A Glance at Science-Related Museums on the Chinese Mainland¹

Jiao Zhengshan 焦郑珊²

(Institute for the History of Natural Sciences, Chinese Academy of Sciences, Beijing 100190, China)

Abstract: Science-related museums are a special kind of museum concerned with science, technology, the natural world, and other relevant issues. On the Chinese mainland, the emergence and development of science-related museums have been influenced by both Western culture and Chinese culture and society. These museums, which include science and technology museums, science centers, specialized museums, and scientific sites, play multiple roles, acting as bases for popular science and patriotic education, research institutes, etc. Today, such museums are attracting more and more public and scholarly attention.

Keywords: Science-related museums, the Chinese mainland, history

摘 要: 科技类博物馆是关注科学、技术、自然界及其他相关领域的一类博物馆。在中国大陆，科技类博物馆的萌芽与发展既受到西方文化的影响，也受到中国文化与社会环境的影响。包括科学技术博物馆、科学中心、专业博物馆和科学遗址在内的科技类博物馆，正在扮演着多元的角色，如科普基地、爱国主义教育基地和科研机构等。今天，科技类博物馆越来越为公众与学界所关注。

关键词: 科技类博物馆，中国大陆，历史

1 Introduction

The emergence of science-related museums is closely linked to the development of modern science and technology, especially in Europe. They appeared in the nineteenth century in order to collect objects, such as tools and scientific instruments, and to manage related knowledge (Simmons 2016). Today, there is a large number of science-related museums all over the world, including science museums, science and technology museums, natural history museums, science and technology centers, and so on, playing a variety of roles in our daily lives. These

1 This paper has been copyedited by John Moffett.

2 Research interests: Science, technology, and society; science-related museums; the history of science and culture; science communication. Email: jiaozhengshan@ihns.ac.cn

museums reflect our views on such issues as the history of science and technology, and the transformation of the relationship between science and society. To some extent, they are increasingly seen as bridges between science and the public, history and the world around us.

As each category of science-related museum has its own mission, the focus of each is different: some focus on scientific objects and instruments, some pay attention to the information related to objects and are devoted to popularizing knowledge, while others emphasize the interaction between scientific cultural heritage and the general public. Science-related museums have experienced a number of transformations during the twentieth century, adopting “new technologies of display, new interpretive experiments and new concerns with their visitors and communities” (Macdonald 1998, 14). In my opinion, the main factor driving the transformation of science-related museums is the change of focus. We used to focus on objects, whereas nowadays more attention is paid to society and its interaction with science, technology, and the natural world. Science and technology centers are relative newcomers to science museums in the twentieth century, but have soon become some of the most popular and effective in the museum sector.

Science-related museums nowadays are more varied in both content and display methods than before. Early examples focused on collection development and research that emphasized the meaning of objects, and exhibitions and conservation were regarded as their main functions. Today, education and the role of people are emphasized. It seems that precious specimens, instruments, and other historical objects are no longer necessary for certain science-related museums to have. The emergence of science and technology centers has resulted in the museums becoming more closely related to the public, and to some extent, education has replaced collection, conservation, and research to become their main function. Both the new experience-oriented museums and traditional ones work together to promote the public understanding of science.

While science-related museums first emerged in the West, museum-like institutions had existed since pre-modern times in other parts of the world. With the expansion of Western cultural influence, museums appeared in these countries too. China serves as a typical example of such a transfer.

