Studies in History and Philosophy of Science 48 (2014) 38–41

Contents lists available at ScienceDirect

Studies in History and Philosophy of Science

journal homepage: www.elsevier.com/locate/shpsa

Essay Review

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Unearthing the Nation: Modern Geology and Nationalism in Republican China, Grace Yen Shen. University of Chicago Press, Chicago (2014). 309 pp., Price US$45.00

Grace Shen's new book on the history of geology in twentieth century China begins with the description of an innocuous looking emblem. The Geological Society of China adopted the round medallion in 1937, during the anxiety laden months before Japanese forces began a full-fledged invasion of the country and the start of the Second World War in East Asia. Resembling a coin, the emblem contains four stylized characters in the four ordinal directions signifying water, earth, mountain and rock, with the character Zhong, meaning "middle" or "center" appropriately enough in the center. In Shen's telling, this emblem opens a window into the strategy of the Chinese geological society to define national territorial sovereignty while remaining open to and gaining acceptance from the international scientific community.

The character *Zhong* richly evokes China, the Middle Kingdom and center of civilization, yet the brief English-language introduction in the *Geological Review* makes no mention of the fact that the character ties together nationalism with geological concepts connected to the Chinese territory. At the center of the round emblem, the prosaic English language face of geology meets the symbolic nationalistic Chinese side. In turn, these two faces of modern Chinese geology inform the central tension of Shen's account, between the universalistic claims and international aspirations of science and the nationally specific territorial roots of geology. Shen's work unearths the connection between geology and science in general and the rise of the modern Chinese state. In the process, her book opens the way to the bigger question of how we define science and assess the technological and scientific contributions of non-Western societies. A long percolating debate in the twentieth century Chinese intellectual discourse, the question has become all the more pressing as China has increasingly begun to assert its diplomatic and economic power in East Asia and the rest of the world in the twenty-first century.

Geology has long played an important role in the history of Western science. One of the leading experts on the history of geology, Martin Rudwick, traced the rise of a historical understanding of the earth to the eighteenth and nineteenth centuries. In two authoritative volumes, *Bursting the Limits of Time* and *Worlds before Adam*, Rudwick explicitly connected the age of European revolutions and the emergence of ideas about terrestrial transformations (Rudwick, 2005; Rudwick, 2008). While train and steamship schedules, stop-motion photographs, and other new technologies transformed the importance of accuracy in time down to the second and even millisecond, geologic time expanded from the units of human history to millions and possibly billions of years, most of which predated human existence. The central place of geology in the cultural history of the nineteenth century means that even those who have little interest in academic geology have encountered the term "deep time," seen famous outcrops, caverns, or fossil sites in their towns, or visited popular mineralogy exhibits in museums of natural history. Big diamonds and other spectacular gemstones on display in the mineral collections of museums could elicit awe from even the most hardened cynics in a time when it has long become far more fashionable to question the utility of science.

In other words, geology has cultural cache beyond the relatively narrow confines of a recently developed science. Key concepts in geology have entered popular usage as metaphors about the relationship of societies to knowledge about territories and natural resources. In the Western context, the nineteenth century represented the height of science's promise to conquer nature and solve social ills. In the age of industrialization and imperialism, geology took on far greater cultural resonance than just as a science. A rich vein of cultural history examining the emergence of modernity turned to geology as the defining science of the nineteenth century. Rachel Laudan and Mott Greene have examined the contribution of continental European schools of mining to the rise of geology (Greene, 1982; Laudan, 1987). Roy Porter connected geology to industrialization and the building of the British Empire, while Paul Lucier exposed the ties between the geosciences and the rise of the energy industries (coal, kerosene, and petroleum) in nineteenth century United States (Lucier, 2010; Porter, 1977). All of these works placed the rise of geology in a historically specific and Western context.

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http://dx.doi.org/10.1016/j.shpsa.2014.08.002

Which brings us back to China and the issue of Chinese geology. What makes it "Chinese?" One could visit the Geological Museum of China in Beijing and emerge none the wiser. The museum contains collections of minerals dating from the very earliest days of geology's presence in China in 1916. The current building opened to the public in 2004, and holds four floors of displays with both English and Chinese captions illustrating the major facets of geology, from tectonic theory to mineral classification and environmental management. One might find the instructive explanations, hands-on demonstrations, and the dazzling gem collection engrossing. Along with the glossy presentation, however, one might also wonder why the geology presented in the museum showcases a wholesale adoption of Western geology. In its content the Geological Museum of China is little different from the contemporary versions presented in the American Museum of Natural History in New York City and European counterparts. The roots of the museum from the 1910s further begs the question of when and why the synthesis of modern geology swept away traditional forms of knowledge in China and created a glossy and curiously non-national based modern geology. Shen's account offers one answer by exploring the ways China's first geologists tied the discipline to the nation through an emphasis on fieldwork.

