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Leibniz and the Manufacture of Saxony Hard Porcelain

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This article focuses on the connection between Leibniz and the production of Saxony hard porcelain. Leibniz commissioned Jesuits to investigate China's porcelain-making techniques, sharing relevant information with Zinnhaus and inspiring him with scientific ideas. Zinnhaus achieved key technological breakthroughs, and Poterger continued to refine the formula and establish the factory. Although Leibniz did not directly participate in the experiments, he promoted this process through his ideas, information, and connections, serving as an important behind-the-scenes force.

Keywords: Leibniz, Saxon, hard porcelain, manufacturing technology

Introduction

In 16th to 18th century Europe, China porcelain (Marryat, 1857), with its warm texture, exquisite patterns, and superb craftsmanship, became a luxury item highly sought after by the aristocracy, regarded as "white gold". However, Europeans were long unable to crack the core secrets of China porcelain production, only able to produce substitutes like tin-glazed pottery and soft porcelain, which could never match the quality of China hard porcelain. It was not until the early 18th century that Saxony successfully developed Europe's first hard porcelain, completely breaking China's monopoly in the global market. This breakthrough marked a milestone in the history of European porcelain. Behind this great achievement, Gottfried Wilhelm Leibniz (1646-1716), the great German mathematician, philosopher, and scientist of the 17th and 18th centuries, though not directly involved in the porcelain-making experiments, became a key behind-the-scenes force driving the success of Saxony's hard porcelain through his intellectual guidance, information building, and network connections.

Leibniz Commissioned the Jesuits to Investigate the Porcelain-Making Techniques of China

Leibniz had a strong interest in Chinese culture and technology. He keenly perceived the immense value of Chinese porcelain-making techniques, while European research in this field was still in a state of blind exploration at the time. By the late 17th century, although imitations such as Italian Medici porcelain and Dutch Delft pottery had appeared in Europe, they all suffered from obvious flaws due to the lack of mastery of core technologies—

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Medici porcelain lacked sufficient hardness, and Delft blue pottery remained essentially pottery, far from the hard Chinese porcelain. Leibniz understood well that to achieve a breakthrough in European porcelain production, it was essential to first obtain key information about Chinese porcelain-making techniques. At that time, the core bridge connecting European and Chinese cultural and technological exchanges was the Jesuits.

The Jesuits, tasked with missionary missions, also played a crucial role in spreading Chinese and Western cultural and technological knowledge. They continuously transmitted information about Chinese philosophy, science, technology, and culture back to Europe (Han, 1999). Leibniz actively established close ties with several Jesuits in China, including famous missionaries like Johann Adam Schall von Bell and Johann Adam Schall von Bell, gathering various information about China through correspondence and academic exchanges (Leibniz, 2005). In his attention to Chinese porcelain, Leibniz demonstrated a highly pragmatic spirit. He was not merely satisfied with appreciating the artistic value of porcelain but was dedicated to uncovering the technical secrets behind it. On July 19,1689, in a letter to the Jesuit Johann Adam Schall von Bell (Landry-Deron, 2015), Leibniz explicitly raised a series of specific questions about Chinese porcelain-making techniques, with the core issue being "What properties does the soil used for making porcelain possess?" "Is the porcelain fired with this clay inherently transparent, or was lime and tin added during the firing process, similar to what is seen in Europe?" These questions precisely point to the core elements of porcelain production—raw material characteristics and firing techniques—guiding subsequent technical investigations.

Leibniz's commission received an enthusiastic response from the Jesuits, with the French Jesuit Yin Hongxu becoming a key executor. Yin Hongxu arrived in China on June 24,1699, initially preaching in Jiangxi Province, and later settled long-term in Jingdezhen (Pfister, 1997). Through close contact with local porcelain craftsmen and merchants, he delved into Jingdezhen's porcelain workshops, not only observing the entire process of porcelain from raw material selection, shaping, glazing to firing, but also obtaining many exclusive technical details from Christian craftsmen and major porcelain merchants. Yin Hongxu compiled the porcelain-making techniques he discovered in Jingdezhen, including important information such as body and glaze formulas and process details, into detailed letters sent back to Europe. These letters, rich and accurate in content, became the most comprehensive and professional materials for Europeans to understand China's porcelain-making techniques at the time, broadening the research perspectives of European scholars. Although this information was not directly applied to the production of Saxon hard porcelain, it provided direction for subsequent researchers, avoiding blind exploration and laying an important informational foundation for technological breakthroughs.

Leibniz and Zinnhaus' Academic Communication

Leibniz's promotion of Saxony's hard porcelain manufacturing was also reflected in his profound academic friendship with the scientist Ehrenfried Walther von Tschimhaus (1651-1708). Tschimhaus was a renowned German mathematician, physicist, chemist, and engineer in the late 17th and early 18th centuries, with extensive expertise in multiple scientific fields. The two met in Paris and became lifelong friends, maintaining extensive correspondence that covered mathematical problems, philosophical thoughts, and the development of European science and technology, including their interest in the manufacturing techniques of China porcelain. Leibniz's scientific ideas profoundly influenced Tschimhaus, who emphasized the importance of the scientific method, advocated exploring natural laws through experimentation and observation, and focused on the integration of theory and practice. Inspired by Leibniz, Tschimhaus abandoned the traditional European empiricist approach to pottery-making and instead adopted scientific experimental methods to study porcelain production.

