Chu-ming) and by a revised version of the discussion which involved B. L. van der Waerden and S. E. Toulmin. Needham's reply is given on pp. 171-78. His further comment on pp. 610-11 appears to relate particularly to Thomas Kuhn's ideas.
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- 1963d. "Psychology and Scientific Thought in East and West." Chap. in Martin Wickramasinghe Presentation Volume. Republished in 1969b.
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- 1963f. (with A. G. Haudricourt) "Ancient Chinese Science" and "Science in Medieval China." In R. Taton (ed.), *Ancient and Medieval Science*. A. J. Pomerans, tr. London: Thames & Hudson; pp. 161-77 and 477-39. Translation of 1957b.
- 1963g. Review of Lynn White, *Mediaeval Technology and Social Change*, in *Isis*, no. 54, pp. 418-20.

- 1963-64a. "China and the Invention of the Pound-Lock." *Transactions of the Newcomen Society*, vol. 36, pp. 85-107.
- 1963-64b. Polish abridgement of 1961c by W. A. Drapek, *Bulletyn Nautologiczny*, vol. 6-7, p. 33.
- 1964a. "Science and China's Influence on the World." Chap. in R. Dawson (ed.), *The Legacy of China*. Oxford: Oxford Univ. Press; pp. 234-308. Included in 1969a. Dutch tr., 1973g. Needham considered this one of his best articles. It argues the importance of Chinese discoveries and innovations for world developments in several major fields, including gunpowder, the magnetic compass, the stirrup, the mechanical chain-drive, deep-drilling, and the stern-post rudder.
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- 1964c. "Chinese Priorities in Cast-Iron Metallurgy." *Technology and Culture*, vol. 5, no. 3, pp. 398ff.
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- 1964e. (with Lu Gwei-Djen) "Mediaeval Preparations of Urinary Steroid Hormones." *Medical History*, vol. 8, pp. 101-201. Abridged in *Nature*, 1963, vol. 200, no. 4911, pp. 1047-48.
- 1964f. "Glories and Defects of the Chinese Scientific and Technical Tradition." Chap. in E. C. Welskopf (ed.), vol. 1 of *Neue Beiträge zur Geschichte der alten Welt*. Berlin: Akademie-Verlag. Modified version of 1963a.
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- 1965d. "The Dialogue between Asia and Europe." Chap. in Raghavan Iyer (ed.), *The Glass Curtain Between Asia and Europe*. Foreword by the Dalai Lama. London: Oxford Univ. Press, 1965; pp. 279–97. German tr. of this volume by M. von Schön & G. Mehling, Munich: Callwey, 1968. Cf. 1955a.
- 1965e. "Understanding the Past is the Key to the Future." *Far East Trade and Development*, London, (Oct.), pp. 1–5. Version of 1955a.
- 1965f. "Implications of Chinese Textile and Cast-Iron technology for Certain Basic Inventions in Mechanical Engineering" [abstract]. *Actes du XIe Congrès International d'Histoire des Sciences*, n.p., pp. 61–64.
- 1966a. (with Lu Gwei-Djen) "Proto-Endocrinology in Mediaeval China." *Japanese Studies in the History of Science*, no. 5, pp. 150ff. Republished in SCC, vol. V, pt. 5.
- 1966b. (with Lu Gwei-Djen) "The Optick Artists of Chiangsu" [abstract]. *Proceedings of the Royal Microscopical Society*, vol. 1, pt. 2, p. 59. See 1967b.
- 1966c. "Les Contributions Chinoises à l'Art de Gouverner les Navires." Les Aspects internationaux de la Découverte océanique aux 15e et 16e siècles. Actes du Cinquième Colloque International d'Histoire Maritime. Lisbon, 1960, Paris: SEVPEN. French tr. of 1961c. Republished in 1974d.
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- 1966e. "The Roles of Europe and China in the Evolution of Oecumenical Science." *Journal of Asian History*, no. 1, pp. 1ff. Republished as 1967d and 1976k. Republished in 1970a. German tr. in 1979a. French tr. in 1991a. A key text for understanding Needham's notion of the evolution in the character of science from "traditional" to "modern" and particularly for his vision of fusion over time of the diverse scientific traditions. Also useful for insight into his understanding of his own work.
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- 1966g. "Organiser Phenomena after Four Decades; A Retrospect and Prospect" [introduction for the reprint of *Biochemistry and Morphogenesis*]. Also as contribution to the J. B. S. Haldane Memorial Volume, *Haldane and*

