

Porcelain and Alchemists

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Porcelain is a ceramic material made by heating substances, generally including a material like kaolin, in a kiln to temperatures between 1,200 and 1,400 °C (2,200 and 2,600 °F). The strength, and translucence of porcelain, relative to other types of pottery, arises mainly from vitrification and the formation of the mineral mullite within the body at these high temperatures.

Porcelain was invented in China, and exported to Asian countries and Europe. It is a versatile material, white in color that can modeled, glazed and painted. It is strong and hard and resistant to chemicals. Because of the beautiful artwork that could be produced, porcelain is highly praised.

From the moment Chinese porcelain appeared in Europe, it attracted the attention of ceramists and alchemists. The long period of four centuries between its first appearance and the discovery by Johann Friedrich Böttger is explained by the characteristics of this ceramic, the secret of which lies in a fine white soil, kaolin or china clay. This forms the basis for the porcelain, together with another product (which the Chinese called liu-li) that was also used in glaze.

Since the early days of Chinese porcelain, alchemists played a decisive role in its discovery. The Chinese alchemists are said to have used kaolin before the potters did, as they included it in the preparation of medicines. Porcelain clay was indeed mentioned for the first time in two pharmaceutical manuscripts from the 3rd century of our era, the Chiang Ji and the Kuo Po, which refer to an older document, the Pie Lu. In the same period, the medical treatise Wu Pu gives a formal testimony to the use of kaolin as a medicine. Finally, another pharmaceutical manuscript from around 650, the Tang Pen Tsao, recognizes the medicinal properties of this substance.

Early records of the components of porcelain indicate that they were used by alchemists or medicine manufacturers, which often amounted to the same thing. It may therefore be assumed that porcelain was discovered by both. When exactly it was discovered remains an open question. There is a proto-porcelain from the beginning of the Han dynasty (206 BC - 220 AD).

Plain white porcelain ware was widely loved in China for its minimalistic elegance. Mature production of it first appeared in the sixth century in northern China, with the most prominent originating from the Xing Kiln in today's Xingtai City, Hebei Province. The Xing Kiln reached its zenith during the Sui (581-618) and Tang (618-907) dynasties, when it had a large output of products of high quality and low price that reached every part of the country including the imperial court. It was one of two best porcelain producers in China, with the other being the Yue Kiln, which was known for celadon wares.

It is not until the T'ang period (618-906) that truly typical objects can be found. The method was undoubtedly developed in small steps and very gradually improved. The preparation of the earth and the glaze belongs to the domain of chemistry, i.e. to the ancient time of alchemy. If the history of porcelain differs from that of kaolin, one must recognize the importance of Chinese alchemy, practiced at least from the 3rd century of our era.



Proto porcelains from the Tang dynasty, around 900

The extraordinary fashion of this very fine pottery, or porcelain, undoubtedly reached the West at the end of the Middle Ages via the Arabs, who considered it extremely precious. The Arabs maintained trade relations with China, through Baghdad, where the caravans from the Far East arrived. During the Sung dynasty (960-1279), Arabs were said to produce *ghazar*, unequalled kind of porcelain similar to the Chinese. From the second half of the 14th century, porcelain objects can certainly be found in European collections. However, when one finds them mentioned in texts, it is impossible to verify whether they really were ceramic objects, since the term "porcelain" was initially used indiscriminately for this form of ceramic and shells (from the ocean) of the same name.

Marco Polo used the word porcelain for the first time: "And I add that in this province (Fuchin), in a place called Timigui, large and small porcelain bowls are made, the most beautiful that one can dream." The Venetian explorer also brought back one of those white, hard and translucent bowls, which he said resembled the shells used as money in the Sharagian province. Because these shells were called porcela, Marco Polo called his bowl porcellana. Later, porcelain started to be accessible in Europe via the Silk Road.



A Chinese Qingbai porcelain jar housed in the Treasury of the Basilica of San Marco in Venice. The San Marco jar is associated with Marco Polo because its dating matches the era of the travels of Marco Polo, and therefore might be the only surviving piece of Marco Polo's treasures reputed to have been brought back from China to Venice in 1295.

