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Hongye Fan et al. 樊洪业等人, eds. *Zhu Kezhen Quanji* 《竺可桢全集》 (*The Complete Works of Coching Chu*)

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The recent publication of the twenty-four-volume *Zhu Kezhen Quanji* (hereafter *ZKZQJ*) is a historians' dream come true and a milestone for the historical studies of science and society in modern China. The massive set not only makes Zhu Kezhen 竺可桢 (Coching Chu 1890–1974) one of the best documented of all Chinese scientists but also provides a gold mine of primary sources on the broader history of Chinese science, education, and politics at a scale and with details unsurpassed in the modern era, with potential relevance for many disciplines in the social and natural sciences.

Zhu Kezhen is best known as a pioneering meteorologist who occupied important positions in Chinese science and education during his long and distinguished career (Wang 2002, 2007). He was also a trailblazer in the historical studies of science and technology in China after whom some of the major awards in the field are named (Liu 2010).[1] Born in Shaoxing, Zhejiang, amidst rapid social changes in the late Qing, Zhu was among the first generation of Chinese to receive a Western-style education before going to the United States in 1910 and enrolling at the University of Illinois at Urbana-Champaign ~~in 1911~~ to study agriculture as one of the Boxer Rebellion indemnity fellows. He shifted to meteorology when enrolling as a graduate student at Harvard in 1913 and received his PhD in 1918 with a thesis on typhoons in the Far East (he also attended lectures on the history of science by one of its founders George Sarton, at Harvard). He returned to China immediately after graduation to teach and start departments of meteorology and geography at several universities there, including the leading Dongnan daxue 东南大学 (Southeast University) in Nanjing in the 1920s. He also became a leader of the Science Society of China, which he had joined while still in the

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[1] Awards named after Zhu include the Zhu Kezhen Award from the International Society for the History of East Asian Science, Technology, and Medicine (see http://isheastm.org/zkz-award/) and the Zhu Kezhen History of Science Visiting Professorship at the Institute for the History of Natural Sciences of the Chinese Academy of Sciences (http://www1.ihns.ac.cn/members/liu/doc/zhukezhen.htm).

United States and which would become the most influential organization of Chinese scientists in the Republican period. In 1928 he became the founding director of the Institute of Meteorology 气象研究所 in the new Nationalist government's Academia Sinica 中央研究院 in Nanjing. Then in 1936 he was persuaded by the Nationalist leader Jiang Jieshi 蒋介石 (Chiang Kai-shek) to become president of Zhejiang daxue 浙江大学 (Zhejiang University or Zheda) in Hangzhou, Zhejiang, home province for both men, while continuing to direct the Institute of Meteorology for another decade.

Zhu's presidency at Zheda ended up encompassing the difficult years of both the War of Resistance against the Japanese invasion in 1937–45 and the civil war between the Nationalists under Jiang and the Communists under Mao Zedong 毛泽东 in 1945–49. Under his devoted and principled leadership (crystallized in the "truth-seeking" motto he chose for the university), Zheda actually flourished in this period and emerged as a leading university in China, especially in the sciences and engineering. Such achievements came at great personal costs: his second son, Heng Zhu 竺衡, and wife, Xiahun Zhang 张侠魂, died tragically from illnesses while he led the university inland to evade Japanese military forces in 1938, and he barely had time to carry out his own meteorological research.

In 1949, as the Communists won the civil war, Zhu decided to stay in mainland China instead of moving with the retreating Nationalists to Taiwan. He was soon appointed a vice president of the newly established Chinese Academy of Sciences 中国科学院 (CAS). In this position he played a key part in the CAS's initial organization during the early 1950s and then in managing its various programs in earth and life sciences, including natural resources surveys. He also participated in China's national science and technology policy making. At heart a liberal and patriot, Zhu struggled in the new political environment as he tried to balance his advocacy for basic research and international scientific collaboration with efforts to make the CAS serve more immediate and practical national needs. Placed on a list of protected people by Premier Zhou Enlai 周恩来, Zhu survived the early violent phase of the Cultural Revolution that had started in 1966 and took part in the reestablishment of US-China scientific relations following President Richard Nixon's trip to China in 1972, including renewing contacts with Chinese scientists who had stayed in the United States after 1949. That same year Zhu published his last major scientific paper, titled "A Preliminary Study on the Climatic Fluctuations during the Last 5000 Years in China," which reconstructed Chinese climate change based on a variety of sources, including phenological information gleaned from classical Chinese literature. It first appeared in Chinese and then also in English (Zhu 1973).