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- 1966h. "Naturvidenskab og samfund i øst og vest." *Dansk Udsyn*, no. 2, pp. 155ff. Danish tr. of 1964b.
- 1967a. (with Lu Gwei-Djen) "Records of Diseases in Ancient China." Chap. in D. Brothwell & A. T. Sandison (eds.), *Diseases in Antiquity*. Springfield, IL: Thomas.
- 1967b. (with Lu Gwei-Djen) "The Optick Artists of Chiangsu." Chap. in S. Bradbury & G. I.E. Turner (eds.), *Historical Aspects of Microscopy* [1966 Oxford Symposium Volume]. *Proceedings of the Royal Microscopy Society*, vol. 2, pp. 113ff. Somewhat abbreviated in 1970e. For abstract, see 1966b.
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- 1967d. "The Roles of Europe and China in the Evolution of Oecumenical Science" [Presidential Address to Section X, British Association, Leeds, 1967]. *Advancement Of Science*, vol. 24, no. 119 (Sept.), pp. 83–98. See 1966e.
- 1967e. "Human Law and the Laws of Nature." Chap. in B. Singh & V. B. Singh (eds.), *Social and Economic Change* [Essays in honour of Prof. D. P. Mukerji]. Bombay/Delhi: Allied Publishers; pp. 1ff. Repr. of 1961f.
- 1967f. Foreword to Sophia Knight, *Window on Shanghai: Letters from China, 1965–1967*. London: Deutsch.
- 1967g. "Skin-Colour in Chinese Thought: An Extract from a Letter to the Editor." *Race*, vol. 11 (1967–68), no. 2 (Oct.), pp. 249–50.
- 1968a. "The Development of Botanical Taxonomy in Chinese Culture." *Actes du XIe Congrès International d'Histoire des Sciences*, Paris, vol. 8, pp. 127ff.
- 1968b. (with Lu Gwei-Djen) "Sex Hormones in the Middle Ages." *Endeavour*, vol. 27, no. 102, pp. 130ff.
- 1968c. "The Voyage of Surgery." *Guy's Hospital Reports*, vol. 117, pp. 139ff.
- 1968d. Review of Charles O. Hueker, *The Censorial System of Ming China*, in *Cambridge Review*, vol. 1968b, no. 2172. Repr. in 1969b.
- 1969a.* *The Grand Titration: Science and Society in East and West*. London: Allen & Unwin, and Toronto: Univ. of Toronto Press. Repr. by both, 1979. French tr., 1973b. Italian tr., 1973a. Japanese tr., 1974k. Spanish tr., 1977b. Chinese tr., 1984b. Includes eight essays: (i) 1963a; (ii) 1964a; (iii) 1946e; (iv) 1947a; (v) 1953b; (vi) 1964b; (vii) 1965b; and (viii) 1951b. Along with 1974f, the most important source for Needham's ideas on the nature and dynamics of Chinese "bureaucratic feudalism" and Chinese society more generally before 1800. The ideas developed here in (i) to (vii) in essay form be intended for systematic and academic elaboration in SCC, vol. VII.

- 1969b.* *Within the Four Seas: The Dialogue of East and West*. London: Allen & Unwin, and Toronto: Univ. of Toronto Press (228 pp.). Repr. by both, 1979. Italian tr., 1975d; Spanish tr., 1975e. Includes 1942e; 1948d; 1948e; 1951e; 1955a; 1960b; 1962d; 1963d; and 1968d. Previously unpublished items include: "A Poem in His Own Style" (for Rewi Alley) (1948); "The 2500th Birthday of Confucius: the Renewed Importance of Chinese Thought" (1951); "The Confucian Temple at Chhang-An" [poem] (1964); "Job the Paynim" [sermon] (1963); "At the Tomb of a Princess" [poem]; "The House of Wisdom" [sermon] (1965); "The Fragrance of Friendship" [address at the inaugural meeting of the Society for Anglo-Chinese Understanding, 15 May 1965]; "Poem for a Chinese Friend" (1948); "Western Misconceptions about Asia" (1967); "Yenan" [poem] (1964); "Shao-Shan" [poem] (1964); "The Pilgrim Comes Again to Chhien-Fo-Tung" [poem] (1958); "Science and Religion in the Light of Asia" (1961). Twenty-two mostly short essays, addresses, sermons, and poems. A companion volume to 1969a; gives insight into Needham's multi-faceted personality and into his broad and eclectic views on science, history, religion, and philosophy, as well as on Chinese and Western civilisation. Notable for its sympathetic assessment of the Chinese cultural tradition, including the humanistic side of Confucian thought. Reflections on the benefits of tolerant cross-cultural interactions.
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- 1969d. (with Lu Gwei-Djen) "The Esculentist Movement in Mediaeval Chinese Botany: Studies on Wild (Emergency) Food Plants." *Archives Internationales d'Histoire des Sciences*, vol. 21, no. 84-85, pp. 225ff.
- 1969e. Foreword to Hugh Montefiore, *The Question Mark: the End of Homo Sapiens*. London: Collins.
- 1970a.* *Clerks and Craftsmen in China and the West: Lectures and Addresses on the History of Science and Technology* ["Based largely on collaborative work with Wang Ling, Lu Gwei-Djen and Ho Ping-Yü"]. Cambridge Univ. Press (xix + 470 pp.). Japanese tr., 1974e. Spanish tr., 1978c. Includes nineteen papers dealing with aspects of Chinese scientific or technological achievement before 1800, with concentrations in physics, engineering, and medicine. Includes 1948c; 1949c; 1949d; 1955-56a; 1958c; 1959b; 1959c; 1960f; 1961a; 1961b; 1962b; 1962c; 1962-63a; 1963b; 1966e; and 1969c. Also included is the essay "China, Europe, and the Seas They Sailed: The

