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Chinese paleontology and the reception of Darwinism in early twentieth century

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ABSTRACT

The paper examines the social, cultural and disciplinary factors that influenced the reception and appropriation of Darwinism by China's first generation paleontologists. Darwinism was mixed with Social Darwinism when first introduced to China, and the co-option of Darwinian phrases for nationalistic awakening obscured the scientific essence of Darwin's evolutionary theory. First generation Chinese paleontologists started their training in 1910s–1920s. They quickly asserted their professional identity by successfully focusing on morphology, taxonomy and biostratigraphy. Surrounded by Western paleontologists with Lamarckian or orthogenetic leanings, early Chinese paleontologists enthusiastically embraced evolution and used fossils as factual evidence; yet not enough attention was given to mechanistic evolutionary studies. The 1940s saw the beginning of a new trend for early Chinese paleontologists to incorporate more biological and biogeographical components in their work, but external events such as the dominance of Lysenkoism in the 1950s made the Modern Synthesis pass by without being publicly noticed in Chinese paleontology. Characterized by the larger goal of using science for nation building and by the utilitarian approach favoring local sciences, the reception and appropriation of Darwinism by first generation Chinese paleontologists raise important questions for studying the indigenizing efforts of early Chinese scientists to appropriate Western scientific theories.

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1. Introduction

The reception and creative adaptation of Darwinian ideas by China's first generation paleontologists present an interesting case for studying the indigenizing efforts of early Chinese scientists to appropriate Western scientific theories. This paper examines the social, cultural and disciplinary context that influenced the reception and appropriation of Darwinism by China's first generation paleontologists.¹ Many authors (e.g., Schwartz, 1964; Kwok, 1965; Pusey, 1983, 2009; Elman, 2006; Schmalzer, 2008; Yang, 2013a, b; Shen, 2014; and; Wu, 2015) have shown that China's unique social, cultural and historical conditions made the Chinese reception of Darwinian ideas different from that in any other countries. Glick (1972), Glick, Puig-Samper, & Ruiz (2001), Elshakry (2009, 2014), Ruse (2013), and Yang (2013a, b) have studied how cultural and social boundaries affect the transmission and spread of Darwinism

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¹ As loosely defined in this paper, China's first generation paleontologists generally received their college education in 1913–1937. These early paleontologists had the time to complete their advanced training overseas and to reach the prime of their career before 1949. Many became the founders or leading figures in their respective fields. This paper does not attempt to give a complete account of all the early Chinese paleontologists. Nor does it discuss issues primarily related to biostratigraphy, paleoanthropology or archeology in China.

in different countries. Fan (2004), Raj (2007), Yen (2012), Lightman, McOuat, and Stewart (2013), Yang (2013a,b), Shen (2014), Tsu and Elman (2014), and Wu (2015) have explored related historical themes such as the circulation, movement and construction of knowledge in the larger context of colonialism, imperialism, nationalism, industrialization, and science.

Yen (2012) pointed out that in knowledge formation, ideas are socially and culturally constructed and are historically contingent. In the second half of the nineteenth century, China's repeated defeats at the hand of Western powers and Japan made the Chinese anxious to borrow Western technology and Western learning for defense and self-strengthening. This, together with the lack of indigenous religious resistance to evolution and the lack of a scientific establishment, made early Darwinian ideas reach China under favorable conditions. Darwin's *Origin* (1859) predated the earliest efforts to train Chinese geologists (including paleontologists) by 50 years. Shen (2014) showed how science and nation were always linked for Chinese geologists (including paleontologists) during China's Republican period (1912–1949). Shen (2014) and Wu (2015) described how early Chinese geologists prioritized their work in response to China's practical needs for mineral resources exploitation. By establishing China's fossil record through their empirical work, early Chinese paleontologists filled in a

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virtually blank page in the history of life, and thus did a great service to promote evolution (i.e. the idea that evolution has occurred) as an intellectual concept and as part of a broader social ideology in China. While China's first generation paleontologists wholeheartedly espoused Darwinism in the sense of descent with modification, not enough attention was paid to the question of evolutionary mechanisms. Yang Haiyan² (2013b, p.202) described the approach toward Darwinism on the part of early Chinese biologists: "the general concepts and narratives of evolution were localized through their own investigating, collecting and excavating. Their work was viewed as an effort to nationalise science and build up their identity as Chinese scientists." These words seem applicable to China's first generation paleontologists as well.

Historically, the development of Darwinism went through roughly three or four broadly defined stages (Mayr & Provine, 1980; Reif, Junker, & Hofffeld, 2000). The first stage (ca. 1859–1885) was characterized by Darwin's own theory which emphasized natural selection while accepting both hard and soft (or Lamarckian) inheritance. The second stage (ca. 1986–1936) was sometimes subdivided into two parts. The earlier part was characterized both by Weisman's refutation of Lamarckism and by new alternative models trying to bypass natural selection (e.g., Neo-Lamarckism, orthogenesis, and saltationism). The later part was characterized by the rapid development of population genetics. The third stage (ca. 1937–1950) was characterized by the emergence of the Modern Synthesis (also known as the New Synthesis) that reconciled natural selection with genetics and achieved a synthesis based on contributions from population geneticists, taxonomists and paleontologists (Mayr & Provine, 1980). With the Modern Synthesis, non-Darwinian speculations such as orthogenesis or Lamarckian inheritance were rejected as causal explanations of evolutionary phenomena.³