Zhu Kezhen remained a revered figure among Chinese scientists and intellectuals following his death in 1974 and especially after the end of the Cultural Revolution in 1976 and the beginning of the reform era soon thereafter, giving rise to what might be called a Zhu Kezhen industry of studies on him (Shi and Xu 1980). Indeed, it was a group of leading Chinese scientists who initiated the project that resulted in the publication of *ZKZQJ*. In 2000, when commemorating the 110th anniversary of Zhu's birth, the climate scientist Duzheng Ye 叶笃正 and about a dozen other Chinese earth science leaders, all academicians of the CAS and former students or associates of Zhu, issued a public call to publish Zhu's writings more fully. This led Yongxiang Lu 路甬祥, then president of the CAS and former president of Zheda, to organize and head an

official editorial committee in 2001 that would oversee the publication of all of Zhu's known published and unpublished writings (*ZKZQJ* 1:5–6).

With initial funding from the CAS and the National Natural Science Foundation of China, the Zhu project set up a staff that through 2001–13 would carry out the enormous task of collecting, editing, and publishing Zhu's writings from many sources. The staff was headed by chief editor Hongye Fan 樊洪业, a senior researcher in the CAS and the widely recognized and admired dean of the community of historians of modern science and technology of China. Indeed, much of the success of the project could be attributed to his vision, leadership, influence, perseverance, and meticulous attention to detail. He was not only personally involved in the editing and final proofreading of almost all of the twenty-four volumes—an unimaginable commitment of time and energy—but also responsible for the establishment of two principles that guided the entire project, ensuring its integrity and making it such a valuable historical source: "preserving the true" (*cunzhen* 存真) and "seeking completeness" (*qiuquan* 求全) (Xiong and Wang 2016).

Credits for the success of *ZKZQJ* also go to other members of the distinguished editorial staff of historians and editors who labored to make it a reality. These unsung heroes included deputy chief editors Yuhai Li 李玉海 and Wenxiong Shen 沈文雄, who had served as Zhu's secretaries in the CAS; An Zhu 竺安, one of Zhu Kezhen's sons who became a chemist in the CAS; and Xuerong Chen 陈学溶 and Zongzhen Huang 黄宗甄, two senior scientists and former colleagues of Zhu who devoted themselves to the project in their eighties and nineties. The Shanghai Scientific and Technological Education Press was the publisher for the project, and it assembled an outstanding group of staff editors, under the able leadership of Tao Pan 潘涛, a professionally trained historian of science in his own right, to undertake most of the nitty-gritty jobs involved in the publication of the volumes. One of the most difficult and time-consuming tasks was to decipher millions of handwritten Chinese characters in Zhu's writings, which were often mixed with scientific symbols, foreign phrases, and numerous names in Chinese and other languages. The editors also tracked down obscure references, compared different editions of some publications, formulated an excellent style sheet, selected photos and other illustrations, and provided helpful notes and supplemental information, all of which were essential in ensuring accuracy, consistency, and accessibility of the publication (Liu 2016).