- Development of Sea Routes Between the Far East and the Far West" which summarises from SCC, vol. IV, pt. 3.
- 1970b.* (ed. and with an introduction by JN) *The Chemistry of Life: Eight Lectures on the History of Biochemistry*. Cambridge Univ. Press (xxix + 213 pp.). Spanish tr., 1974l. Japanese tr., 1978i. Lectures by Robert Hill and others arranged by the Cambridge Univ. History of Science Committee.
- 1970c. "Artisans et alchimistes en Chine et dans le monde hellénistique" [Rapkiné Lecture, Institut Pasteur, Paris]. *La Pensée*, no. 152, pp. 3ff. Included in 1974d. See somewhat modified English version, 1971c.
- 1970d. "China and the West." Chap. in A. Dyson & Bernard Towers (eds.), *China and the West: Mankind Evolving*. London: Garnstone, for the Teilhard de Chardin Association.
- 1970e. (with Lu Gwei-Djen) "The Optick Artists of Chiangsu." Chap. in Jerome Ch'en & Nicholas Tarling (eds.), *Studies in the Social History of China and South East Asia* [Victor Purcell Memorial Volume]. Cambridge Univ. Press; pp. 197ff. Somewhat abridged from 1967b.
- 1971a.* (with the collaboration of Wang Ling & Lu Gwei-Djen) *Science and Civilisation in China*, vol. IV. *Physics and Physical Technology*, pt. 3. *Civil Engineering and Nautics*. Cambridge Univ. Press (lvii + 931 pp.). Includes building technologies, bridge construction, hydraulic devices and irrigation systems; ship-building, nautical propulsion and a survey of Chinese maritime navigation.
- 1971b.* *Chung-kuo chih k'o-hsüeh yü wen-ming*. Taipei: Shang-wu yin-shu-kuan. Multi-volume translation of SCC into Chinese, undertaken under the auspices of Chen Li-fu. See Introduction, above.
- 1971c.* *The Refiner's Fire: The Enigma of Alchemy in East and West* [Second J. D. Bernal Lecture, 4 Feb. 1971]. London: Ruddock, Birkbeck College (31 pp.). French version, 1970c.
- 1971d.* (with Joan Robinson, Edgar Snow & T. Raper) *Hand and Brain in China, and Other Essays*. London: Anglo-Chinese Educational Institute (41 pp.).
- 1971e. "Do the Rivers Pay Court to the Sea? The Unity of Science in East and West." *Theoria to Theory*, vol. 5, no. 2, pp. 68ff.
- 1971f. "Desmond Bernal: A Personal Recollection." *Cambridge Review*, vol. 93 (19 Nov.), pp. 33ff. Reprinted in 1989b.
- 1971g. Foreword to *Science at the Cross-Roads*. R. M. McLeod, ed.; introduction by P. Gary Werskey. London: Cass (pp. vii-x). Republication of papers presented by the Soviet Delegation (N. I. Bukharin, N. I. Vavilov, Boris Hessen et al.) to the Second International Congress of the History of Science and Technology, 1931.
- 1972a. "A Chinese Puzzle: Eighth or Eighteenth?" Chap. in A. G. Debus (ed.), *Science, Medicine, and Society in the Renaissance: Essays to Honour*

