Obituary

Tsun Ko (Ke Jun 柯俊)

(1917-2017)

Professor Tsun Ko (Ke Jun), a world renowned scientist and educator, academician of the Chinese Academy of Sciences, and life-long professor at the University of Science and Technology Beijing (Beijing keji daxue 北京科技大学, hereafter USTB), passed away on August 8, 2017 in Beijing at the age of 101. He will be remembered for his academic rigor, abundance of wisdom, and pioneering contributions to the study of metal physics and the history of metallurgy in China.

Professor Ko was born in Changchun 长春, Jilin Province on 23 June, 1917, while his ancestral home was in Huangyan 黄岩, Zhejiang Province. In 1931, at the age of 14, he went to high school in Shenyang, Liaoning Province, after attending primary and middle schools in Changchun. The Japanese invasion of China's northeastern region on 18 September 1931 forced him to flee to Tianjin, where he was given a place at the First High School of Hebei Province. In 1934, he was admitted to the Hebei College of Industry and studied chemistry. Before the completion of his university education, he had to flee again to Wuhan due to the advance of the Japanese army into North China on 7 July 1937. He was received by Wuhan

University and graduated from its Chemistry Department in 1938, a few months before the fall of the city to Japanese troops. After graduation, he was offered a position in the Republican Government with responsibilities for organizing the transportation of important factories and equipment from Wuhan to southwest China. In the war years that followed, he was sent to Vietnam, Burma and India to manage the transportation of industrial materials to Free China. In 1944, at the recommendation of the Government, he was awarded an Imperial Chemical Industries (ICI) Fellowship and sent to the University of Birmingham in Britain to study in the Department of Metallurgy. He obtained his Ph.D. in 1948, and later became a senior lecturer there.

In 1953, together with his wife and baby son, Dr. Ko returned to China and became a professor at the newly established Beijing Industrial Institute of Iron and Steel (Beijing gangtie gongye xueyuan 北京钢铁工业学院, now USTB). There he devoted himself to research and teaching of metallurgical theories and their industrial applications, and became the founder and first Chair of the Department of Metallurgical Physical Chemistry, the first department for this specialized subject in China. Professor Ko's important contributions to physical metallurgy began with his work on the bainite shear theory, extending to the development of martensitic transformation kinetics and the exploration of the effects of trace elements in steel. His pioneering research on super-steel had an important impact on basic scientific research and the development of the iron and steel industry in China. By introducing the required technology and equipment to China and fostering the first generation of specialists, Professor Ko made significant contributions to the establishment and development of electron microscopy in China.

During the period of the Cultural Revolution in the late 1960s and early 1970s, Professor Ko, like many others, suffered appalling and unjustified treatment, and was unable to lead a normal life as a scientist. It was not until the mid-1970s that he was allowed to participate in some research work on the history of Chinese metallurgy. In 1974, at the request of Professor Xia Nai 夏鼐, Director of the Institute of Archaeology, Chinese Academy of Sciences (CAS), Professor Ko carried out a detailed examination of a bronze axe (*yue* 钺) with an iron blade, using an optical microscope and electronic probe. Based on the identification of nickel and cobalt distribution patterns in the iron-blade sample, he concluded that it was made of meteoritic iron rather than man-made iron. This result was crucial to bringing an end to the debate on whether iron was already being smelted and used during the Shang dynasty (16th-11th centuries BCE). He and his colleagues published an article entitled “Guanyu Gaocheng Shang-dai tong yue tie ren de fenxi” 关于藁城商代铜钺铁刃的分析 (Studies on the iron blade of a Shang dynasty bronze axe unearthed at Gaocheng, Hebei) in

Kaogu xuebao 考古学报 (*Acta Archaeologica Sinica*, 45 (1976): 17-34), the top Chinese journal for archaeology, under the pseudonym of Li Zhong 李众. It was later translated into English (Li, Chung, "Studies on the Iron Blade of a Shang Dynasty Bronze *Yuèh*-Axe Unearthed at Kao-Ch'eng, Hopei, China," *Ars Orientalis* 11 (1979): 259-289). This work marked the start of his long-lasting interest in the history of science and technology in China, and he became recognized as a pioneer in the application of materials science to the study of archaeological artefacts in China.

