

# The man who unveiled China

An English biochemist single-handedly changed the West's perception of China, revealing its past scientific glories and predicting more to come. **Simon Winchester** investigates the ongoing legacy of Joseph Needham.

Seldom does the pork-and-rice reliability of a Chinese takeaway spring a revelation. One frigid December evening last year in Washington DC, as I was counting out money for a Shanghainese delivery man, I mentioned that I was writing a book about Joseph Needham, known in China as Li Yue-se. Hardly anyone in the United States knew of my chosen subject, so I was astonished when the delivery man gave a sudden and enthusiastic response. "How wonderful!" he replied. "Li Yue-se! The most famous Englishman ever to have lived in China! We are taught about him in school. He is loved in China, because he told us Chinese about ourselves. He helped us to feel proud about all we have done in the past."



The encounter underlined a sobering reality. Noel Joseph Terence Montgomery Needham (1900–1995), the sole architect and author of what is universally acknowledged to be the greatest and most authoritative of all books about China in the English language, is now far better known in the country about which he wrote than in his homeland where he wrote it.

This autumn marks 60 years since Needham began work on what would become his masterpiece: an enormous series of books entitled *Science and Civilisation in China*. Each volume was greeted with stunned admiration by critics and scholars around the world — the approbation growing as the number of volumes swelled. Together the books can now probably lay claim — although their author never did — to causing a profound mind-shift in the way the West came to regard the mysterious and long ill-regarded China.

## Fresh perspective

Needham was among the first in the Western world to realize the scope of China's historic achievements, and so to expect an equally glittering future for the nation. Now China is indeed rising to prominence again. And yet Needham, known and revered in China, is still very much a prophet without honour in the Western world. Except for within a scattering of academic centres, his name is little known or long forgotten.

Needham's interest in China came comparatively late. He read chemistry at the University of Cambridge, took a PhD in biochemistry, became a dedicated embryologist and married



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Joseph Needham wrote nearly 3 million words on China before his death in 1995.

a woman in his department. He was a lifelong Marxist, a robust practising Christian, a nudist, a Morris dancer, an accordion player, a chain-smoker — and an ardent and unceasing womanizer. When a clever and pretty young Chinese scientist, Lu Gwei-djen, arrived in Cambridge from Nanjing in 1937 to study under Needham's wife Dorothy, he began a life-long affair. As he fell in love with Gwei-djen, he fell in love with her language and country.

When Needham began his flirtation, China was in a parlous state. This "booby nation", as the American poet and essayist Ralph Waldo Emerson had called it in 1824, was widely seen

by Western mercantile classes as good for little more than the production of rhubarb, ceramics, silk and tea. As foreigners disdained it, so they also began to gnaw away at it. The British went to war over opium in 1839, seizing tracts of territory that included Hong Kong. The French followed suit in south China, the Germans in the east, the Russians and then the Japanese in the north. From 1937, Japan was engaged in a full-scale war.

As Needham was settling down to his calligraphy exercises in the studied calm of Cambridge, Tokyo's armies had occupied almost all of the eastern third of China. In one of the more

melancholy and little-known consequences of the invasion, many of the great eastern universities in cities such as Beijing, Shanghai, Tianjin and Nanjing were forced to flee westwards, to re-establish themselves as refugee colleges in safer mountain cities beyond the reach of the Japanese bombers. In 1941, these academics sent word to Britain that urgent help was needed to avoid the utter collapse of Chinese intellectual life.

The British government decided in 1942 to lend assistance. It chose Joseph Needham as a temporary diplomat to determine what was needed, arming him with a pistol in case of wartime emergencies. He arrived in Kunming in the spring of 1943, to begin three years of dauntingly difficult expeditions into the hitherto little-known heartlands of China.

### Into the unknown

Lu Gwei-djen had advised her lover to keep an open mind while in China, and not to assume, as most Westerners did, that the country was an intellectual desert. Her advice struck home. On his very first day in Kunming, Needham records meeting an old gardener “in a little Mongol cap” top-grafting a plum tree. Needham’s Mandarin proved good enough to communicate, and he soon learned that the man’s grafting techniques were different from and far older than any similar techniques recorded in the West: the Chinese had, in effect, invented this aspect of plant husbandry.

