

Joseph Needham (1900–95)

With the death of Joseph Needham on 24 March 1995 the world of learning lost one of the greatest scholars in this or any country, of this or any century. For more than thirty years Needham had been the greatest sinologist in the West, having previously achieved an international status as a research biochemist and as a historian. Intellectually a bridge-builder between science, religion and Marxist socialism, and supremely so between East and West, he has been called the Erasmus of the twentieth century. A sober assessment suggests that with the passage of time he will be recognized as a greater figure than the scholar from Rotterdam.

Great mountain peaks are often found close-packed in ranges. Needham matured at Cambridge in the presence of J. J. Thomson, Ernest Rutherford, Arthur Eddington, Edgar Adrian and Charles Sherrington, not to mention some ten other Nobel laureates from Blackett and Bragg to C. T. R. Wilson. As important influences he himself might well have first mentioned his mentor in biochemistry, (Sir) Frederick Gowland Hopkins and his polymath physicist friend J. D. Bernal. It was in the Department of Biochemistry, where he was eventually the Sir William Dunn Reader, that he met Dorothy Mary Moyle, herself a distinguished biochemist. They became the first husband-and-wife pair each to be elected Fellows of the Royal Society.

Noel Joseph Terence Montgomery Needham was born in London on 9 December 1900, the only child of a Harley Street consultant and an artistically gifted mother. At school at Oundle, in addition to Greek and Latin, which he further cultivated so that he could have taught them at university level, he acquired a deep appreciation of Christian teaching and of the Anglican Church: later he was for two years in the noviciate at the Oratory of the Good Shepherd, an Anglo-Catholic house. He then entered Gonville and Caius College intending to qualify in medicine, but the sparkling interests of ‘Gowie’ and his colleagues in Biochemistry captured him even from the Church. At Caius he successively became a research fellow, tutor and Fellow. He was Master from 1966 to 1976.

In 1928, after four years of advanced study, Needham was appointed University Demonstrator in Biochemistry. His biochemical researches thereafter were centred on one of the most challenging problems in the biological world: how does the single fertilized egg-cell develop the highly specialized limbs, organs, senses, of the new-born offspring? Part of his search was for the chemical agencies promoting specific differentiation in the growing embryo. He acquired an appreciation of subtle physico-chemical factors that appeared to be relevant, and of these he gave the general reader an account via the Silliman Lectures, which Yale University published as *Order and Life* in 1936. Before this he gave a systematic exposition in a three-volume work *Chemical Embryology* (1931). The latter totals approximately a million words. The first 90,000 provide a history of embryological studies from Egyptian times up to the early nineteenth century. As well as

Arabic writings, the sources used by this 30-year-old scholar embraced those in most European languages, including Russian. The work was published separately as *A History of Embryology* in 1934. Ten years later, when he was on the point of leaving this research area, he critically surveyed his own and other contributions of the twentieth century in a magisterial volume, *Biochemistry and Morphogenesis* (1942). This was his fifth at research level in biochemistry. The lay person could well assume that such volumes are of interest only to the specialist. Not so, when written with Needham's erudition and style. It has been well said that the ordinary reader can admirably extend a good general education by merely reading Needham's intriguing footnotes. He was elected FRS in 1941.

Let it be emphasized too that the young Needham was no closet scholar unable to sharpen his own pencil. He was a laboratory scientist with a mastery of refined manipulative techniques. During the General Strike of 1926 his practical acumen led him to drive trains at Cambridge. This apparent lack of sympathy for the workers was corrected when he found that striking engine-drivers were to be penalized. He led a walk-out of their volunteer replacements. For several years he actively represented Labour party interests on local Cambridge councils, and his left-wing sympathies were seen during the Spanish Civil War and in the pre-1939 Cambridge Air Raid Precautions Study Group.

In the mid-1930s three Chinese research students in the Department of Biochemistry impressed Needham by exhibiting modes of thought and qualities of mind with which he fully resonated. He took to learning Chinese, with historic consequences. In 1942 he was sent to become Scientific Counsellor to Chiang Kai-shek's government at Chungking. He immersed himself in the historical records of China's science, and he sought out locations where ancient techniques were still to be seen. Then, and on many subsequent return visits to China, he criss-crossed the country repeatedly, searching out original materials, even joining in archaeological activities so that he acquired a unique grasp of the details of age-old technologies. From the outset he had a major preoccupation: why did China, so clearly ahead of Europe up to the thirteenth and fourteenth centuries, fail to break into the era of modern science? He became so deeply imbued with the Chinese outlook that he was reluctant to admit the profound role played by Greek logic and Greek mathematics in the emergence of rational European science.