2 The emergence of modern museums on the Chinese mainland

In pre-modern China, wealthy members of the nobility and upper classes enjoyed collecting old objects that were not related to production. One such example is what is called *jinshi xue* 金石学 (epigraphy), which grew to prominence during the Northern Song dynasty (960–1127), and is considered a predecessor of archaeology. Using ancient

bronzes and stone tablets, scholars of epigraphy tried to tease out information about history. The thirty-fascicle *Jinshilu* 金石錄 (Record of bronzes and stone tablets) by Zhao Mingcheng 趙明誠 (1081–1129), a pioneer in inquiries into history using material objects, is considered the most outstanding of these early treatises on inscriptions found on ancient bronzes and stone tablets dating from ancient times until the tenth century. To some extent, the concept of epigraphy and its development laid the foundation for collecting in pre-modern China. In *Bencao gangmu* 本草綱目 (Compendium of materia medica), Li Shizhen 李時珍 (1518–1593) classified more than 1800 species of plants into different categories according to their natural qualities (Luo and Wang 2005), regarded by some as the best classification system before Carl Linnaeus (Moellendorff 1887). However, private collections of objects and the classification of plants did not lead directly to the emergence of museums. As late as the nineteenth century, Chinese scholars and officials usually still did not have even a smattering of knowledge about foreign museums. For example, in Lin Zhen's 林鍼 *Xihai jiyou cao* 西海紀遊草 (Notes on travels to the Western world, 1849), which was written following a visit to the United States, Lin mentions that a museum collected curiosities from all over the world and visitors could observe and touch them, something he regarded as completely new to him (Lin [1849] 1985, 36).

In the wake of Western expansion into China in the nineteenth century and the Chinese Self-Strengthening Movement, foreigners, especially missionaries from such countries as Britain, France, and America, established the first generation of museums. These included the Xujiahui Museum in Shanghai (1868),³ the North Church Museum of Natural History in Beijing (1873) (Li 2014),⁴ the Tsinanfu Institution in Jinan (1904) (Zhou 2014),⁵ and the West China Union University Museum in Chengdu (1914) (Liang 1986).⁶ During this time, as a national consciousness started to grow, the Chinese began to think about the cultural functions of museums, and planned to inaugurate their own such institutions. Zheng Guanying 鄭觀應 (1842–1922) insisted that the Chinese should learn about Western culture, including railways, machines, museums, and so on. He regarded museums as vital tools in improving the nation's overall strength (Zheng 2002). As one of the leading scholars of the Hundred Days' Reform, Kang Youwei 康有為 (1858–1927) proposed the establishment of museums,

3 This museum was established in 1868 by the French missionary, Pierre Marie Heude (韓博祿, 1836–1902), and today is the natural history department of the Shanghai Science and Technology Museum (see Zhu 2009).

4 This museum was established in 1873 by the French missionary, Jean Pierre Armand David (譚衛道, 1826–1900).

5 This museum was established in 1904 by British missionary, J. Sutherland Whitewright (懷恩光, 1858–1926).

6 This museum was established in 1914 by American missionary, Daniel Sheets Dye (戴謙和, 1884–1977).

and regarded them as effective tools in national education (Ma 2009). Eventually, Zhang Jian 張謇 (1853–1926), a successful industrialist, founded the Nantong Museum (南通博物苑, Figure 1) in 1905, the first museum independently founded by the Chinese (Ma 2001).

More were to follow in the twentieth century. In 1924, after Emperor Puyi 溥儀 was evicted from the Forbidden City, the Committee for the Preservation of Antiquities of the Royal Family of the Qing Dynasty (清室古物保管委員會) began to check the imperial collections. In 1925, the Qing Palace was transformed into the Imperial Museum (故宮博物院). In 1936, the Nationalist Government began construction of the National Central Museum (國立中央博物院) in Nanjing, which became the predecessor of today's Nanjing Museum (南京博物院). Unfortunately, the development of museums was interrupted by the Anti-Japanese War and subsequent civil war. As a result, there were only twenty-five museums in the whole country when the Communist Party took control of the Chinese mainland in 1949 ("China: Mad about Museums").⁷

Since the 1950s, a multitude of museums have been founded by the central and local governments of the People's Republic of China. By the end of 2017, there were 5136 museums on the Chinese mainland, with about 180 new museums opening their doors every year (Luo 2018). A sub-section of these museums are related to science and technology. For example, the Beijing Museum of Natural History (北京自然博物館, Figure 2), which grew out of the Preparation Department of the National Central Museum of Natural History (中央博物館籌備處), was founded in 1951 and formally named in 1962. The Beijing Planetarium (北京天文館) was opened to the public in 1957, and was the first large-scale planetarium in Asia at that time. The construction of the Military Museum of the Chinese People's Revolution (中國人民革命軍事博物館) began in 1958, and the museum, which houses many objects and documents that reflect the development of military technology, was opened to the public in 1960. In addition, there are at least a dozen large provincial museums, such as Shaanxi History Museum (陝西歷史博物館) and Henan Museum (河南博物院), which have collected a vast number of historical relics, including science-related objects.