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- 1972b. (with Lu Gwei-Djen & Dorothy Moyle Needham) "The Coming of Ardent Water." *Ambix*, vol. 19, no. 2, pp. 69–112.
- 1972–73a. "Altes China-junges Europa." *Die Waage*, vol. 11, pp. 97ff.
- 1972–73b. "Von der Vielfalt der Traditionen im modernen China." *Die Waage*, vol. 11, no. 5, pp. 194–203. German tr. of 1960c.
- 1972–73c. "Über die gesunde Unruhe in Ost und West." *Die Waage*, vol. 11, no. 5.
- 1973a.* *Scienza e Società in Cina*. M. Baccianini, tr. Bologna: Il Mulino. Translation of 1969a.
- 1973b.* *La science chinoise et l'occident (le grand titrage)*. Eugène Jacob [= Simion], J. M. Rey, & R. Dessureault, trs. First French translation of 1969a. Paris: Seuil. Published in large format (263 pp.); also in small format, Collection Points, Série "Sciences," no. 59 (253 pp.), of which there was a 1977 reprint.
- 1973c. [under the pseudonym Henry Holorenshaw] "The Making of an Honourary Taoist," chap. 1, pp. 1–20, in 1973h. This is Needham's main autobiographical essay; it is published in this Festschrift under the pseudonym he used in the 1930s when writing on English social and political history. Republished in 1990a.
- 1973d. "The Historian of Science as Ecumenical Man: A Meditation in the Shingon Temple of Kongōsammai-in on Kōyasan," in 1973i, pp. 1–8. A reflection on universality and cultural difference, rather in the manner of *Within the Four Seas* (1969b). French tr. in 1991a.
- 1973e. (with Lu Gwei-Djen) "Ancient Chinese Occology and Plant Geography: The Case of the *Chū* and the *Chih*," art. in *Etudes Song*. In *Memoriam Etienne Balazs*, F. Aubin, ed. Série II: Civilisation; section X: sciences, chap. 1.
- 1973f. (with Lu Gwei-Djen) "Il concetto di elisir e la medicina su base chimica in Oriente e in Occidente." *Acta Medicae Historiae Patavina*, vol. 19, pp. 9–41. Italian tr. of 1974j.
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- 1974e.* *Higashi to nishi no gakusha to koshō: Chūgoku kagaku gijutsushi kōenshu*. Yamada Keiji & Ushiyama Teruyo, trs. Tokyo: Kawade shobō shinsha, 1974 (354 + 14 + 6 pp.); repr. 1977 (389 + 15 + 38 pp.). Japanese tr. of 1970a.
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- 1974h. "The Jesuits in China" [review of N. Sivin, *Copernicus in China*], *Journal of the History of Astronomy*, vol. 5, pp. 204–5.
- 1974i. "Astronomy in Ancient and Mediaeval China." *Philosophical Transactions of the Royal Society*, B, vol. 276, pp. 67–82.
- 1974j. "The Elixir Concept and Chemical Medicine in East and West." *Journal of the Chinese University of Hong Kong*, vol. 1, no. 1. Republished 1975j. Italian tr., 1973f.
- 1974k.* *Bunmei no tekitei: kagaku gijutsu to Chūgoku no shakai*. Hashimoto Keizō, tr. Tokyo: Hōsei daigaku shuppankyoku, 1974 (417 + 10 pp.). Translation of 1969a.
- 1974l.* (ed.) *La química de la vida: capítulos de historia de la bioquímica*. Mexico City: Fondo de Cultura económica. Spanish tr. of 1970h.
- 1974m. "Chu K'o-chen" [biography]. *Nature*, vol. 250 (16 Aug.), p. 614.
- 1974n. "The Social Position of Scientific Men and Physicians in Mediaeval China." *Proceedings of the XIVth Congress of the History of Science*, Tokyo, vol. 4, pp. 19–34.
- 1975a. *Chung-kuo k'o-hsüeh chi-shu shih* [*Zhongguo kexue jishu shi*]. Beijing/Shanghai: Kexue chubanshe and Hong Kong: Chung-hua shu-chū. Multi-volume translation of SCC, first promoted by Zhou Enlai, ca. 1964.
- 1975b.* *Chūgoku no kagaku to bunmei*, vol. 3. *Shisōshi* [= SCC, II, sections 14–18]. Yoshikawa Tadao, tr. Tokyo: Shisakusha (pp. 390–770). See 1974c.

- 1975c.* *Chūgoku no kagaku to bunmei*, vol. 4. *Sūgaku* [= SCC, III, section 19, Mathematics]. Shibahara Shigeru, tr. Tokyo: Shisakusha (208 pp.).
- 1975d.* *La Cina e la Storia*. G. Ascenso and M. Baccianini, trs. Milan: Feltrinelli. Italian tr. of 1969b.
- 1975e.* *Dentro los cuatro mares: el diálogo entre Oriente y Occidente*. P. López Máguez, tr. Mexico City: Siglo Veintiuno (250 pp.). Spanish tr. of 1969b.
- 1975f. "L'alchimie en Chine, pratique et théorie." *Annales E.S.C.*, vol. 30, no. 5, pp. 1045–61.
- 1975g. (with Lu Gwei-Djen) "Problems of Translation and Modernization of Ancient Chinese Technical Terms: Manfred Porkert's Interpretations of Terms in Ancient and Medieval Chinese Natural and Medical Philosophy." *Annals of Science*, vol. 32, no. 5 (Sept.), pp. 491–502.
- 1975h.* *History and Human Values: A Chinese Perspective for World Science and Technology*. Occasional Papers, Centre for East Asian Studies, Montreal: Centre for East Asian Studies, McGill Univ. (40 pp.). Lecture delivered in May 1975 to the Canadian Association of Asian Studies meeting in Montreal. Abbreviated version of 1976f.
- 1975i. "Dilemmas of Modern Sciences and Medicine—A Chinese Cure?" / "Dilemmes de la Science et de la Médecine Modernes—le remède est-il chinois?" *Impact of Science on Society / Impact: Science et Société*, Paris, UNESCO, vol. 25, no. 1, pp. 49–54. An early version of 1976f; similar to 1975h.
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- 1975k. Foreword to R. A. Salaman, *Dictionary of Tools*. London: Allen & Unwin, pp. 9–10.
- 1975l. Interview in *Oriente y Occidente*. Barcelona: Salvat Editores; pp. 8–17, 62–71.
- 1976a.* (with the collaboration of Ho ping-Yū [Ho Peng Yoke] & Lu Gwei-Djen) *Science and Civilisation in China*, vol. V. Chemistry and Chemical Technology; pt. 3. Spagyric Discovery and Invention: Historical Survey, from Cinnabar Elixirs to Synthetic Insulin. Cambridge Univ. Press (xxxv + 481 pp.). An historical survey of Chinese alchemy from the Warring States period to the Qing dynasty.
- 1976b.* *Moulds of Understanding: A Pattern of Natural Philosophy*, ed. and with an introduction by Gary Werskey. London: Allen and Unwin (320 pp.). Repr., *Modern Revivals in Philosophy* series, Aldershot, Hants: Gregg Revivals, 1993. Sp. tr., 1976e. Japanese tr., 1990b. A collection of eleven essays dating from 1927 to 1974 and illustrating diverse aspects of Needham's vision of the world. Includes two previously unpublished essays: "Man and His Situation" (1970) and "The Chinese Experience: An Eastern