The results of Needham's fifty years of Chinese studies are enshrined in what is perhaps the greatest work of scholarship achieved by one individual since Aristotle. Those who doubt this must find an original achievement greater than the sixteen volumes on *Science and Civilisation in China*. These have appeared regularly since volume 1 was published in 1954. Supported by a number of specialist researchers in the literature and fieldwork, Needham wrote more than twelve of these, and they were mostly meticulously proof-read by Dorothy, his wife from 1924. The first ten volumes alone have 4808 text pages, 1202 illustrations, 1285 pages of bibliographies and 549 pages of indexes (in Chinese and Roman script). Whilst the size of the work is itself remarkable, it is the thoroughness, the depth and the enlightenment found in these volumes that make them an unsurpassed historiographic treasure of the twentieth century. Carefully detailed systematic accounts and interpretations of Chinese achievements over twenty-five centuries in mathematics and astronomy, physics, chemistry, geology, zoology, botany, hydraulics, metallurgy, maritime science, textiles, hygiene and medicine are presented. Thus, in assessing the volume of

Science and Civilisation in China that Needham published in his 87th year, which dealt with the gunpowder epic, the reviewer in *Nature* wrote:

No work of scholarship in the twentieth century has done so much to alter received ideas about the past as Joseph Needham's *Science and Civilisation in China*...Needham's talents are extraordinary, a combination of linguistic ability – he is completely fluent in eight languages, three of them ancient – chemical, technical and mechanical competence, and a cast of mind that has put endless details together into a clear and convincing picture of a world-wide development that ran across some 1500 years.

The *Times Higher Education Supplement* expressed the view that ‘no one could dispute that Needham's original concept has developed into the major scholarly work of our time’. Many would add ‘or of any other time’. And an essay by Rupert Hall in *Notes and Records of the Royal Society* in 1990 concluded:

Few pages, chosen at random, would not at once identify themselves as the products of Needham's typewriter. He has had (and may have still) many critics, as he well knows; nevertheless he has been the supreme spokesman of the universal ‘scientific culture’ of this century – in the best and widest sense of those words – and contemporaries may well be proud to have lived in an age adorned by a man of such intellectual stature.

However, the subject matter of *Science and Civilisation* provided Needham with little opportunity for comment on the behaviour and trials of the Chinese people. Even in his numerous essays he presented few clouds on the Chinese scene. He did, of course, accept that what we would call bribery of the representatives of the Son of Heaven was an established practice at all levels: the age-old system would not work without it. On the daily life of the Chinese, Needham is far less instructive (it was never his theme) than the brilliantly realistic Matteo Ricci in his report of 1600–10.

Yet that an English scholar should be responsible for so enormous an expansion of Chinese cultural horizons would seem worthy of the highest commendation. For forty years, no British government offered any recognition. On Needham's 80th birthday, celebrated quietly in his college, a delegation of four senior members of Academy Sinica brought their congratulations and acclaim from Peking to Cambridge. He had built a bridge of monumental proportions between the cultural history of one quarter of the human race and the larger world outside Chinese civilization. Then, in 1992, he was elected a Companion of Honour. When friends qualified their pleasure with the comment that it was belated and inadequate, his response was: ‘Well, I suppose it's a failed OM.’ In that respect he outweighed the total of any two in the Order of Merit.