7 The data does not include museums in Taiwan, such as the Science and Technology Museum in Kaohsiung.

Figure 1: The Nantong Museum. Photo from *Nantong Shifan Xiaoyouhui zazhi* 南通師範校友會雜誌 (Nantong Normal College Alumni Association magazine), 1915 (5).

Figure 2: The fossil skeleton of *Tsintaosaurus spinorhinus* in the palaeontology exhibition room of the National Central Museum of Natural History, the predecessor of Beijing Museum of Natural History, in 1961. Photo by Gao Hong 高宏, from *Beijing Ribao* 北京日报 (Beijing Daily), 17; July 20, 2018.

3 Science-related museums in China

The government's attitude toward science and technology has always had the most important influence on the development of science-related museums in China. In 1978, Deng Xiaoping, a central government leader, emphasized that science and technology are key productive forces for the modernization of China. Consequently, since 1979, the first year of the period of reform and opening-up, the government emphasized the importance of science education. Subsequently, the government invested heavily in science-related museums, prioritizing their construction and that of other popular science education bases, especially after 2006, the first year of the Eleventh Five-Year Plan (The Central People's Government of the People's Republic of China 2006). By 2015, there were 140 science-related museums in China (Wen 2015). It has been claimed that in 2016 the average annual number of visitors to other kinds of museums was about 60,000, while for science-related museums the figure was 300,000 (Zhu Youwen, pers. comm.; Wen 2016). According to *China News*, popular science-related museums attract a total of more than 20 million visitors per year ("Quanguo 2500 zuo" 2014). In May 2018, Themed Entertainment Association and AECOM published *TEA/AECOM 2017 Theme Index and Museum Index: The Global Attractions Attendance Report*, which claimed that the Shanghai Science and Technology Museum ranked sixth in the list of *Top 20 Museums Worldwide*, attracting 6,427,000 visitors in 2017 (TEA/AECOM 2018). These figures can give one a sense of the contribution of science-related museums to science education and the cultural industry in China.

Science centers are one of the most important types of science-related museum in China. Unlike traditional science and technology museums in the Western world that house and exhibit a large number of historical objects, such as the Science Museum in London and Museo Galileo in Florence, science and technology museums in China rarely have many such exhibits. Most of them actually are science centers built specifically for education. A typical example, the China Science and Technology Museum (中国科学技术馆, Figures 3–4), opened in Beijing in 1988, with the aim of popularizing knowledge about scientific and technological achievements. Some exhibitions emphasize the influence of Chinese scientific and technological contributions to world civilization, such as the Four Great Inventions, while others illustrate developments in modern China, such as achievements in space technology, agricultural technology, and so on. Consequently, visitors acquire a fuller picture of China's position in the history of science and technology. Besides exhibitions, the museum frequently organizes science-related activities, such as Science Talk Show, Special-Effect Movie Appreciation, Science Salon, etc. There are similar science and technology museums in many other provinces and cities, such as the Shanghai Science and Technology Museum (上海科技馆), Guangdong Science Center (广东科学中心), etc.

Figure 3: The new venue (left, photo by Fu Xing 傅兴, September 8, 2009) and the old venue (right) of the China Science and Technology Museum.

Figure 4: The interior of the China Science and Technology Museum (left photo by Deng Shiping 邓士平, August 25, 2010; right photo by Yang Shutian 杨树田, August 25, 2010).