The tension between nationalism and the universal claims of science is particularly evident in geology because of its terrestrial foundations. Field consensus in modern geology remained in flux until relatively recently. Alfred Wegener had proposed the theory of continental drift in 1912 and it was not adopted in mainstream geology until after World War II. The focus of Shen's book on the Republican period (1911–49) thus straddles an era of international debate and competition in the field of geology. These formative years for the Chinese geological community took place against a backdrop of rapidly changing political alliances, civil wars, foreign invasion, and internal divisions. On one end the Qing dynasty collapsed in 1911; in 1949, the proclamation of the People's Republic of China came at the end of two decades of strife. Rudwick's account traced geology's emergence from the age of European revolutions. The key question in Shen's account address how the discipline of geology emerged from the era of Chinese revolutions and in turn shaped the narrative of modern China.

To answer this question, Shen emphasizes two entwined aspects of modern Chinese geology: fieldwork and the geological investigation of territory; cosmopolitanism and the building of a domestic geological community. In effect, she replicates in her account the duality of the emblem adopted by the Geological Society of China and the tension of a field that was aiming for international recognition while tying geology to Chinese nationalism. The result is an important contribution to the historiography on modern China, because Shen makes clear how and why geology became the most acclaimed science in China in the twentieth century, leaps and bounds ahead of other scientific fields at a time of severe budgetary constraints and adverse political conditions.

Unearthing the Nation largely follows a chronological outline. Shen begins with a chapter on foreign exploration of China during the Qing, including the German geographer Ferdinand von Richthofen's expeditions (1868–1872). By the 1900s, the founders of geology in China, Zhang Hongzhao, Ding Wenjiang, Weng Wenhao, and Li Siguang, went abroad to study geology and returned to China appalled at the lack of knowledge about their own country. This first generation of Chinese scientists came of age as traditional careers for young men of promise in the bureaucracy disappeared. The civil-service examination was abolished in 1905, part of the New Policy Reforms, a wide-ranging series of political, educational, and military reforms rushed through by the Qing court as a last effort to salvage the dynasty. For these returned students, fieldwork encompassed both "on-the-spot investigation" and work in the outdoors. The importance of fieldwork extended beyond its practical value for the exploration of Chinese territory to a philosophical outlook as the rejection of the traditional literati abhorrence of physical exertion. In fact, the inaugural issue of the *Bulletin of the Geological Survey* in 1919 included at the beginning a derogatory quote taken from Richthofen's China works on the unwillingness of Chinese literati to engage in strenuous physical activity. The director of the survey, Ding Wenjiang, used the quote to spur young Chinese students to action.

Geological activity in China formally began in the 1910s, as the country underwent a series of leadership changes after the collapse of the Qing dynasty. Under these uncertain conditions, the Geological School of the Ministry of Industry and Commerce started to train students to serve in the newly founded Geological Survey. In 1921, two mining companies donated the funds for a new library and museum for the Geological Survey and subsequently Zhang Hongzhao presided over the founding of the Geological Society of China. From the beginning the Society welcomed foreign participation at the same time that it carved a space for Chinese geologists. In its first year, twenty-seven expatriates took part in the Society's meetings out of seventy-seven active members overall. To further ease the difference between Chinese and foreign specialists, the *Bulletin* of the Society published all reports in English, adding to its international visibility.

By the time that Shen's account circles back to the start of the Japanese invasion in 1937, when the Geological Society adopted its emblem, a robust Chinese geology had grown into the most vibrant scientific community in China. During the war, members of the Geological Survey retreated with the Guomindang (GMD) government to the interior of the country, eventually to Chongqing in Sichuan province. From the pre-war academic hubs of Beiping, Shanghai, and Nanjing, a majority of universities, research institutes, and scientific organizations followed suit to inland centers like Chongqing and Kunming in the southwestern province of Yunnan. The scientific community, including and especially the geologists, threw their weight behind the war effort to survey these remote areas, rebuild industry and infrastructure, and contribute to the practical issues of surviving their besiegement in previously little developed areas of the country. The war reinforced the importance of fieldwork, which the first generation of Chinese geologists had emphasized from the 1910s as the only way to gain knowledge about their own country.

Instead of relief, Japan's defeat began the downward spiral of the GMD government as its troops continued fighting the civil war with the Communist forces. The commitment of the geological community to the territorial vision of China was such that even as the GMD ordered the relocation of academic institutions like Academia Sinica and their affiliated personnel to Taiwan, most of the geologists resolved to remain and carry on their research. This dedication reaffirms Shen's focus on the importance of fieldwork in the construction of a scientific community in the twentieth century. The result is a work that details the early decades of Chinese geology as a discipline, but with important implications for a broader narrative of modern China.

Shen's book belongs to a new wave of scholarship on East Asia paying attention to the relationship between science and modernity in an epistemologically confusing period from the late nineteenth century into the twentieth. As Shen points out, few people at the time had a clear notion of science. Late nineteenth and early twentieth century intellectuals viewed science in relative terms, defined by its opposition to the staid Confucian tradition rather than as a specific epistemological approach. Reformers and writers anthropomorphized "Mr. Science" to promote science as a cure-all for China's considerable social and political ills (Wang, 1995). In many ways the so-called "scientism" debate in the 1920s