It is a pleasure to note that one major monument to his interests and achievement is to be found in Cambridge. The Needham Research Institute was constituted in 1976 and devoted to the study of East Asian History of Science. Since 1987 it has been housed in a notably attractive purpose-built ‘East Anglian Asian’ building (the architect's description) adjacent to Robinson College. With a brief provided by Needham, the architect Christophe Grillet (another Caius man), produced a masterly creation in the Chinese style, incorporating the finest Western materials. It is reminiscent of Frank Lloyd Wright's ‘Talesin’, near Madison, Wisconsin. The Needham Institute has won many architectural awards, including a number for the quality of the interior woodwork. The Institute also houses numerous treasures from China. The 1400 separate chapters of an encyclopaedia given to Needham by Dr Lu-Needham Gwei-Djen's father are themselves dwarfed by a

reprint, bound in 1500 substantial volumes, of *The Complete Collection of the Four Treasures of Literature*. This is one of the most monumental of Chinese works. Ordered by imperial edict in 1773, its contents come under 1872 titles, which are divided into classics, history, philosophy and literature, comprising 79,000 chapters from 3400 original works. This was the gift of the Commercial Press of Taiwan. Sadly, only relatively minor support for the Institute has come from the UK. The cost of the building – the third and last part, the south wing, cost more than \$500,000 – came more particularly from the generosity of Tan Chin Tuan, a Singapore banker, K. P. Tin, a Hong Kong businessman, the Kresge Foundation of the USA, and the government of the People’s Republic of China.

Needham’s attachment to things and thought Chinese was profound: he confessed that he might be as much a Daoist as an Anglican. He did not readily accept criticism of the Peking government even in the era of the cultural revolution. He earlier supported Chinese claims that the USA had used biological weapons in Korea (and the *American Bulletin of Atomic Scientists* recently established a sound basis for this conclusion). He generally held views sympathetic to the Soviet government’s on many international activities. It was thus he became *persona non grata* to UK establishment representatives. Given the scale and brilliance of his achievements, such reactions will become difficult to accept in the future. He had himself written, ‘Loyalty of course is possible anywhere, but its value stands in proportion to the ideals which it serves.’ In March 1900 he stated:

I was...appalled by the ‘June 4th massacre’ at Beijing, with its later repercussions in the clampdown on intellectuals which has followed. I put my name down as supporting various collections for the Chinese students in the early days but have not done so for some time past because we don’t want the Institute to be blacklisted...It was an extraordinary irony of history that Gorbachev’s visit should have coincided with the student occupation of Tiananmen Square. All the extraordinary events in the Eastern European countries during the past winter, and now in the Soviet Union itself, have shown how right the students were in wanting more democracy in China. What will be the end of it I really cannot tell.

Needham was a radical, convinced that Christianity is a revolutionary force. With this conviction and with notable historical care, he published the monograph *The Levellers and the English Revolution* (1939) under the pseudonym ‘Henry Holorens Shaw’. Needham employed the pen-name again when writing a no less analytical sketch of his early life, ‘The making of an honorary Taoist’, for Mikuláš Teich and Robert Young’s *Changing Perspectives in the History of Science: Essays in Honour of Joseph Needham* (1973). The editors reported how they were able to persuade Henry Holorens Shaw to contribute: ‘Holorens Shaw has not published in the field of history for several decades but he was willing to take up his pen again for this special occasion, to write about an intimate of whom he says “As I have known him so well for more than sixty years I might be able to explain how it all fits in.”’

It was on Needham’s return from China in 1945 that his friend (Sir) Julian Huxley, the first Director General of what became Unesco, persuaded him to join in the venture of setting up this United Nations organization. It seems clear that without Needham’s insistence and lobbying the word science would not have appeared in the Unesco title as one of its principal interests. He was director of the Department of Natural Sciences, Unesco, 1946–48. It was during this period that he also played a significant role in establishing the discipline of history of science in Britain. He and Walter Pagel worked hard

to establish history of science teaching at Cambridge, publishing an important text, the *Background to Modern Science: Ten Lectures at Cambridge arranged by the History of Science Committee, 1936* (1938). As one of a small number of British members in the élite Academie Internationale d'Histoire des Sciences, he pressed for including history of science under the Unesco umbrella. A key article by Needham and Armando Cortesao in *Archives Internationales d'Histoire des Sciences* began the chain of events that resulted in formation of the British Society for the History of Science in 1947. Needham was a founder member of the Society, and the longest-lived of that body. He believed the subject was crucial for inculcating humane values. Many members will remember his lecture on 'Science as a Cultural Symbol' at the XVth International Congress of the History of Science at Edinburgh in 1977, where he addressed the thorny problem of scientific ethics. He was president of the International Union of History of Science, 1972–75.