The first attempts at imitation date from this period, when the extremely luxurious China porcelain was undoubtedly already fairly widespread. However, its origin was still shrouded in mystery. Only at the end of the 16th century, trade via the sea routes had expanded greatly, and no one doubted its origins. Spain and Portugal, which sailed all the seas, contributed most to the spread. The first attempts to imitate the much sought-after ceramics took place in Italy.

The discovery came in 1470 in Venice, where scientists enjoyed all the facilities to study the Chinese specimens from the collections of magistrates, but where there was also a very thriving glass industry. The discovery was the work of an alchemist at the end of 1469 or early 1470, as is apparent from a letter from one Guillermo de Bologna to a friend in Padua:

Your Honor, you receive a bowl with our letter and a small porcelain jug brought to you by master Antonio, alchemist, who built the new kiln of San Simeon has lit. These two objects were made by this master with very great

workmanship, for he obtained translucent and very light porcelain with a good earth, which he obtained through you; Varnishes and beautiful colors make the pieces so beautiful that they seem to come from Barbary and are perhaps better than the porcelain from that country. The secret has seized all our potters and alchemists, but he who is an alchemist will not reveal to them the secret of such beautiful discovery. Yesterday a senator of very high rank visited him and promised to speak to certain persons about his invention and its great importance. I am telling you this because I know it will give you great pleasure to know about it. May God protect you. Greetings to all in Padua. Venice, April 1470. P. Guillermo de Bologna.

This document is very important. It was not drawn up by a boastful inventor, but by a witness, who also sent supporting documents. He is not talking about a chimeric project, but a fact that already arouses the curiosity of society. Although his letter does not provide proof that this ceramic was really porcelain, he does indicate that the quality was sufficient to pass in collections for an imitation. Finally, he also proves the interest shown by alchemy in ceramics in general and porcelain in particular, which is later confirmed by other facts and documents. It most likely was not the hard porcelain but a softer kind.

A century later, an alchemist in the service of the Duke of Tuscany, Francesco de' Medici also worked on the solving the secrets of porcelain. We find an account in a letter written to him, on 25 August 1567, by his correspondent in Ferrara, Bernardo Canigiari. In it he mentions a certain Camillo da Urbino, "potter and painter and, as it were, alchemist of His Excellency, the modern inventor of porcelain, and who is a great friend of Monsignore of Florence". Ferrara for Alfonso II had founded a factory there in 1565. He made a porcelain of which there are no surviving copies. The alchemist took his secrets to his grave when he died, in 1567, from a full charge of a cannon.

The driving force behind the invention of genuine European porcelain was Augustus II, Elector of Saxony and King of Poland (1670-1733). Lines of buyers traveled Europe in search of (the most beautiful Chinese or Japanese pieces, which eventually ended up in Meissen, Germany. He had indisputably the most important collection, with Imari porcelain from Japan, blue and white porcelain from the last Ming dynasty. He spent another part of his fortune on alchemical research. He was in possession of a transmutation medal.

This interest in alchemy was the basis of great discoveries. He employed Count Walther von Tschirnhausen, whose mission was to find the Philosopher's Stone, and; to make gold, but also to discover the secret of the Chinese porcelain. He began his research around 1694, especially in the direction of the production of hard ceramics, which required higher temperatures than those achieved at that time. Yet it was not Tschirnhausen who achieved the goal, but a young alchemist, Böttger.

Johann Friedrich Böttger was born on February 4, 1682 in Schleiz, Saxony. His father was an alchemist at the Mint of Maagdenburg. In 1701, while the young Böttger was apprenticed with a certain Zorn, a pharmacist in Berlin, he met the

famous Lasearis, who was friends with his master. Lascaris became seriously ill and fearing for his life revealed some important secrets to him and especially his interest in the writings of the alchemist Basilius Valentinus. He offered him two ounces of projection powder, that Böttger immediately went to test in Halle, where he studied medicine. His reputation grew so rapidly that, during a stay in Berlin, he was summoned by Frederick of Prussia. He needed gold. However, Böttger distrusted him, declined the offer and sought lodging with Georg Kaspar Kirchmaier, an uncle living in Wittemberg. He preferring the proposal of Augustus II, who sent a military escort to accompany him to Dresden.