- Perspective on Western Anti-science" (1974). Also included are 1929a (ii); 1932a (i) & (iv); 1935c; 1946a (v) & (xii); 1937b; 1943a (i) & (x).
- 1976c. *Chūgoku no kagaku to bunmei*, vol. 5. *Ten no kagaku* [= SCC, III, sections 20 & 21]. Yoshida Tadashi tr. Tokyo: Shisakusha (436 pp.).
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- 1980a. (with the collaboration of Ho Ping-Yü [Ho Peng Yoke] & Lu Gwei-Djen, and a contribution by Nathan Sivin) *Science and Civilisation in China*, vol. V. *Chemistry and Chemical Technology*; pt. 4. *Spagyric Discovery and Invention: Apparatus, Theories, and Gifts*. Cambridge Univ. Press (xlviii + 772 pp.). Includes laboratory apparatus and equipment, reactions in aqueous media, comparative macrobotics; the section by Sivin analyses the theoretical background of elixir alchemy.
- 1980b.* (with Lu Gwei-Djen) *Celestial Lancets: A History and Rationale of Acupuncture and Moxa*. Cambridge Univ. Press (xxi + 427 pp.). Chinese tr., 1995b. With chapters on the *jingluo* system, the historical development of acupuncture, influences on other cultures including the early modern West, and modern scientific interpretations and developments. Like other collaborative works of Needham and Lu Gwei-Djen, including SCC volumes, this study was written up by Needham on the basis of the authors' joint research and analysis. Originally intended by them for inclusion in the SCC series, it is of the scholarly character of the series as a whole. Independent publication allowed treatment of post-WW2 developments in acupuncture which were deemed inappropriate for the SCC version. The analysis features a distinction of two different circulation systems (for *qi* and blood) in traditional Chinese medical thought. This position has been criticised by Nathan

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- 1985g. Review of J. R. Pusey, *China and Charles Darwin*, in *China Quarterly*, no. 101 (March), pp. 161-63.
- 1986a.* (with the collaboration of Ho Ping-Yü [Ho Peng Yoke], Lu Gwei-Djen and Wang Ling), *Science and Civilisation in China*, vol. V. *Chemistry and Chemical Technology*; pt. 6. *Military Technology: The Gunpowder Epic*. Cambridge Univ. Press (xxxiii + 703 pp.). For this volume Ho Peng Yoke drafted a book-length text, which served as the basis for Needham's subsequent writing carried out in collaboration with Lu Gwei-Djen and Wang Ling. Includes treatment of projectile weapons such as fire-lances, bombards, cannon, and handguns; also rocketry; and peaceful uses of gunpowder in mining and for ceremonial purposes.
- 1986b.* (with the collaboration of Lu Gwei-Djen & Huang Hsing-Tsung) *Science and Civilisation in China*, vol. VI. *Biology and Biological Technology*; pt. 1. *Botany*. Cambridge Univ. Press (xxxii + 718 pp.). Treats