There are now also many specialized museums that focus on a certain industry or scientific topic, reflecting Chinese history and the latest developments from different perspectives. For example, the Yifu Museum of the China University of Geosciences (中国地质大学逸夫博物馆, Figure 5) in Wuhan opened in 1982; the China Aviation Museum (中国航空博物馆) in Beijing opened to the public in 1989 and is the first large-scale aviation museum in the country, housing more than 800 aircraft prototypes; the China National Silk Museum (中国丝绸博物馆, Figure 6) in Hangzhou provides a comprehensive picture of the history of spinning and weaving, the development of textile tools, and modern developments in the textile industry; the China Railway Museum (中国铁路博物馆) in Beijing preserves many historical objects from the history of railway construction; and the biggest paleozoological museum in Asia, the Paleozoological Museum of China (中国古动物馆) in Beijing houses more than 200,000 specimens, as well as serving as a department of the Institute of Vertebrate Paleontology and Paleoanthropology of the Chinese Academy of Sciences. These specialized museums not only promote science communication through exhibitions,

talks, field studies, and so on, but also support academic research on such disciplines as history, cultural heritage, archaeological science, and paleozoology.

Figure 5: The Yifu Museum of the China University of Geosciences in Wuhan.

Figure 6: An exhibition at the China National Silk Museum in Hangzhou. Photo by Long Bo 龙博, November 20, 2012.

Some relics of China's industrial heritage have been transformed into another important type of science-related museum. Many industries have undergone or are undergoing transformation, leaving behind old industrial plant no longer of use. Some are well worth preserving, and are being renovated as museums and technological landscapes. For instance, "Dahua 1935" (大华-1935) in Xi'an is a museum based on the Dahua Cotton Mill plant, illustrating the modern history of spinning and weaving, as well as the interaction of industry with commerce and society. There is also an industrial museum opened in 2012 in Shenyang based on the old plant and equipment of the Shenyang Foundry. With its collections that include cooling tanks and machines,

the museum is playing an essential role in preserving the history of industrial technology and culture, and disseminating awareness of it to the general public. These industrial museums are also playing new roles in developing China's cultural industry, education, and tourism.

Scientific sites are also an important foundation for science-related museums in China. Sometimes, the scientific equipment on these sites is fixed and of special value for the study of the history of science. For example, the predecessor of the Shanghai Astronomical Museum (上海天文博物馆) was the Xujiahui Observatory (徐家汇天文台), founded in 1872 by French Jesuits. The observatory made pioneering contributions to meteorology and earthquake detection and recording in modern China. Moreover, the history of the observatory reflects the transmission of science and technology between China and other countries. Another example, the Beijing Ancient Observatory (北京古观象台, Figure 7), was equipped with both astronomical instruments from China's pre-modern period as well as Europeanized instruments designed by Jesuit scientists in the seventeenth and eighteenth centuries.

Figure 7: The Beijing Ancient Observatory.

Besides carrying out the traditional functions of museums, science-related museums on the Chinese mainland play various roles in promoting the implementation of national policies and the strengthening of patriotic education. According to the *Law of the People's Republic of China on Promulgation of Science and Technology* (中华人民共和国科学技术普及法) published in 2002, museums hold an important position in science

popularization. Consequently, many science-related museums have been designated as popular science education bases (Figure 8). The China Science and Technology Museum in Beijing, Shanghai Science and Technology Museum, and many other museums in China are popular science education bases, devoted to promoting the development of science popularization through exhibitions, public lectures, cooperation with schools, and other forms of public outreach. Besides science popularization in general, there are also specialized museums that play unique roles in helping to disseminate information about certain disciplines. For example, with its important national defense collections, the China Aviation Museum has been designated as a national defense education base. The Xishuangbanna Tropical Botanical Garden, CAS (西双版纳热带植物园) is of global importance for species diversity protection and research, and has been named as a National Base of Environmental Protection & Popular Science (国家环保科普基地). These museums attract many teenagers in school groups or with their families, and have a significant impact on science popularization.