Leibniz shared with Ziegenhaus the information about China porcelain obtained through Jesuits, further strengthening Ziegenhaus's determination to explore the secrets of porcelain-making. Ziegenhaus realized that to produce products comparable to China porcelain, it was necessary to thoroughly study the raw material composition and high-temperature firing techniques. Influenced by Leibniz's "mercantilist" ideology—the idea of developing local industry and commerce to achieve national prosperity and strength—Ziegenhaus regarded porcelain research as an important means to promote national economic development and resolved to break the East's monopoly on porcelain. In this process, Ziegenhaus achieved remarkable results: He designed and manufactured advanced experimental equipment such as large reflectors and light-transmitting mirrors, which could concentrate solar energy and reach temperatures above 1,500 degrees in a short time, solving the key temperature challenge for firing hard porcelain; he also analyzed through experiments that the main components of China porcelain were alumina, silica, and calcium, providing important scientific evidence for finding suitable raw materials and adjusting formulas (Richards, 1999).

In October 1707, Ziehenhaus successfully developed a reddish-colored stoneware material resembling hard porcelain. By January 1708, he had formulated the first practical hard porcelain using kaolin from Schneeberg and snowflake gypsum. Sadly, Ziehenhaus passed away on October 11,1708, and the baton of porcelain-making research was thus passed to Johann Friedrich Bottger (1682-1719) (Fang, 2023).

Porter and Zienhaus Improve the Production Technology of Hard Porcelain

In his early years, Poterger served as both a pharmacist and alchemist, possessing extensive chemical knowledge and experimental expertise. After taking over Ziegenhaus's research, he systematically organized previous experimental data and formulas, further optimizing raw material ratios. By adjusting proportions of kaolin, feldspar, and quartz, he enhanced the texture and transparency of porcelain. Simultaneously, he refined firing techniques by precisely controlling temperature fluctuations and holding time to reduce cracking. On March 28,1709, Poterger reported to Elector Augustus II of Saxony that he had achieved (Berges, 1965, p. 92) "high-quality white porcelain and superior glazes and colors, whose perfect quality could rival East Indian porcelain". Subsequently, Augustus II ordered the establishment of a royal porcelain factory. In August 1710, the Royal Porcelain Manufactory of Meissen (Konigliche Porzellan Manufaktur) officially commenced operations, marking the beginning of large-scale production of European hard porcelain.

During the development of the Meissen porcelain factory, Poterger continuously improved the manufacturing techniques and product quality of hard porcelain, solving the problem of early porcelain being reddish in color. In 1713, his white porcelain became a hot commodity at the Leipzig Easter Fair; in 1717, he successfully developed the "Poterger Pearl" pigment, enriching the decorative options for porcelain. At the same time, he established strict production processes and quality control standards, emphasizing technical training for workers, which gradually developed the Meissen porcelain factory into Europe's most renowned porcelain production base. With the spread of technology, countries such as Austria, France, and Britain followed suit in establishing porcelain factories, transforming Europe from an importer of China porcelain to a producer and exporter, thereby promoting the prosperity of the entire European porcelain industry.

The Historical Position of Leibniz in the Manufacture of Saxony's Hard Porcelain

Leibniz occupied a unique and important position in the historical process of Saxony's hard porcelain manufacturing. On the intellectual level, his emphasis on the scientific experimental method and the integration

of theory and practice provided a methodological foundation for Ziehnhaus's research, freeing it from the shackles of traditional empiricism. His mercantilist ideology inspired researchers to break the Eastern monopoly and develop local industries, becoming a spiritual driving force for technological innovation. On the informational level, by commissioning Jesuits to investigate China's porcelain-making techniques, he built a bridge for European researchers to access core information, avoiding blind research and creating a favorable external environment for subsequent technological breakthroughs. On the level of social networks, his profound academic friendship with Ziehnhaus became an important bond for technical research, enabling the effective transmission of scientific ideas and China's porcelain-making information, thereby promoting the continuous deepening of research.

Conclusion

Although Leibniz did not personally participate in any experiments or firing processes of Saxon hard porcelain, he created indispensable conditions for this monumental breakthrough in European porcelain history through intellectual guidance, information exchange, and academic networking. His efforts not only facilitated the successful production of Saxon hard porcelain but also promoted the exchange and integration of Chinese and Western ceramic cultures, injecting strong vitality into the rise of Europe's porcelain industry. With his wisdom and foresight, Leibniz became a crucial behind-the-scenes driving force that propelled European porcelain technology from imitation to innovation and from backwardness to leadership. His contributions to this historical process deserve eternal remembrance.

References

Berges, R. (1965). *From gold to porcelain*. New York: Thomas Yoseloff.

Fang, X. M. (2023). *For the west, for China: Elements of China in European art.* Nanjing: Jiangsu People's Publishing House.

Han, Q. (1999). *The western transmission of China's science and technology and its impact*. Shijiazhuang: Hebei People's Publishing House.

Landry-Deron, I. (2015). *Please China bear witness: Duhet's complete records of the Chinese empire*. (M. L. Xu, Trans.). Beijing: The Commercial Press.

Leibniz. (2005). *Recent events in China*. Zhengzhou: Elephant Publishing House.

Marryat, J. (1857). *A history of pottery and porcelain: Medieval and modern*. London: John Murray.

Pfister, A. (1997). *Biographies of Jesuits in China during the Ming and Qing Dynasties*. (C. Q. Mei & C. J. Mei, Trans.). Shanghai: Catholic Diocese of Shanghai Light Enlightenment Society.

Richards, S. (1999). *Eighteenth-century ceramics: Products for a civilised society*. Manchester: Manchester University Press.