

# Discovering the 'White Gold' Secret

## Porcelain-making in Europe

By Maura Rinaldi

From early times odd pieces of Chinese porcelain had arrived in Europe, mainly from the Middle East, but it was only at the end of the 13<sup>th</sup> century that Marco Polo named this mysterious, white, sonorous and translucent material *porcellana*, as he thought it was made with a seashell known in Italian as *porcella*.

In Europe, porcelain could not be bought in quantity until the second half of the 16<sup>th</sup> century when the Portuguese and Spanish regularly plied the oriental maritime trade routes. It was only after the establishment of the Dutch East India Company at the beginning of the 17<sup>th</sup> century that this beautiful, yet mysterious material arrived in a steady flow, allowing wealthy European collectors to buy thousands of pieces at a time.

One avid collector was Augustus the Strong, Prince Elector of Saxony (r 1694-1733) and later also King of Poland (r 1697-1706 / 1709-1733). By the end of the 17<sup>th</sup> century he had acquired and gathered some 35,000 pieces of Chinese and Japanese porcelains of which 8,000 are still to be found in the Zwinger Palace in Dresden. Today it is one of the most important oriental ceramic collections in the world.

A man of great ambitions and expensive tastes, Augustus the Strong was constantly in dire need of fresh capital, so when he heard that a young alchemist, Johan Friedrich Böttger, claimed to have found the *arcanum* that allowed



A Meissen cameo showing Johan Friedrich Böttger's profile, this piece uses the two materials whose formulae he discovered: red stoneware and white porcelain

him to transform base minerals into gold, Augustus thought, "now, that would solve my problem!"

In those years many Europeans believed that the transmutation of base metals into gold was possible, an *arcanum* known only to alchemists. In November 1701 Augustus brought Böttger to Dresden where he was lodged within the royal palace in an area that was to function as both residence and laboratory. After a year, working in isolation, his mental health deteriorated. Believing that this was a ploy to not deliver the promised gold, Augustus had Böttger imprisoned in the dreary Königstein fortress. However, the terrible hardships imposed on him caused his mental health to go from bad to worse. Conditions were so unbearable that he decided to run away, only to be apprehended five days later. Since hardship had failed to produce results, Augustus tried leniency and Böttger was again lodged in the palace, in pleasant surroundings, served good food and allowed to

meet men of like mind, but he remained under strict control. Despite this, no gold was produced.

Short of other 'ideas' Böttger accepted Ehrenfried Walther von Tschirnhaus' proposal, to use Böttger's undoubted chemical knowledge and great intelligence to discover the secret of porcelain-making. This would make Augustus the Strong just as happy, both because he loved porcelain and also because whoever was able to produce porcelain in Europe would reap enormous profits.

Tschirnhaus, a scientist of many talents and highly regarded at the Dresden court, was fascinated by porcelain and had, as early as the 1680s, experimented with clay and fusible rocks to produce porcelain. He also worked with burning mirrors, using the sun to produce the high temperatures necessary to fuse the clays. Although he was very close to finding the formula for porcelain, he needed fresh ideas to succeed and believed that Böttger was the right man for that purpose.

In Europe many had tried to find the secret of the precious 'white gold', as oriental porcelain was often referred to, yet nobody had managed to produce anything better than *faience*, that is, earthenware covered with a white tin glaze or soft paste wares.

In September 1705 Augustus, who enthusiastically embraced the idea of pursuing the dream of uncovering porcelain's secret, provided the two men with well-equipped laboratories located in



Augustus the Strong, elector prince of Saxony and King of Poland, a passionate collector of oriental porcelains and founder of the first European porcelain industry in Meissen, Germany. Detail from a mural over 100 m in length composed of 25,000 Meissen tiles decorated with a procession of the 35 Electors, princes of Saxony, riding horses, and their entourages. This is one of the famous landmarks of the city of Dresden. Photo by the author



*Böttger shows Augustus the Strong that he has successfully produced a gold nugget by transmutation. The nugget is still preserved in the Porcelain Collection in the Zwinger Palace in Dresden. Wall mural by Paul Kiessling, Albrechtsburg Castle, Meissen*



*Böttger in his laboratory and prison in the Albrechtsburg Castle in Meissen, this painting shows his despair at being held prisoner. He mitigates this by drinking heavily. Wall mural by Paul Kiessling, Albrechtsburg Castle, Meissen*

the Albrechtsburg Castle in Meissen. They were assisted by a considerable number of experts from different fields, including miners who had to supply different kinds of clays and chemists who were to assist Böttger in his experiments, both to develop the technology to produce porcelain as well as to find the secret of the transmutation for obtaining gold.

In fact, Böttger remained a well-guarded prisoner for the following nine years. This was meant to force him to work relentlessly to discover the secrets to these two money-producing materials (gold and porcelain) and to ensure that should there be success in finding either formula, no information would leak out. Although his circumstances were better than during the cruel imprisonment, he still had to work in unhealthy conditions with all the discomforts of being a prisoner.



*Böttger red stoneware in different shapes and colours*

At the end of 1707, Böttger, using a mixture of red clays, managed to high fire a red stoneware (now referred to as *Böttger Stoneware*), similar to Chinese *yixing*. This material offered many possibilities as it could be polished, shaped into intricate compositions and given a similar appearance to jasper (often called *Jaspirporzellan*). But it was not porcelain. It was two years later, in

October 1708, that Tschirnhaus and Böttger finally succeeded in producing an unglazed bowl, fired at 1350°, white, sonorous and translucent – porcelain at last! Tschirnhaus died only days afterward; his last words were, "Triumph. Victory!"

However, many technical problems had yet to be solved, so it was not until 1710 that the patent for a European formula for producing porcelain was filed by Augustus the Strong; this is the date usually accepted as the birth of European porcelain. The formula used by Böttger to obtain a material having porcelain characteristics had a slightly different composition from that used in China, where porcelain is obtained by mixing only two materials: kaolin

and petunze (a feldspathic material also known as 'China stone'), while Böttger's formula, which is still in use today to produce porcelain in Europe, is a mixture of three materials: kaolin; a feldspathic material and quartz. The content of kaolin is higher than that found in Chinese porcelain and this lends a glassier and whiter look to the Meissen porcelain compared to Chinese porcelain.

Shortly afterward, in December 1710, Böttger was appointed Administrator of the Meissen Manufactory. The first European true porcelain was sold for the first time in 1713 at the Leipzig Easter Fair.

Böttger must have been a man of great charisma and theatrical ability because despite his unsuccessful efforts, Augustus never stopped believing that he possessed the *arcanum* to produce gold. In March 1713 Böttger did succeed, probably by sleight-of-hand, to 'produce' a small gold nugget, an event depicted on a mural in the Albrechtsburg Castle in Meissen.

In April 1714 Böttger was finally set free, but he was in very poor health because of the many years that he had been exposed to poisonous fumes in his airless laboratory and he also suffered from severe alcoholism. When he died in Dresden in April 1719, he was only 37 years old.

Böttger is credited with having invented European porcelain, but it is doubtful if he would have achieved this without the scientific work carried out by Tschirnhaus. It would be fairer to say that the secret of the 'White Gold' was discovered thanks to the collaboration of both men.



*The original porcelain formula written in Böttger's handwriting reproduced on white porcelain. Photo by the author*

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*Unless otherwise noted, photos by Patricia Bjaaland Welch*