A few days later, in a tailor’s shop, Needham inquired into the antiquity of the Chinese abacus. He found it to be centuries older than Blaise Pascal’s seventeenth-century calculating mechanism, the Arithmetique.

The findings set off a lifetime of inquiry in Needham’s mind. He fast realized that China had created or developed scores of the ordinary, unsung underpinnings of human civilization. With painstaking precision, he began to list them.

Needham soon found Francis Bacon’s long celebrated ‘holy trinity’ of gunpowder, printing and the compass to be Chinese. Also the stirrup, chains and chain drives, suspension bridges, blast furnaces, wheelbarrows, toilet paper, playing cards, inoculation, chess, the accurate establishment of  $\pi$  and much more. The Chinese, said Needham, had demonstrated “a promising start”. He wrote: “The early Taoists (in China), not only curious about what they saw, but observing nature patiently and persistently, were [the world’s] proto-scientists.”

Although awed by all of this, Needham was also perplexed. “China was well endowed, and we can understand how it is that they obtained an early lead in technology,” he wrote. “Yet it was Western Europe which discovered the method of developing the new natural science.”

If the Chinese had invented so much, so early, why had their inventive energies dried up in the sixteenth century? Why was there never a Chinese Newton, a Kepler, Galileo or Einstein, when there had evidently in earlier times been a Chinese Euclid and Archimedes? He proposed what became known as the Needham question: why was almost all modern science the monopoly of the West?

The list of early Chinese achievements and this famous question became the twin underpinnings for a monumental book project that Needham began when he returned to Cambridge in 1948. Originally he did not think it would be such a huge task: his first letters to Cambridge University Press suggested he might compress his findings into a single volume. Maybe three, he wrote a few months later.



Lu Gwei-djen, Needham’s inspiration and lover.

Then maybe seven, or eleven.

The first volume of *Science and Civilisation in China* was published in 1954, to general critical rapture. Volumes followed on a host of other topics. Whereas the first offered a general historical perspective, subsequent parts were more specific and included chemistry, nautics, astronomy, engineering, ceramics and botany. Most of them were enormous tomes, often split into several physical parts (none so large it could not be handily read in the bath, Needham insisted). At the time of Needham’s death in 1995 he had completed 17 volumes, having written almost single-handedly more than three million words.

Readers sensed in the books something more than mere history. George Steiner, the polymathic critic, remarked in 1971 that like

Proust, Needham had “made of remembrance both an act of moral justice and of high art”.

The volumes, it was generally declared, had the power to change the world’s mindset. Needham’s books are littered with the famous Latinism *Ex oriente lux*, meaning light comes from the east. “It is time,” he wrote, “that Christians realized that some of their highest values may be coming back to them from cultures and peoples far outside historical Christendom.” Many agree that *Science and Civilisation in China* was instrumental in persuading the West’s intellectual elite to shake themselves loose from their earlier preconceptions of moral, ethical and economic superiority — a legacy of paradigm-shifting that few other books can claim.

Mark Elvin, one of the greatest of contemporary scholars of Asian Pacific history, wrote in 1995 that after reading the books, “one’s conception of the world has been transformed”. A review in *Nature* of Needham’s Volume 5, Part VII, which was largely devoted to the epic saga of the making of gunpowder, declared “no work of scholarship in the twentieth century has done as much to alter received ideas about the past” (W. H. McNeill *Nature* 326, 751; 1987).

Few late-twentieth-century scholars of China who were made aware of the books — few scholars of any calling, in fact — long retained any dismissive notions of China. In time, and as international politics allowed for a greater travel to and correspondence with China, so these attitudes began to settle onto the wider world as a whole.

### A difficult question

Needham deferred tackling his eponymous question until 1994, when he was more than 90 years old and working on what would be his final volume.