In addition to science popularization, some science-related museums also serve to provide patriotic education and are designated as patriotic education bases (Figure 8). For example, the China Aviation Museum in Beijing interprets patriotism through the history of China's aviation industry, while the China Science and Technology Museum in Beijing, which houses Shenzhou-5's re-entry capsule, is another such base. Yang Liwei 杨利伟, China's first man in space, and Academician Wang Yongzhi 王永志, former chief designer of China's Manned Space Program, gave speeches in the China Science and Technology Museum in May 2004, when the re-entry capsule was delivered to the museum. They shared their stories about the design process of Shenzhou-5, experience in space, and the significance of Shenzhou-5 for national science and technology competitiveness, and national strength.

Figure 8: Plaques for National Patriotism Education Base (left) and Popular Science Education Base (right) at the China Science and Technology Museum. Photos by Zhang Wenjuan 张文娟.

4 Conclusion

In general, Western science-related museums can be divided clearly along the lines of different generations, from the earliest natural history museums, to science and technology museums, and finally to science and technology centers. On the Chinese mainland, on the other hand, different models of science-related museums have appeared at almost the same time. As they started late in China, policy makers had the chance to learn from successful experience of museums all over the world. As a result, many Chinese science-related museums and science centers have reached international advanced levels, such as the China Science and Technology Museum and Shanghai Science and Technology Museum.

Most museums in China have been built and managed by the government. For example, the China Science and Technology Museum and many other science-related museums are attached to the China Science and Technology Association. At first, Chinese scholars and officials regarded science-related museums as educational tools to improve public science literacy. As Chinese society developed and the museums evolved, the roles of science-related museums on the Chinese mainland became more diverse: these museums are now also tools to promote patriotism and scientific development, and to strengthen environmental awareness.

So far, China has not built any traditional object-oriented science and technology museums, except some specialized technology/industry museums. Unfortunately, valuable artifacts were not collected in the past, and most have been lost; so-called science and technology museums in China are actually experience-oriented centers for science education, full of demonstrating devices and hands-on displays.

Some researchers of the history of science and technology have interacted with museums. Wang Zhenduo 王振铎, a specialist in history and museology at the National History Museum reconstructed more than eighty models of inventions from pre-modern China (Li 1991), working with historians of science and technology from the Institute for the History of Natural Sciences, CAS, Tsinghua University, and elsewhere to create these exhibits.

The sector of science-related museums is still a relatively new and developing enterprise. A lot of such museums are being constructed or are undergoing transformation. One trend on the Chinese mainland is closer cooperation between museums and academic institutions and universities. Some universities have their own museums, such as the Electronic Science and Technology Museum, constructed and managed by the University of Electronic Science and Technology of China in Chengdu, and the Beijing Air and Space Museum (a department of Beihang University).

Figure 9: The astronomical clock-tower reconstructed by Wang Zhenduo and his coworkers (Wang 1989, VIII).

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References

- The Central People's Government of the People's Republic of China. 2006. *Guomin jingji he shehui fazhan di shiyige wunian guihua gangyao (2006–2010)* 国民经济和社会发展第十一个五年规划纲要 (2006–2010) (The Eleventh Five-Year Plan [2006–2010]).
- "China: Mad About Museums." 2018. *The Economist*, August 14.
- Li, Nuan 李暖. 2014. "Lai Hua waiguoren suojian bowuguan yanjiu" 来华外国人所建博物馆研究 (Research on the museums established by foreigners in China). Master's thesis, Henan University.
- Li, Qiang 李强. 1991. "Wang Zhenduo yu Zhongguo Lishi Bowuguan guancang keji moxing de fuyuan gongzuo" 王振铎与中国历史博物馆馆藏科技模型的复原工作 (Wang Zhenduo and his restoration of ancient Chinese products of science and technology kept in the Chinese Historical Museum in Beijing). *Zhongguo keji shiliao* 中国科技史料 (China Historical Materials