- Chinese plant geography, botanical terminology and nomenclature, and the Chinese botanical literature. Huang Hsing-Tsung contributes a section on natural plant pesticides and biological pest control. Other botanical sections by Georges Metaillié are indicated here as in preparation; a second botanical volume is planned.
- 1986c.* (with Lu Gwei-Djen, J. H. Combridge & J. S. Major) *The Hall of Heavenly Records: Korean Astronomical Instruments and Clocks, 1380-1780*. Antiquarian Horological Society Monograph, 25, Cambridge Univ. Press (xxii + 201 pp.).
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- 1986e.* Li Yuesi wenji. Collected Papers of Joseph Needham: Papers and Lectures on the History of Science and Technology in China by Joseph Needham: 1944-1984. Compiled and Edited in Honour of the Eighty-fifth Birthday of Dr Joseph Needham. Pan Jixing (chief ed.); Pan Jixing, Chen Yangzheng et al., tr.; foreword by JN. Shenyang: Liaoning Science and Technology Publishing House (2 + 2 + 4 + 50 + 1098 pp.). This volume includes Chinese translations done under the general editorship of Pan Jixing of all major papers by Joseph Needham related to the history of Chinese science, technology, and medicine in 1944-84. Also includes a bibliography of Needham's non-biochemical works with translations of titles into Chinese.
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- 1986g. *Li Yüeh-se po-shih ying yao fung hua-hsüeh shu chiang yen tzu*. Taipei: Chung-hua wen-hua fu-hsing yun-tung tui hsing wei-yuan-hui. First Chinese tr. of 1985d.
- 1986h. Introduction to Robert K. G. Temple, *The Genius of China: 3000 Years of Science, Discovery, and Invention*. New York: Simon & Schuster, and London: Prion, 1991. French tr. in R.K.G. Temple, *Quand la Chine nous précédait: 3000 ans de découvertes et d'inventions chinoises*. Paris: Bordas.
- 1986i. "The Cosmic Setting of Human Life" [paper circulated and presented at the Tenri Conference, Tenri, Japan, Dec. 1986], pp. 1-32. A renewed reflection on the relation between science and religion in the light of the rise of fundamentalism and recent developments in cosmology.
- 1987a.* "Science and Civilisation in China" [Inaugural Lecture, Joseph Needham Distinguished Lecture Series]. Macao: Universidade da Asia Oriental (11 pp.). General talk on the history of the Chinese science.
- 1987h. "A Sketch of the History of Gun-Powder in East and West." Chap. in Lionello Lanciotti (ed.), *Venezia e l'Oriente*, Florence: Leo S. Olschki Editore; pp. 1-21.

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- 1988a.* (by Dieter Kuhn, with a foreword by JN) *Science and Civilisation in China*, vol. V. *Chemistry and Chemical Technology*; pt. 9. *Textile Technology: Spinning and Reeling*. Cambridge Univ. Press (xxxiv + 50 pp.). Includes two-page foreword by JN as series editor. In addition to spinning and reeling, this volume also treats preliminary preparation of fibres. A second textile volume devoted to weaving is being prepared by Dieter Kuhn.
- 1988b. (with Lu Gwei-Djen and Pan Chi-Hsing [Pan Jixing]) "Research Note: The Oldest Representation of a Bombard." *Technology and Culture*, vol. 29 (July), pp. 594-605. Supplements SCC, vol. V, pt. 7, pp. 580-81.
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- 1988d. "Time and Eastern Man." *Cultural Dynamics*, vol. 1, no. 1, pp. 62-76. See 1965a.
- 1988e. Review of P. U. Unschuld, *Medicine in China: A History of Ideas and Medicine in China: A History of Pharmaceuticals*, in *American Ethnologist*, 15 (Fall), pp. 182-83.
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- 1990a.* *A Selection from the Writings of Joseph Needham* [chosen, arranged, and introduced by Mansel Davies]. Lewes: Book Guild (487 pp.). Repr. 1994. Intended to give the general reader a sense of the overall character of Needham's thought, this volume includes fifty-six pieces by Needham, mainly short extracts taken from his essays on the history of science, philosophy, and religion. Includes reprint of 1973c and an expanded version of 1977e.
- 1990b.* *Rikai no igata: tōzai no shisō keiken*. Inoue Eimei, tr. Tokyo: Hōsei daigaku shuppanyōko (484 + 22 pp.). Japanese tr. of 1976b.
- 1990c.* (by Tsien Tshuin-Hsuen) *Chih ho yin-shua [Zhi he yinshua]*. Shanghai: Kexue chubanshe (xxxv + 472 pp.). Tr. of 1985a.
- 1990d.* [Videofilm] *Joseph Needham, with Gregory Blue. (Interviews with Historians [Second Series])*, London: Institute of Historical Research, Univ. of London. Approximately 35 minutes in length; edited from recording in Cambridge in Nov., 1988. Shows Needham obviously slowed by age.