Besides Zhu's professional and moral standing among Chinese scientists and intellectuals and the easing of various concerns with the receding of time, the successful publication of the *ZKZQJ*, with inclusion of politically sensitive historical contents, is also a testimony to the haltingly uneven but real advances that have been gained toward liberalization in the Chinese press and politics in the reform era. The project not only received support from official institutions but actually won the "Government Award," the highest official honor in publishing in China, and other prizes since its completion (Guojia 2018). The *ZKZQJ* also fits into a recent wave of state-sponsored Big History of Science projects: the China Science and Technology Association (CAST) has carried out a massive program, under the leadership of the historian of science Li Zhang 张藜 and with Hongye Fan serving as a senior adviser, to document the lives and careers of senior Chinese scientists, which has resulted in more than one hundred published biographies and other books, many based on oral histories, and the collection of much archival material for a new National Museum for Modern Chinese Scientists

(http://www.mmcs.org.cn) (Tian 2017). The Chinese Academies of Sciences and Engineering and other agencies have added biographies and institutional histories (see, e.g., http://www.sciencep.com), and Hongye Fan also edited for Hunan Education Press a series of high-quality oral histories and biographies of Chinese scientists (http://www.hneph.com). Then there are the Chinese projects to publish the writings and archives of the Chinese American linguist and Zhu's lifelong friend Yuen Ren Chao 赵元任 (Yuanren Zhao in pinyin), one of which plans to include five hundred volumes (Zhao Yuanren quanji bianji weiyuanhui 2001–7; Ren 2016).

Back to the *ZKZQJ*, the principles of truthfulness and completeness that Fan and his staff upheld shine through especially in the inclusion and editing of Zhu Kezhen's remarkable diary. Totaling about eleven thousand pages and 10 million characters, it takes up sixteen volumes and forms the heart of the *ZKZQJ*. Zhu reportedly started writing systematic diaries when he was at Harvard from 1913 to 1918, but a fire in 1923 at Southeast University and the occupation of Japanese forces of his residence in Nanjing in 1938 apparently resulted in the loss of all the diaries before 1 January 1936. He was able to save all those from that date to 6 February 1974, the day before he died, except for the first half of January 1941, which was lost. What is special about these diaries is not only that they were systematically kept but also that they miraculously survived wars and political turbulence, including the Cultural Revolution (*ZKZQJ* 1:9–12).

Zhu apparently never shared his diary with anyone else during his lifetime, and it was only in 1978 when a group of scientists launched a project to edit and publish a selection of Zhu's papers that they learned from his family that he had left behind this hidden treasure. In 1984, the People's Press in Beijing published two volumes of excerpts of Zhu's diary covering 1936–49, and then in 1989–90 the Science Press, also in Beijing, published three more volumes of Zhu's diary excerpts covering 1950–74 (Lü and Xu 1984; Huang 1989–90). Unfortunately, in the process of editing, diary books covering the entire years of 1953 and 1961 as well as October to December 1960 were lost. Luckily, Zhu had kept another set of pocket notebooks that he would carry with him all the time to take notes and use as the basis for his nightly diary entries; they filled the gaps left by the lost diaries (*ZKZQJ* 1:9–12).

Even though the published excerpts from the 1980s represented only a fraction of the original and many politically sensitive passages were left out, this so-called Beijing edition of Zhu's diary still provided an unprecedented window into the history of modern science and education in China and quickly became a source of studies in this area by many historians in and out of China, my own included (Wang and Zhang 2010).

These Beijing excerpts having whetted the appetite of both the scholarly community and the public at large, there was widespread expectation, mixed with a sense of anxiety, for the Shanghai edition to present a true and full version of Zhu's original diary. It did not disappoint. Against all odds and beyond even the hopes of some of those involved in the project, the *ZKZQJ* delivered on its promise of truth and completeness, especially regarding the publication of Zhu's original diary. Thus, we are treated to a complete and uncensored transcription of all the contents in each day's diary entry. The only places where editors exercised discretion, appropriately in view of privacy concerns, appear to be some diary entries in spring 1939 where the first names of several students and staff members involved in disciplinary investigations at Zheda were replaced with Xs (*ZKZQJ* 7:63–68).

