Book reviews

BOMB, BOOK AND COMPASS: JOSEPH NEEDHAM AND THE GREAT SECRETS OF CHINA **SIMON WINCHESTER**

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One of the great synoptic works of human developmental biology is a three-volume work that was published by Cambridge University Press in 1931. Over 2000 pages long, *Chemical Embryology* provides not only an exhaustive account of changes in the embryo and placenta (osmotic pressure, pH, respiratory gradients, metabolic processes) but a descriptive history of the egg from its earliest mythic beginnings. 'Practically nothing was left out,' wrote its author — one Joseph Needham, born 1900, only son of a Harley Street physician specialising in anaesthetics and an erratic, high-strung mother (who so seldom saw eye to eye with her husband that she called her son by a different Christian name). Leading light of the Cambridge Biochemical Laboratory, he was already being hailed as the new Erasmus, so impressive were his intellectual reach and vigour. He did have the benefits of a photographic memory. His wife Dorothy — 'Dophi' — Moyle, herself a noted biochemist, recalled him lying awake in bed, energised by the work he had been doing: 'mentally visualising the book's page proofs, and then correcting in a notebook any errors or infelicities' (p28).¹

Needham liked bringing things between covers, and it wasn't always writings on

developmental biology. Wayward driver of an Armstrong Siddeley tourer, brazen nude-bather, radical activist, liberal Anglo-Catholic, and keen morris dancer, he was also acquiring a considerable reputation as a skirt-chaser. Being an eccentric in Cambridge went with the turf; being unsound was to invite social ostracism. But Needham knew how to toe the line: he just had to be brilliant. Then in 1936, three Chinese research assistants came to work in his lab. He began a relationship with the female member of the team, Lu Gwei-djen, a physiologist from Nanjing: their affair was to last, with the complaisance of Dophi, for the next half-century. All three spent many a jolly evening together in the local pub discussing the biomechanics of muscle tissue.

Theirs was to be a significant encounter in another way. Lighting a post-coital Players for her one evening in 1938, Needham casually asked her how 'cigarette' would be written in Mandarin. Gwei-djen guided his hand, inscribing the ideogram that seemed far more poetic in literal translation than the English word: fragrant smoke. A cigarette had been the catalyst: 'I must learn this language — or bust!' he told her. Within a couple of years Needham had produced a series of homemade notebooks detailing 6000 characters indexed in terms of their radicals and cross-referenced to English words. The task of learning Chinese made him, in his own words, 'almost delirious with happiness.' (He was still spending the days as a biochemist.)

With the war in its third year, and large parts of China under Japanese control, a member of the Royal Society (of which Needham was now a fellow), suggested that a senior figure connected with British research should be airlifted into China as head of a new body with quasi-diplomatic status, to be called the Sino-British Scientific Cooperation Office (SBSCO). Needham was the obvious choice. His duties were to include organising help for Chinese scholars fleeing the Japanese invaders, who were advancing into the inner provinces. Equipped with a Webley

service revolver and diplomatic papers, he was flown in February 1943 into China over the notorious Hump, the Himalayan airbridge out of India. He had just seen his second major work through the press, *Biology and Morphogenesis* (1942). His base would be Chongqing, the capital of unoccupied China, at the humid confluence of the Yangtze and the Jialing: it is now said to be the world's biggest city with a population of well over 35 million.

It was a dangerous mission, full of hair-raising logistical difficulties, but Needham had a genius for improvisation and an 'imperturbable persistence' (p54).¹ The scholarly Grand Panjandrum had derring-do, and Winchester devotes nearly half of his entertaining book to the 3 years in China. Needham was hardly ever in his office in Chongqing. He made no less than 11 sorties on behalf of the SBSCO, some of them mere excursions but others epic undertakings that were risky and, in one case, which involved crossing the frontline south-west to Fuzhou, 'downright foolhardy.' The most spectacular of them all involved driving a convoy of trucks to the north. This allowed him to inspect the irrigation project set up at Dujiangyan in 250 BC on the orders of Li Bing, governor of the province. The fact that it was still working brought him to a pitch of high excitement. Months later they reached the Mogao Caves at Dunhuang, an oasis on the edge of the western Gobi Desert and the repository of the world's oldest printed book, the *Diamond Sutra*, as well as thousands of other rare scrolls. The man who had actually found the scrolls in 1907 and inspired Needham to make the trip, the famous explorer Sir Aurel Stein, was actually lying on his death-bed, just a few hundred miles away in Kabul. Needham found out only later; there's no telling what he might have done had he known.

When he left China in 1946, Needham had visited 296 Chinese institutes and universities. He had helped to lay the foundations for organisations to support Chinese science. These were not the only organisations he helped to establish in

those years: he was the administrator in Paris who, as his admirers later said, 'Put the "S" into Unesco'. Two years later, glad to be back at his rooms in Gonville and Caius, he began opening the hundreds of boxes and crates he had sent back to his college during the war. In 1948 he addressed a proposal to the syndics of Cambridge University Press. It was the outline of the work which would make him famous: *Science and Civilisation in China*.

In spite of a few querulous souls at the press who felt Needham ought to be doing what he was there for, that is, teaching embryology and doing experimental work into the chemistry of early life (specifically inositol levels in the chicken embryo), he was given leave of teaching duties. From then on he was able, with the help of his assistant the Chinese historian Wang Ling, to 'follow [his] star without distraction' (p173).¹ (This is all the more remarkable given that Needham had no academic standing whatever in the Department of Oriental Studies.) Soon, some of the discoveries he had made in China — on the abacus, dam-making, and plum-grafting techniques — were being supplemented by the results of methodical reading and judicious probing of Chinese sources.