During this period Professor Ko played a major role in the investigation and examination of ancient metallurgical remains (both sites and artefacts) across the country. He and his colleagues collected a large number of samples from various archaeological sites and undertook systematic examinations of them in the laboratory. Based on these investigations, they published a series of important papers, such as "Zhongguo fengjian shehui qianqi gangtie yelian jishu fazhan de tantao" 中国封建社会前期钢铁冶炼技术发展的探讨 (The development of iron and steel technology in ancient China), *Kaogu xuebao* 1975.2: 1-22, and "Cong Mianchi tieqi kan woguo gudai yejin jishu de chengjiu" 从渑池铁器看我国古代冶金技术的成就 (Ancient Chinese metallurgical achievements as shown by the iron artefacts from Mianchi County, Henan) *Wenwu* 文物 (Cultural Relics) 8 (1976): 51, 59-62. They also published a book entitled *Zhongguo yejin jianshi* 中国冶金简史 (A Brief History of Metallurgy in China) in 1978 (Beijing: Science Press). These publications for the first time explored in great depth the development of iron and steel technology in ancient China, and expounded the role of the invention and development of China's cast iron technology in human civilization.

During the late 1970s and early 1980s, after the Cultural Revolution, Professor Ko was able again to fully engage in academic activities, and was appointed Vice-President of the Beijing University of Iron and Steel Technology (BUIST, Beijing gangtie xueyuan 北京钢铁学院, now USTB). He was elected Academician of the Chinese Academy of Sciences, as well as a member of the Standing Committee of the Department of Science and Technology of CAS in 1980. While his time and energy were largely taken up by his important research work in metal physics as well as increasing heavy administrative duties, his interest in the history of metallurgy continued to grow. He not only supported the enlargement of the Archaeometallurgy Group (Yejinshi zu 冶金史组) into the University's Institute of Historical Metallurgy and Materials (Yejin yu cailiao shi yanjiusuo 冶金与材料史研究所), but also founded the first postgraduate program in the history of metallurgy at the Institute in 1984. In the mid-1990s, he further founded a Ph.D. program in the History of Science and Technology at USTB. These strategic acts have proved most far-sighted and significant for the development of the history of science and technology as

a discipline not just in USTB, but in China as a whole. The postgraduate program in the History of Science and Technology that he founded has now become one of the best in China.

Following the national policy of “Reform and Opening Up”, Professor Ko made great efforts in establishing BUIST’s international links and promoting academic exchange programs with universities in Europe, North America, Australia and Japan during the 1980s. Prior to that of most other universities in the country, BUIST was able to send some of their best teachers and students abroad. This effort had a profound impact on the development of BUIST over the next three decades, especially in terms of the fostering of generations of academic leaders at all levels in the university.

The founding of BUMA (The Beginnings of the Use of Metals and Alloys) conference series in the early 1980s is one of the best examples testifying to Professor Ko’s far-sighted vision of the future development of scientific research and education in China. After hearing the news of Professor Ko’s passing, Professor Robert Maddin of the University of Pennsylvania, BUMA co-founder, wrote a condolence blog entry as follows:

On my return to China in 1978 I met Ko Tsun in his office at BUIST; although our paths had often crossed, this was our first face-to-face meeting... Those few hours in 1978 during which he made me aware of the exciting activities and discoveries, for the most part unknown outside China, were electrifying. The disconsolate and unacceptable situation was that very little was known outside of China. The archaeometallurgical studies were all published in provincial journals and in Chinese. Ko and I immediately realized that an international conference should occur in China. Keep in mind that this was the time labelled by the press as “ping-pong diplomacy”. On my return, I met in Washington with John Yellen, head of the Anthropology section of the National Science Foundation. He readily agreed to consider a proposal to support the travel and subsistence of ten U.S. scholar/scientists. I subsequently submitted such a proposal with the names of ten chosen from among metallurgy, art history and conservation and associated areas. The proposal was accepted after which I wrote to various scholars throughout the world inviting them to attend a conference in Beijing. That was the first of what became known as the BUMA conferences.