- of Science and Technology) 12 (2): 63–71.
- Liang, Jisheng 梁吉生. 1986. “Jiu Zhongguo bowuguan lishi shulüe” 旧中国博物馆历史述略 (A brief introduction to the history of museum in old China). *Zhongguo bowuguan* 中国博物馆 (Chinese Museum) 3 (2): 73–87.
- Lin, Zhen 林鍼. [1849] 1985. *Xihai jiyou cao* 西海紀遊草 (Notes on travels to the Western world). Hunan: Yuelue Press.
- Luo, Guihuan 罗桂环, and Wang Zichun 汪子春. 2005. *Zhongguo kexue jishu shi: Shengwuxue juan* 中国科学技术史: 生物学卷 (History of science and technology in pre-modern China: Biology). Beijing: Science Press.
- Luo, Shugang 雒树刚. 2018. “Zai ‘Quanguo bowuguan guanzhang luntan’ shang de jianghua” 在“全国博物馆馆长论坛”上的讲话 (Talk at the National Museum Symposium 2018).
- Ma, Honglin 马洪林. 2009. *Kang Youwei pingzhuan* 康有为评传 (Critical biography of Kang Youwei). Nanjing: Nanjing University Press.
- Ma, Min 马敏. 2001. “Zhang Jian yu jindai bolan shiye” 张謇与近代博览事业 (Zhang Jian and the exposition industry in modern China). *Huazhong Shifan Daxue Xuebao (Renwen shehui kexue ban)* 华中师范大学学报 (人文社会科学版) (Journal of Central China Normal University [Humanities and Social Sciences]) 40 (5): 14–21.
- Macdonald, Sharon. 1998. “Exhibitions of Power and Powers of Exhibition: An Introduction to the Policies of Display.” In *The Politics of Display: Museums, Science, Culture*, edited by Sharon Macdonald, 1–24. London: Routledge.
- Moellendorff, O. F. 1887. “The Vertebrate of the Province of Chihli with Notes on Chinese Zoological Nomenclature.” *North-China Branch of the Royal Asiatic Society* (11): 41–111.
- “Quanguo 2500 zuo bowuguan mianfei kaifang gengduo wenwu shou falü baohu” 全国 2500 座博物馆免费开放, 更多文物受法律保护 (About 2500 museums in China offer free admission, and more cultural relics are now under legal protection). 2014. *China News*, February 24. <http://www.chinanews.com/cul/2014/02-25/5876841.shtml>.
- Simmons, John E. 2016. *Museum: A History*. Maryland: Rowman & Littlefield.
- Themed Entertainment Association and AECOM. 2018. *TEA/AECOM 2017 Theme Index and Museum Index: The Global Attractions Attendance Report*.
- Wang, Zhenduo 王振铎, ed. 1989. *Keji kaogu luncong* 科技考古论丛 (Papers in Technical Archaeology). Beijing: Cultural Relics Publishing House.
- Wen, Xinhong 温新红. 2016. “Zhongguo shi kejiguan: Zhong guan yi mian zenme po” 中国式科技馆: “众馆一面”怎么破 (Chinese science-related museums: How to avoid similarity?). *Zhongguo kexue bao* 中国科学报 (China Science Daily), May 13, 1.
- Zheng, Guanying 郑观应. 2002. *Shengshi weiyan* 盛世危言 (Words of warning to a prosperous age). Beijing: Huaxia Publishing House.
- Zhou, Shurong 周蜀蓉. 2014. “Chuanjiaoshi yu Huaxi Xiehe Daxue Bowuguan de chuangjian” 传教士与华西协合大学博物馆的创建 (Missionaries and the establishment of West China Union University Museum). *Zongjiaoxue yanjiu* 宗教学研究 (Religious Studies) 33 (4): 220–227.
- Zhu, Youwen 朱幼文. 2009. “Zhongguo de kejiguan yu kexue zhongxin” 中国的科技馆与科学中心 (Science & Technology Museums and Science Centers in China). *Kepu yanjiu* 科普研究 (Studies on Science Popularization) 3 (2): 70–73.