Needham did far more than study China deeply. There are numerous contributions that establish his status as a historian. To mention merely one: his article on 'The prenatal history of the steam engine', which surveys the Chinese, Indian, Greek, Arabic and early European usage of steam power, is a *tour de force*. It is replete with detailed explanatory diagrams and over 270 footnotes, several of them the length of paragraphs. Other similarly original essays relate to the use of the compass, clocks, metallurgy, astronomical instruments, hydraulics and navigation. It is thus invidious to compare him with others whose achievements may amount to rewriting the history of, say, the Tudor period, for a new generation of students. As an indication of his scope and grasp in this area, a paragraph he wrote on Chinese historiography may be quoted:

The philosophy of history was brilliantly studied in the T'ang period with *The Generalities of History* of Liu Chih-Chi in AD 710 – the first treatise on historiographical method in any language, quite worthy of comparison with the work of the European pioneers Bodin and de la Popolinière, eight and a half centuries later. At that later time China was also to have her Giambattista Vico in the person of Chang-Hsueh-Cheng. But it was Liu Chih-Chi's son Liu Chih (fl. c. 732) and another T'ang scholar, Ta Yu, who invented a new form of encyclopaedic institutional history, the former with his Governmental Institutes, the latter with the famous Comprehensive Institutes – a Reservoir of Source Material on Political and Social History, issued in AD 801. But the climax to this sort of work was not reached until the Yuan period, when in 1332 *The Comprehensive Study of the History of Civilisation* by Ma Tuan-Lin saw the light. His lucid and outstanding treatise in 348 chapters, was essentially a general history of institutions... it paralleled the sociological history initiated by Ma's near contemporary the great Ibn Khaldun, and the history of institutions later to be achieved by Pasquier, Giannone, and de Montesquieu.

Not untypically, this paragraph carried a richly revealing footnote. Needham referred to the writing of a professor of modern history (elected OM) who 'wondered whether any non European civilisation had developed the history of laws and institutions'.

Many essays show his knowledge of early church history, and many published and unpublished sermons, including those delivered as Master of Caius College, are masterly commentaries on the Christian virtues. He could even convey the experience of the transcendent: 'When like Mozart, we see in an instant of time, all the sonatas of the universe circling round the point from which we started, then we may say that we are, though in the midst of time, in our eternal home.'

In this context, several of his admirers may feel that Needham, as a rational analytical scientist, an honorary associate of the Rational Press Association, an active socialist and

a devout Anglican, was straddling unbridgeable chasms. His volumes of essays, of which there are some fifteen, offer illuminating insights into the bridges he felt existed. Before he was 30 he explained that words had different meanings in different contexts, that some apparent contradictions were not real, and that each of the principal concerns of human thought (history, science, art, philosophy and religion) has its own valid vocabulary, which is not necessarily transferable to the others. Wittgenstein's posthumous papers contain essentially the same thesis.

Needham only latterly became a workaholic. As a young man he walked extensively in East Anglia and in hill country around the world: he particularly enjoyed swimming in rivers and lakes, and took a keenly active part in English folk-dancing. Always approachable and friendly, he did not extend his patience to suffering fools gladly. After a close marriage of sixty-two years, his wife Dorothy died in December 1987. His principal collaborator in Chinese studies for fifty years had been the indefatigable Lu Gwei-Djen, of whom he wrote as 'the explainer, the antithesis, the manifestation, the assurance of a link no separation can break'. So at the time he moved from his home of sixty years in Grange Road, Cambridge, to a purpose-built bungalow near to his own Research Institute in Sylvester Road, it was no surprise when in September 1989, with a special licence (and a bouquet of flowers) from the Archbishop of Canterbury, Joseph Needham married Lu Gwei-Djen in Caius College Chapel. His was a bride of 85 years. Sadly, Lu-Needham Gwei-Djen died in 1991. It was remarkable how Needham's resilience survived even this terrible blow.

In his later years Joseph Needham was greatly incapacitated by arthritis in both hips and by many other inflictions of old age, including partial blindness. In 1991 he returned for two weeks to Portmeirion in North Wales, where he and Dorothy had visited over many years. Out of his wheelchair he was unable to stand unsupported and fell there, gashing his cheek and ear, a matter for seven stitches. Within hours he was insisting 'I'm all right'. But only above his shoulders did that remain true, even during his last year, when he still worked (always helped by a reader) on the volumes being written on the history of medicine in China over nearly four millennia. He died in Cambridge.

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