In a typical diary entry, Zhu would record, one page per day, the day's date and location, usually the city he was staying in but sometimes geographical coordinates as when he was voyaging across the Pacific from the United States to China in 1947; detailed weather data, including phenological information such as the blooming of certain flowers, as befitting a meteorologist and climatologist; keywords that served as an abstract of the main diary text and sometimes also major national and international events; main diary text, which often included not only what he did, whom he saw, and what they said but also lengthy notes on his readings; and names of senders and recipients of correspondence. At the end of each month or year he would use the blank space in the diary notebook to record additional information, such as reading and research notes and statistical data on a wide variety of subjects such as weather, price changes, family expenses, and heights and weights of family members. At the end of each year he would usually also make a list of key events in the year and compile a list of contact information, including addresses and telephone and telegram numbers of people he interacted with.

With the complete and multidimensional information presented in the full Zhu dairy, an almost cinematic view, with both panoramic vistas and intimate dramas, unfolds before the eyes of the reader as one travels with Zhu back in time to see how he navigated and played his part in the drastic transformations that reshaped modern Chinese science, education, society, and politics through wars and revolutions. Not only historians of Chinese science, technology, and education but also other scholars who are interested in the social, economic, and political history of modern China or Chinese scientific interactions with other countries (especially the United States, Russia, Britain, and India) would find much in these diaries to mine and distill, as he recorded conversations, talks, and writings ranging from elite figures such as Jiang, Mao, Zhou, and leading Chinese and foreign scientists and intellectuals to common people such as his drivers at the CAS.

Even those who are interested in the social history of medicine in modern China would find valuable information here as Zhu Kezhen often recorded detailed information not only about his own health conditions and medical care but also about those of others in his family and in his wide circles of friends and acquaintances through this long time span. The detailed and systematic information he kept on the weather and climate, sometimes including such unique details as the amount of dust falling into his yard, which he collected and calculated in the 1960s, might be useful to climatologists and environmental scientists (*ZKZQJ* 18:241).

The *ZKZQJ* also contains Zhu's non-diary writings in the first five volumes and last three volumes. These include his published and unpublished papers and books, lectures, correspondence, and valuable archival materials such as his lengthy autobiography that accompanied his application to become a member of the Chinese Communist Party in 1962. As the result of a wise editorial policy, most of these materials were mixed together and arranged in chronological order, making it easy to understand the context as well as the contents. The two exceptions are volume 5, which is devoted to his fifty-nine papers in foreign languages (fifty-six in English and three in Russian), including his previously unpublished PhD thesis; and volumes 22–24, which include Zhu's writings and translations discovered after the beginning of the project, especially his voluminous correspondence as director of the Institute of Meteorology of the Academia Sinica from the Second Historical Archives of China (SHAC) in Nanjing.

Given the many restrictions that still exist regarding Chinese archival access and all the potential obstacles—including political sensitivity and legitimate concerns over privacy—that might have impeded its publication, as a historian I can only feel thankful that this *Complete Works* of such an eminent scientist and meticulous diarist has been brought to the world. I for one have already begun to make use of the *ZKZQJ*, especially the new full diaries, in several of my own writings on post-1949 Chinese science policy and politics, such as the making of the twelve-year science plan in 1956 and debates over basic and applied research in the Mao years, as well as in my current research on American-educated Chinese scientists, both those who stayed in the United States and those who returned to mainland China in the 1950s (Z. Wang 2015, forthcoming). Other scholars, too, have started to mine the *ZKZQJ* on a wide range of topics, including the history of Chinese earth sciences, the histories of Zhejiang University and the Chinese Academy of Sciences, and the origins and development of the history of science as a discipline in China. One 2014 commemorative volume on the *ZKZQJ*'s publication listed 142 newspaper and journal articles and books that had appeared in 2004–14 with references to the set (Shanghai keji jiaoyu chubanshe 2014). As mentioned above, Zhu pioneered the historical studies of science in China and was primarily responsible for the founding of what is today the CAS's Institute for the History of Natural Sciences 自然科学史研究所 (Liu 2010). He also provided crucial assistance to Joseph Needham's well-known efforts in this field (Pan 2007).