- 1991a.* *Dialogue des civilisations Chine-Occident: pour une histoire oecuménique des sciences*, ed. and with an introduction by Georges Métaillé; Francine Fèvre & Marie-Brigitte Foster, trs.; preface by JN. Série: Histoire des sciences, Paris: La Découverte (367 pp.). Includes first-time French translations of 1935a; 1959b; 1961a; 1966e; 1973d; 1974f; 1979d; and 1988c; also of "Mechanistic Biology and the Religious Consciousness" from 1925a; and of Lu Gwei-Djen's biographical essay on Needham's first forty years published in the Festschrift edited by Li Guohao et al. Also with a bibliography of Needham's work from 1980 to 1988. Presented to Needham on his ninetieth birthday.
- 1991b.* Joseph Needham, un taoïste d'honneur: autobiographie. De l'embryologie à la civilisation chinoise: entretien avec Didier Gazagnadou. Paris: Editions de Felin/UNESCO (155 pp.). Includes a bibliography of Needham's publications in English, Chinese, French, German, and Italian.
- 1991c.* *Tsai tz'u ling t'ing ta yang liang an ti kung ming: hui ku k'ua yüeh T'ai-ping yang ti wen-hua k'o*. Wang Yü-sheng, tr. River Edge, NJ: Pa-fang wen-hua chih-yeh kung-ssu, 1991 (116 pp.). Second Chinese tr. of 1985d. See also 1986g.
- 1991d. (with Kenneth Robinson) "Literary Chinese as a Scientific Language." Chap. in E. S. Shafer (ed.), *Comparative Criticism*, vol. 13: *Literature and Science*. Cambridge Univ. Press; pp. 3–30.
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- 1993a. "Journal of the North-West Tour." *Times Literary Supplement*, no. 4719 (10 Sept.), p. 13. Excerpts from unpublished journal of autumn 1943 travel in Gansu and Xinjiang.
- 1993b. "Preface" and reprint of 1992a, in *Lu Gwei-Djen: A Commemoration*. Edinburgh/Cambridge/Durham: Pentland Press; pp. viii & 1–4.
- 1993c. "Poverties and Triumphs of the Chinese Scientific Tradition." Chap. in Sandra Harding (ed.), *The Racial Economy of Science*. Bloomington: Indiana Univ. Press; pp. 30–46. Extract from 1963a.
- 1993d. "Science and Democracy: A Fundamental Correlation." Chap. in Sandra Harding (ed.), *The Racial Economy of Science*. Bloomington: Indiana Univ. Press; pp. 534–39. Extract from 1946e.
- 1994a.* (JN and Robin D. S. Yates, with the collaboration of Krzysztof Gawlikowski, Edward McEwen, & Wang Ling) *Science and Civilisation in China*, vol. V. *Chemistry and Chemical Technology*; pt. 6. *Military Technology: Missiles and Sieges*. Cambridge Univ. Press (xxxviii + 601 pp.). Robin Yates contributed the section "Early Poliorcetics: The Mohists to the Song" and made editorial contributions in updating other sections.
- 1995a.* *Science et civilisation en Chine: une introduction*, vol. 1. Arles: Philippe Picquier (356 pp.). French tr. of 1978d.

- 1995b.* *Chen chiu: li-shih yü li-hun*. Chou Hui-cheng & Hung Jung-kuei, trs. Taipei: Lien-ching ch'u-pan shih-yeh kung-ssu (xiv + 356 pp.). Chinese tr. of 1980b.
- 1995c. (by Tsien Tsuin-Hsuen) *Tsao chih chi yin shua*. Taipei: Taiwan shang-wu yin-shu-kuan (jii + 9 + 16 + 610 pp.). Tr. of 1985a.
- 1995d. "Foreword," in A Festschrift for Nathan Sivin, *Chinese Science*, no. 12, p. 5.
- 1996a. "The Start of SCC: Joseph Needham's Proposal to the Cambridge University Press." *Needham Research Institute Newsletter*, no. 15 (Sept.) [in an unpaginated "In Memoriam" insert, pp. 1–2]. Letter of 18 May 1948 to S. C. Roberts at the press proposing a one-volume work of 600–800 pages. In it Needham stated a conception of the series he continued to hold to over the following decades: "In view of the present state of the field of the history of science and its social background in the Far East, the book I am writing can not hope to be more than a pathfinding one, calculated to stimulate other scholars much better qualified than myself, whether Western or Chinese."

Festschriften and Congratulatory Volumes

- Mikulas Teich & Robert M. Young (eds.), *Changing Perspectives in the History of Science: Essays in Honour of Joseph Needham*. London: Heinemann, 1973 (xxi + 490 pp.). This volume was prepared in honour of Needham's seventieth birthday with the intention of bringing together diverse approaches to the history of science. Contributions, mainly but not exclusively, on European topics, are by contemporary leading historians of science, including (by chapter order): Cyril Stanley Smith, A. G. Drachmann, A. Rahman, Lu Gwei-Djen, A. G. Debus, Walter Pagel, Charles Webster, Mary Hesse, P. M. Rattansi, Gerd Buchdahl, Jerome R. Ravetz, Marie Luisa Bonelli, I. Bernard Cohen, Derek de Solla Price, André Haudricourt, Neil McKendrick, Roy Porter and the editors. The first chapter is Needham's autobiographical essay (see 1973c). The volume includes a bibliography of Needham's publications on the history of science till 1973.
- Nakayama Shigeru & Nathan Sivin (eds.), *Chinese Science: Explorations of an Ancient Tradition*. M.I.T. East Asian Science series, 2, Cambridge MA: M.I.T. Press, 1973 (xxxvi + 334 pp.). Japanese tr., Tokyo: Kinseido, 1973. The second volume of essays compiled in honour of the seventieth birthday of Joseph Needham. A classic in the historiography of Chinese science, this volume combines a characteristic historiographical statement by Needham (1973d) with several critical discussions of his historiography that have shaped scholarship on Chinese science over later decades. These include the volume's introduction by Nathan Sivin; A. C. Graham's "China, Europe,

and the Origins of Modern Science: Needham's the Grand Titration"; Shigeru Nakayama's "Joseph Needham, Organic Philosopher"; D. J. de Solla Price's "Joseph Needham and the Science of China." Further contributions on various aspects of the Chinese scientific tradition are provided by K. Yabuuti; M. Yoshida; A. C. Graham & N. Sivin; Ho Peng Yoke, B. Lim, & F. Morsingh; W. C. Cooper & N. Sivin; and S. Miyasita.