After settling there on November 25, 1701, he bought a beautiful house and amazed the city by his way of life and his generosity. For example, he gave banquets during which there was a gold piece under each plate. He was then charged with espionage and sentenced to house arrest. Lascaris, who was in recovery, heard this news and sent an influential friend, Dr. Pasch, to Dresden. When the latter was unsuccessful, he planned an escape attempt, but word got out. He was imprisoned in Sonnenstein Castle, while Böttger was imprisoned in Königstein Castle, where he could use an alchemical laboratory to perform transmutations. Count von Tschirnhausen was in charge of guarding him, while also conducting his own experiments which were more down to earth. He wanted to make sufficiently strong refractory crucibles to use in alchemical preparations.

Böttger became more and more involved, although he could not immediately appreciate this kind of work, because it distracted him from his transmutations, He he wrote above the entrance of his laboratory: Gott unser Schopfer hat gemacht aus einem Goldmacher einen Topfer (God our creator has made a goldmaker into a potter).



The ceramic laboratory of Böttger, in the castle of Albert, in Saxony.

In 1704, both alchemists thought they had found a red porcelain. In fact it was a fired ceramic vitrified clay obtained from red earth that came from Zwickau,

Nürnberg and Plauen. This stoneware could be engraved and processed.



A Böttger red stoneware silver-mounted baluster coffee-pot and cover, circa 1710-13



Red Böttger teapot from Meissen, 1710

Germanisches Nationalmuseum - Nuremberg, Germany

After porcelain, this type of ceramic was undoubtedly the hardest. It could also be covered with a layer of black glaze of manganese or cobalt, and was an imitation of Ji Shing porcelain. However, this paste did not have any of the characteristics of those based on kaolin and liu-li.

The Elector was naturally delighted with this success and on September 22 he had Böttger transferred to his castle Jungferbastei near Meissen. Tschirnhausen accompanied him. They were ordered to abandon their searches for gold and devote themselves entirely to porcelain, a command that proves both its value and the intelligence of Augustus II. Until Tschirnhausen's death in 1708, both alchemists improved the quality of the red porcelain. A year later, while Böttger was still looking for the white paste, he did an experiment with Kolditz refractory clay mixed with charred alabaster. Overwhelmed by his discovery, he began to make euphoric promises, announcing that he would "make vases of all colors, harder than porphyry and like fine stone, borax of better quality than Venice, masses of rock crystal, strong water and aqua regia at very low cost and with local raw materials, and finally a liqueur which, when poured over a dead animal, glazes it and preserves it forever." He did better: he discovered what he was paid for.

In 1711 a certain Johann Schnorr, owner of blast furnaces in the Erts Mountains, rode on horseback near the town of Auc. When he noticed that his riding boots were covered in a strange white powder, he stopped to gather it, and he sold it as wig powder. One day Böttger's valet used it to powder his master's headdress. Böttger was surprised and reacted like a true physicist. He researched it in his laboratory, made a number of experiments in the greatest secrecy and finally made really hard porcelain, like in China! This powder was kaolin.