The first BUMA conference was held in Beijing in 1981 and its great success paved the way for further gatherings, with the second BUMA being held in Zhengzhou, China (II, 1986), then Sanmenxia, China (III, 1994), Matsue,

Japan (IV, 1998), Gyeongju, South Korea (V, 2002), Beijing, China (VI, 2006), Bangalore, India (VII, 2009) and Nara, Japan (VIII, 2013). The 9th BUMA conference was held in Busan, South Korea in October 2017. BUMA is now widely conceived as a circum-Pacific conference series, attracting broad international participation from various research backgrounds. The growing role of BUMA in strengthening East-West scientific dialogue and cooperation testifies to the pioneering contributions of its two founders: Tsun Ko and Robert Maddin. At their meeting in Bangalore in 2009, the BUMA Standing Committee decided to offer the title of 'Honorary Chairperson' to both Professor Ko and Professor Maddin to acknowledge the considerable contributions the two founders had made to the BUMA community.

Professor Ko also played a key role in promoting the study of the history of science and technology as a discipline in China, especially in opening up and strengthening its links with international partners and community. He was elected President of the Chinese Society for the History of Science and Technology in 1983. During his two tenures as President (1983-1990), he guided the Society to enlarge and consolidate its membership, and to actively participate in international conferences and exchange programs. He made significant contributions to the establishment of the International Society for the History of East Asian Science, Technology and Medicine in the early 1990s, serving as its first Vice-President. From the early 1990s, he also helped the Society to build up close links with the Division of the History of Science of the International Union of History and Philosophy of Science (now the Division of the History of Science and Technology of the International Union of History and Philosophy of Science and Technology), leading to the holding of the 22nd International Congress of the History of Science in Beijing in 2005.

Professor Ko had a remarkable ability to spot talent and always encouraged and supported young scholars to broaden their research horizons in their own ways. He wrote numerous supporting letters for young scholars in their endeavors, such as finding a job, going abroad and applying for projects or funding. In the last two decades of his life, he actively advocated and promoted the reform of engineering education in China, and set up a pilot class of 'materials in a broad sense' (Da cailiao ban 大材料班) at USTB, which had a deep impact on engineering higher education in China.

Professor Ko's scientific achievements have been widely recognized, as evidenced by some distinguished national honors, such as the National Natural Science Award (Guojia ziran kexue jiang 国家自然科学奖), National Teaching Achievement Award (Guojia ji jiaoxue chengguo jiang 国家级教学成果奖), and the Science and Technology Progress Award of the HLHL Foundation (Heliang Heli jijin kexue yu jishu jingbu jiang

何梁何利基金科学与技术进步奖). He held important positions in a number of organizations: the Discipline Appraisal Group of the Academic Degree Committee of the State Council (Guowuyuan xuewei weiyuanhui xueke pingyizuzi 国务院学位委员会学科评议组); the Chinese Science and Technology Association (Zhongguo kexue jishu xiehui 中国科学技术协会), and the Board of Education of the Chinese Academy of Engineering (Zhongguo gongchengyuan jiaoyu weiyuanhui 中国工程院教育委员会). His memberships included the Chinese Society for Metals (Zhongguo jinshu xuehui 中国金属学会), the Nonferrous Metals Society of China (Zhongguo youse jinshu xuehui 中国有色金属学会), the Chinese Materials Research Society (Zhongguo cailiao yanjiu xuehui 中国材料研究学会), the Chinese Electron Microscopy Society (Zhongguo dianzi xianweijing xuehui 中国电子显微镜学会), the Chinese Society for the History of Science and Technology (Zhongguo keji shi xuehui 中国科技史学会), the China Society for Archaeometry (preparatory) (Zhongguo keji kaogu xuehui 中国科技考古学会), and the International Society for the History of East Asian Science, Technology and Medicine. He also served as chief editor of *Acta Metallurgica Sinica* and as a consultant for the China Nonferrous Metals Industry Group (Zhongguo youse jinshu gongye zong gongsi 中国有色金属工业总公司) and the Baosteel Education Foundation (Baogang jiaoyu jijinhui 宝钢教育基金会).

Professor Ko was a rigorous scholar, indifferent to fame and wealth, and enthusiastic in giving guidance and support to young people, an outstanding example for all those engaged in scientific and technological work and education. He made a great contribution to the development of science and technology in China, and the reform of China's higher education. Professor Ko's passing is a great loss not just for his family, colleagues and close friends, but also for his University and the wider community of science and technology in China. He will be deeply mourned and fondly remembered by all of us.

Professor Ko is survived by his two sons, Ke Ying 柯英 and Ke Ming 柯明, two grandchildren and a brother and four sisters. His wife, Professor Qiu Xuyao 丘緒瑤, passed away in 2012.

Mei Jianjun (Needham Research Institute, Cambridge)
and

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