Needham had already been awarded one of the Republic's highest honours, but he had close ties with the new rulers too. In fact, he was so close to Zhou Enlai, Mao's foreign minister, as to be blind to the nature of the new regime: the Patriotic Hygiene Campaign under the Communists would, he believed, be China's saving. Loyalty to the Communists led Needham to put his entire career in jeopardy: in 1952 he took part in a Chinese-led inquiry into alleged use of germ warfare by the Americans during the Korean War. Hoaxed (it would appear) by a disinformation campaign, the inquiry's findings accused the Americans of dropping cholera-infected rats on northern villages. The entire British establishment, including parliament, the Royal Society, and his own college, vented its fury on him: 'Some people called him a dupe, others a traitor, a few simply a crank' (p210).¹ And most inconveniently for his career, the State Department in the US blacklisted him until

well into the 1970s. Like a long list of British intellectuals he was naive enough to think politics worked along the same impartial terms as science.

Ending up *persona non grata* saved him for his work. Needham had read enough to start writing. Seven volumes were initially planned, of which volume V would be devoted to what has since become known, even in Mandarin, as the Needham question (Li Yuese nanti): if the Chinese had been so technologically inventive why did they not come up with modern science? 'Sci[ence] in general in China—why [did it] not develop?' was his original diary entry. The question is still open (and it includes Islam too). Wherever Needham looked the Chinese had been there first: fitting stirrups, steering with compasses, casting iron, inoculating against smallpox, recognising beriberi, distilling mercury, making maps, ball-bearings, umbrellas and clockwork escapements ... Yet just at the time when the Renaissance was in full flow in Europe, the creative passions of the Celestial Kingdom were drying up; Needham was unsure. Perhaps his question was back-to-front: perhaps it ought to be 'Why in Europe (of all places)?'. Was it related to mathematics, capitalism, or the peculiar 'doubleness' of the European mind: '... oscillating for ever unhappily between the heavenly host on one side and the "atoms and the void" on the other; while the Chinese, wise before their time, worked out an organic theory of the universe which included nature and humans, church and the state, and all things past, present, and to come. It may well be that here, at this point of tension, lies some of the secret of the specific European creativeness when the time was ripe'.²

When the first volume of *Introductory Orientations* appeared in 1954, it was a critical success. Even Needham's bitterest enemies praised it in unstinting terms. The initial print-run sold out, and it has been regularly reprinted ever since. And when the second volume of *History of Scientific Thought* appeared 2 years later, it was apparent to everybody that Needham's magnum opus was going to be something very remarkable. Literary voices joined in the chorus of praise. George Steiner, no slouch himself, wrote

that it was the modern work which came closest to Marcel Proust's fictional attempt to recreate an entire society. He thought Needham was reconstituting a country of the imagination forgotten by Chinese scholars themselves: 'Proust on the altering focus of the steeple at Martinville and Needham on man's realisation, across centuries and cultures, of the true shape of the snow crystal are exactly comparable exercises in total imaginative penetration'.³

Things were looking up in Needham's life too. Lu Gwei-djen was living close by again, just a few yards away from the house he shared with his wife, in an arrangement that evidently suited all parties concerned. In 1959, he was elected to the presidency of the fellows at Caius, an almost unimaginable reversal of events earlier in the decade. Subsequently master of the college, he proved to be a traditionalist while remaining perfectly left-liberal in his support for the Progressive League, the New Left Review Club, and the Campaign for Nuclear Disarmament. He was very slow to criticise Mao, despite the fact that scholars were suffering most from the harshness of the Cultural Revolution.

Surrounded by his forest of documents, Needham was beginning to realise that he might not manage to recreate ancient Chinese society in its entirety within his lifetime. Some of the seven volumes were calving fascicles. He brought in collaborators, and the work is still going strong: publication proceeds under the guidance of the Needham Research Institute (NRI), which in 2008 released part 11 of volume V, on *Ferrous Metallurgy*.⁴ The NRI had been set up at Cambridge by the ailing sinologist in 1987, after years on the fundraising circuit. His library had to be housed somewhere after all. His wife died that year too, 15 years after publishing her own magnum opus *Machina Carnis*, an account of the biochemistry of muscular contraction. In September 1989, in a small ceremony at the college chapel, an ancient figure married the woman whose love had inspired him so many years before. Lu Gwei-djen, aged 87, was to die not long after, and Needham himself, now a Companion of Honour, as old as the century, in 1995.

Needham would hardly be surprised at the dynamic explosion of wealth and creativity in China, even in the decade or so since his death, since that creativity was implicit in his 'discovery' of the country in the first place. He was chronicling a cultural self-confidence as well as a technological past that had been completely hidden — 'the unique degree of self-knowledge that helps to make China China' (p259).¹ That he could perceive

these things when everybody else had written China off is not the least extraordinary thing about this man. Perhaps it took a biochemist to be properly attuned to those emergent cultural properties.

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All volumes are available from Cambridge University Press (see also the website of the Needham Research Institute for further information at <http://www.nri.org.uk/>), although older copies can often be found at more affordable prices on the used book market. Another 4 volumes are in preparation. Parts 8 and 10 of volume V have been planned but have yet to be finished, edited and printed.