Li Guohao, Zhang Mengwen, Cao Tianqin (eds.), *Explorations in the History of Science and Technology in China: A Special Number of the "Collections of Essays on Chinese Literature and History."* On cover and added title-page: *Zhongguo keji shi tansuo*. With an introduction by the editors. Shanghai: Shanghai Chinese Classics Publishing House [Shanghai guji chubanshe], 1982 (viii + 835 pp.). Repr. 1986 (4 + 743 pp.) same publisher, and Hong Kong: *Zhongguo shuju Xianggang fenju*; also 1987, New Brunswick, NJ: Transactions. Essays in English, Chinese, and Japanese compiled in honour of Joseph Needham on his 80th birthday. The opening essays by long-time collaborators Lu Gwei-Djen and Huang Hsing-Tsung are biographical, the former examining Needham's life prior to WW2 [French tr. in 1991a], and the latter dealing with his wartime experience in China. Also included are contributions on topics pertaining to Chinese science, technology, and medicine by other SCC collaborators: Tsien Tsuen-Hsüin, Ho Peng Yoke, Nathan Sivin, Robin D. S. Yates, Dieter Kuhn, Peter J. Golas, Francesca Bray, Ray Huang, Timothy Brook, and Hans Ågren. Further contributions are by other distinguished scholars in the field from China, Japan, Britain, Malaysia and the Low Countries, including Anthony Butler, Cao Tianqin, Chen Guofu, Fan Chuyu, Hu Daojing, Keizō Hashimoto, Li Guohao, Lam Lay Yong, U. J. Libbrecht, Shigeru Nakayama, Manfred Porkert, Miyasita Saburo, A. W. Sleeswyk, Tan Qixiang, Tian Rukang, Xia Nai, Xia Weiyong, Yabuuti Kiyosi, Zhang Mengwen, and Zou Shuwen. This volume includes several Needham bibliographies: the first lists his biochemical books and papers; the second reproduces the bibliography of publications related to the history of science from Teich & Young (eds.); the third updates the Teich & Young bibliography.

Hakim Mohammed Said (ed.), *Essays on Science: Felicitation Volume in Honour of Dr. Joseph Needham*. Karachi: Hamdard Foundation Pakistan, 1990 (xiii + 267 pp.). An anthology of essays presented to Joseph Needham on the occasion of the Sixth International History of Chinese Science Conference held in Cambridge in 1990. Most papers are of modest length; topics treated range from astronomy to textiles, botany, and medicine. The first chapter is an appreciation of Needham's life and work by the editor. This volume includes contributions by leading historians of South Asian science: namely, in addition to Said himself, Debiprasad Chattopadhyaya, Hakeem Abdul Hameed, S. Mahdihassan, A. Rahman, S. N. Sen, B. V. Subbarayappa, and S. B. Vokora. Other contributions are by Gregory Blue, Didier Gazagnadou, Keizō Hashimoto, Dieter Kuhn, Tetsuro Nakaoka, Pan Jixing, Kenneth G. Robinson, and Xu Zhentao.

Reviews

H. Lyman Miller, *Science and Dissent in Post-Mao China: The Politics of Knowledge*. Seattle and London: University of Washington Press, 1996. xii, 370 pp.

Richard Baum

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When the journal *Bulletin of Natural Dialectics* (*Ziran bianzhengfa tongxun*) made its debut in Beijing in 1980, it attracted a good deal of scholarly attention. Under the aegis of Deng Xiaoping's newly promulgated ethos of "seeking truth from facts," science and technology were officially declared to belong to the realm of the "productive forces," which meant that they were ideologically neutral and free from the taint of bourgeois class bias. For the first time in three decades, Chinese scientists, historians, and philosophers of science could—at least in theory—freely debate both the canons of scientific inquiry and the constraints affecting science policy, both Western and Chinese, without fear of ideological fetters or "forbidden zones." The result was a remarkable outpouring of critical analysis and commentary by such noted Chinese academics as Xu Liangying and Fang Lizhi, among others.

Bulletin of Natural Dialectics was just one of several new journals that sought to explore and expand the limits of permissible inquiry in post-Mao China. In this timely new book, H. Lyman Miller expertly chronicles this extraordinary period of techno-scientific "blooming and contending." Focusing his attention on a small but distinguished group of liberal "scientist dissidents," Miller draws a line—sometimes oblique, sometimes direct—linking together the various intellectual and ideological currents of the post-Mao period, beginning with the 1978 "criterion-of-truth" debate and culminating in the Tiananmen disaster of June 4, 1989. In between these two defining milestones of the Deng Xiaoping era lay the push and pull of conflicting sociological imperatives, as