He first suggested that the lack of technological innovation was due in part to the lack of competition within the unified Imperial China under the Ming emperors. Europe, by contrast, was a mélange of competing and often warring states, their constant struggles for primacy leading to an endless tide of mercantile and military advances.

Needham also blamed what he called the ‘bureaucratic feudalism’ of late modern China. As late as the early twentieth century, it was the ultimate ambition of all clever young Chinese men to become not doctors or merchants or scientists but bureaucrats. The smartest men in the nation were bent on becoming officials who would run China just as it always had been run: unerringly true to the tenets of Confucius. Innovation, modernizing, reform — all these were inimical to the basic principles of those in charge.

The entry point into this bureaucratic system

for some 1,400 years was the legendarily rigorous Confucian examination system. The exam theoretically allowed for upward mobility throughout all classes, as success was down to merit rather than family or political connections. But it also promoted a fairly rigid type of learning: the exam required the faultless memorization of vast reams of classic Confucian texts. By the early 1900s, there was widespread antipathy against the archaic nature of the system. It was finally scrapped by the Qing imperial family in 1905, as part of a slew of reforms and modernizations they hoped would stave off their own downfall. They failed to save themselves. But in abolishing the examinations, and so freeing the brightest of the newly declared republic to strive for other goals, they triggered the birth of an entirely new Chinese attitude towards invention and innovation. Mass education with a Western-style curriculum was introduced and promoted.

Today, Chinese innovative energies have been fully unleashed once again. Universities are brimming with cash, brains and ambition (see page 382). There has been a noticeable increase in the number of patents applied for and papers published. The Chinese government recently passed a law stating, effectively, that it was acceptable for scientists to fail — an attempt to curb the traditional loss of face that long discouraged scientists whose experiments didn't work.

All the evidence suggests that a new golden age seems to be settling upon the country. True, for four recent centuries not a great deal



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Needham rides into the remote areas near Dunhuang during his exploration of China's heartland.

of innovation went on. But this is a relatively brief period when ranged against the broad sweep of China's history. It seems that the original Needham question has been submerged by the rising tide of modern history.

None would today dare call China a 'booby nation'. The profound nature of the country's past achievement is now widely accepted, and seen as a natural precursor to the impressive future that China clearly has in store. Disdain has been replaced by awe: few doubt that China is on course to become a world force economically, intellectually and scientifically.

### The work goes on

Needham's work continues. A research institute named after him in Cambridge has published eight volumes since his death in 1995, with three more in the works. The institute, which houses all of Needham's vast library, attracts scholars with as wide a variety of fascinations as Needham had himself: currently there are researchers investigating the role of millet in Neolithic China, sexuality and the rise of Chinese nationalism, Darwinism and modern China, early Chinese mathematics, the history of clocks, the history of Chinese hygiene, and much more. The presence of Needham is felt deeply here — an impressively large bust stands on a plinth beside the front door, and his ashes lie under a tree by the gravel pathway. The scholars are counselled to take note, as Needham would have wished, of the profound relevance of China's vast historical legacy, both to the country's

condition today and to its future trajectory.

Back to the Chinese delivery man in Washington DC. By the most extraordinary coincidence, it turned out that I knew him. I realized that I had filmed him for a BBC documentary series in Shanghai in the 1980s, and had subsequently helped him get a visa and funds for a PhD in Philadelphia. He wanted to go and study in what he regarded as the world's leading nation: America.

He secured his degree, and by 1999 was living in Washington working on a secret communications protocol for the Department of Defense. After the terrorist attacks of 11 September 2001, he, along with all other non-citizens, was sacked. He was allowed to stay in the country as a consultant. Now, he told me that cold December night, his savings are all being put towards his new driving ambition: to go home.

His years in America had convinced him, unequivocally, of one overarching truth. America's time in the sun is rapidly coming to an end, and he should now return to the country poised to assume the world's leadership in its place: China. After telling me of this bold ambition, he added with pride and assurance that Li Yue-se — Joseph Needham — would have most readily and presciently agreed. ■

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See Editorial, page 367.



BETTMANN/CORBIS

The Japanese invasion of China spurred universities there to call for help from abroad.