Other creative possibilities are available with the appearance of the *ZKZQJ*, especially the full diaries. One is to select materials on a particular subject from the sea of Zhu's writings and produce a thematic primary source. Yangzong Wang 王扬宗, a leading historian of the CAS and of modern science in China who was involved in the editing of *ZKZQJ*, has led the way when he compiled a subset of entries in Zhu's diary from July 1951 to December 1952 dealing with the brutal anticorruption and "Thought-Remolding" campaigns as they were carried out in the CAS (Wang 2013). Based in part on this new information (much of it had been left out in the earlier Beijing edition), Wang found the widespread view that the CAS fared relatively well compared with universities during these campaigns to be inaccurate. As Zhu Kezhen recorded unfolding events in detail in his diary, at least during the early stages of this period, scientists, especially leading scientists like himself, in the CAS came under unbearable pressure to denounce themselves and show loyalty to the new regime. At one point in April 1952, Zhu had to console and dissuade Youxun Wu 吴有训, a fellow CAS vice president and a senior physicist, from committing suicide. It was cases like Wu's attempted suicide and actual suicides of several other scientists that later led to a moderation of the campaign in the CAS (Y. Wang 2014; Z. Wang 2015).

Zhu's diary shedding new light on the Thought-Remolding campaign is just one of many cases where the full diary not only provides additional information but also potentially changes our previous perspectives based on the incomplete Beijing edition. Hongye Fan's investigation of a cryptic note in Zhu's diary (not included in the Beijing edition) led him to make the surprising but persuasive discovery that the origin of Chinese decision making on building atomic bombs was not January 1955 as many scholars had believed, but should be traced at least to the time around 27 March 1952, when Zhu recorded the visit that day of two of Premier Zhou Enlai's assistants to talk to him about "Sunburst" (Fan 2004).

Yuhai Li, one of the deputy chief editors of *ZKZQJ*, has taken advantage of its rich offerings to complete *Zhu Kezhen nianpu changbian* (*Detailed Daily Chronicle of Zhu Kezhen*), which is scheduled to be published by the Shanghai Jiaotong University Press in 2018 and will prove to be a very helpful reference (Li 2018). Li and Hongye Fan also took advantage of the diary in editing an elegant collection of annotated photographs taken by Zhu Kezhen, an avid photographer, from the period of the war against Japan (Fan and Li 2015). Similarly, Hangchun Li 李杭春, a young researcher at Zheda, has mined Zhu's diaries related to Zheda and combined them with other archival materials to produce a very useful chronological history of the university under Zhu (Li 2017).

Looking to future possibilities, one hopes that a digitized *ZKZQJ* database would appear and open its rich information to all the potential that comes with big data technologies. A website sponsored by the National Chekiang [Zhejiang] University Forum has already presented Zhu Kezhen's diary for 1936–52 online (http://www.ncku1897.net/diary/index.html). Parts or all of *ZKZQJ* may have already appeared in some commercial databases, but it will be helpful to make it into a free, independent online database with a good search function, like the Einstein Archives Online (http://www.alberteinstein.info) based on the Einstein Archives (http://www.albert-einstein.org) and the ongoing *Collected Papers of Albert Einstein* project (Stachel et al. 1987–). A well-condensed *ZKZQJ*, with a focus on the history of science and technology, would also be helpful, as has been done with Joseph Needham's *Science and Civilisation in China* (Needham and Ronan 1980–95) and the records of the 1954 government hearings over the security clearance of the American physicist J. Robert Oppenheimer (Polenberg 2002). And finally, one hopes that Zhu's pocket notebooks mentioned above and the majority of his vast correspondence (to and from him) not yet included in the *ZKZQJ* have survived and will one day be published as well. In this regard a good example is the publication of the 1915–48 two-way correspondence of Hu Shih 胡适, the well-known Chinese philosopher and statesman who was, like Zhu and Chao, also a 1910 Boxer fellow (Zhongguo shehui kexueyuan 1983).

In sum, this magnificent *Complete Works* of Zhu Kezhen should not only benefit the historical studies of modern Chinese science and society but also stand as a monument of true and complete historical documentation and serve as a model for other projects of primary sources in China and elsewhere. After all, truth, openness, and transparency so admirably exemplified in this publication are essential values of any modern and democratic society.

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