In this paper, I will first describe how Darwin and Darwinism reached China with little resistance, and how Darwinian ideas were appropriated and transformed into a powerful tool for nationalistic awakening in China. I will next describe the institutional and disciplinary settings that influenced early Chinese paleontologists in their reception and appropriation of Darwinism. I will examine factors such as the training and early career path of first generation Chinese paleontologists, and the approaches toward Darwinism in the professional circle surrounding them. I will argue the following points in the hope of stimulating further study on this interesting topic: 1) the adaptive reception and appropriation of Darwinism by first generation Chinese paleontologists were shaped and characterized by the larger goal of nation building; 2) the pragmatic approach favoring "utilitarian research" helped first generation Chinese paleontologists to establish their identity as Chinese scientists while influencing them to favor the practical aspects in their research agenda; and 3) factors that may have constrained early Chinese paleontologists in their reception and appropriation of Darwinism, when examined from both intra-scientific and extra-scientific perspectives, can serve as sites of historical insight shedding light on the indigenizing efforts of early Chinese scientists to appropriate Western scientific theories.

2. China's first encounter with Darwin and evolutionary ideas

Yang (2013a) summarized China's early encounter with Darwin and the appropriation of Darwinian ideas. After China's defeat in

the First Opium War (1839–1842), some reformed-minded Qing officials headed by Li Hongzhang and Zeng Guofan started the "Self-Strengthening Movement" (ca. 1861–1895) to promote the adoption of Western technology for China's defense (Shen, 2014; Spence, 2012).⁴ The spirit of the movement was summed up as "keeping Chinese learning for fundamental substance and using Western learning for utilitarian application." This, together with the colonialist-imperialist global expansionist scheme of the West, accelerated China's early efforts to transplant modern Western science onto its soil (Elman, 2006; Fan, 2004; Wright, 1998; Wu, 2015). It also set the tone for science in China to be viewed primarily through utilitarian lens.

The first documented reference to Darwin in a Chinese publication was the translation of Lyell's *Elements of Geology*, completed in 1873 by Hua Hengfang⁵ and D. J. MacGowan (Elman, 2006; Shen, 2014; Wu, 2015; Yang, 2013a, b). Wright (1998), Montgomery (2000), Elshakry (2009, 2014) and Sarukkai (2013) have discussed translation as a process of knowledge formation, together with the unique issues in transferring scientific ideas across linguistic, cultural and epistemological boundaries. Wu (2015, p.86) noted that "In the Chinese translation, the grand edifice (of Lyell's theory) disappeared; instead, one finds only plodding details without an overarching theory." However, Wu pointed out that early translations by Hua, MacGowan and others were successful as cultural intermediaries and opened a space for the future spread of science in China.

In nineteenth century Western countries, Darwin's theory met with varying degrees of social and religious push-back as well as reservations from part of the scientific establishment (Bowler, 1976; Glick, 1972; Ruse, 2013). When Lyell's *Elements of Geology* was first translated, China had no modern scientific community, and there were no paleontologists, morphologists or naturalists⁶ to react to Darwinian ideas from a scientific perspective. Until the first generation of Chinese paleontologists came onto the scene in 1920s, Chinese fossils were mostly procured or collected by Western explorers or missionaries from Europe and America, such as P. A. David, R. Pumpelly, F. von Richthofen, B. Széchenyi, K. A. Haberer, B. Willis, and E. Blackwelder. The fossils were sent to Europe and America for study by Western paleontologists such as J. S. Newberry, R. Owen, E. Koken, C. D. Walcott, and H. Woodward (Lucas, 2001; Peng, 2007; Schmalzer, 2008; Shen, 2014; Yen, 2012; Zhou, 2011, pp. 606–613). In contrast to the case in nineteenth century Western countries, Darwinism met little or no indigenous religious resistance when first reaching China. Despite limited missionary activities dating back to China's Yuan and Ming dynasties, China remained secular in its fundamental social and cultural fabrics. Instead of the Western belief in God's creation and the fixity of species, belief in the fluidity of cosmic changes was deeply rooted in ancient Chinese philosophies and cultural traditions (Schmalzer, 2008; Yang, 2013a, b). Thus, Darwin's ideas failed to generate vehement debates when first reaching a limited Chinese readership (Elman, 2006; Yang, 2013a, b).

⁴ The movement accelerated early Chinese efforts to build modern shipyards and arsenals, to open Western-style schools offering foreign language and rudimentary science courses, and to translate books in science, engineering and other fields (Fan, 2004; Wu, 2015; Yang, 2013a).

⁵ In the preface, Hua described how the crude translation process caused great stress and confusion and how his dreams became haunted by the "scaly creatures" and "the bones of fantastic beasts" in Lyell's book (Shen, 2014; Yang, 1988, p. 38).

⁶ Fan (2004, pp. 104–105) noted that China at the time did not have a discipline or coherent scholarly tradition equivalent to Western notions of "natural history," "botany," or "zoology."

² Except for a few cases in the Acknowledgement section, when Chinese full names are used in this paper, family names precede given names.

³ This paper does not consider developments such as "the paleobiological revolution" (Sepkoski, 2009) that took place after the Modern Synthesis.

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