His first pieces are kept in the Dresden Museum. Those are the facts as they are known to us. However, there are several versions of Böttger's life before he was recruited by the Elector of Saxony. According to a rather mysterious story, the alchemist Lascaris revealed to Böttger the process for the manufacture of porcelain, but the latter chose to devote himself to transmutation for years to come:

There is, and we give for certain, a singular anecdote, but which in the country is accepted as proven and noted by circumstances which still exist. I myself questioned the famous chemist M. Margraff on this subject, who confirmed the authenticity to me, and explaining it as an educated man and of good sense: "Give me, he said, ten thousand louis in gold; I will turn them in powder, of such color, and in such form, and even enlarging the volume, of a weight which will appear light. You can transport this powder wherever you like; and by following the procedure which I will indicate, you will find in it worth your ten thousand louis, with a very small amount of waste." It is therefore said that an old man, dressed very simply and unknown, had entered the royal apothecary of Berlin, and had successively asked for several drugs; that at different intervals he had been seen to

reappear there, and always for various requests of the same kind; that the first boy in this pharmacy, who, moreover, had an excellent appearance, had always served him with as much care as he was honestly, so that in the end the old man had told him, pointing out his home, that if he wanted to come and see him, he would not have to regret it; that the young man had paid him a visit, and that after a rather long interview, the old man had said to him: "You seem to me a brave young man, I want to give you a fortune: I only ask you that you promise me to keep it a secret, never to disclose it to anybody, and not to misuse what you have received or learned from me"; That, in this way, he gave him a box or cassette, full of a particular powder, and indicated to him the procedure to follow to extract gold from it, such weight for such volume; that he added: "If by misfortune this box was exhausted, and if you felt new needs, examine carefully this dirt of which I leave you a sample: it is quite common in the north of Germany; now, by following such procedures, you will make a porcelain of it as perfect as that of China;" that the young man, who has never seen his old man since, had nothing more in a hurry than to test his powder; that the success having been such as it had been announced to him, he allowed himself more expenses than before, using or rather abusing his treasury; that one evening feasting with his friends, he drank enough to become imprudent and boastful; that having boasted of knowing how to make gold, he had wanted to justify this statement, and had done so in their presence; that the next day, when he woke up, he had been terrified of his thoughtlessness, and had fled; that indeed his friends had spoken out; that William, having been informed of the fact and of the departure, and having made inquiries of the route which this young man had taken, had discovered that he had passed through Saxony; that this king had dispatched a courier to Dresden to arrest him; that this apothecary boy had soon been recognized, arrested and put in prison; that, fearing above all to be handed over to the King of Prussia, he had offered to the government of Saxony to enrich the country by the manufacture of a porcelain equal to that of China, provided that he was not handed over, and that he was guaranteed his freedom; and that, finally, such was the origin of the famous manufacture of Meissen in Saxen. One can still see in the cabinet of curiosities, in the castle of Berlin, the nail which was used as a spatula, in the difficult test which the apothecary boy made with his powder in the presence of his friends: it is a large nail which was changed into gold, at least the color of it, for the greater half of its length, that is to say the entire part that was used to stir the composition.

(from [Frédéric-le-Grand, sa famille, sa cour, son gouvernement, son académie, ses écoles, et ses amis, généraux, philosophes et littérateurs: ou, Mes vingt ans de séjour à Berlin,,](#) by Thiébault Dieudonné, 1827, Volume 2, page 21.

This report comes from Thiebault Dieudonné, who had lived in Berlin for some twenty years. He arrived when Böttger, who died in 1719, and had been dead for

about sixty years. Broadly speaking, his story agrees with what we know about the alchemist's adventurous existence, but otherwise it provides a curious detail worth mentioning: Lascaris is said to have provided him with a sample of kaolin and revealed to him that porcelain had to be made with this earth, which was found in Germany. Can it be inferred from this that Lascaris had already made porcelain, without wanting to make his discovery public? Lascaris passed for a monk of Greek origin. So he came from a country with close contacts with the East. Shouldn't the origin of his knowledge be sought there? In this we understand that a century and a half earlier, another Greek, who had traveled to the Indies, corrected the "porcelain of the Medici".

Couldn't Böttger immediately use these mysterious revelations because he didn't know the origin of kaolin? Was it because of the history with the wig that he discovered it? Even if one believes in these events that brighten up the legend, one must still admire his discovery, which nevertheless required a rich experience in the baking and use of minerals.

On January 23, 1710, Egon, Prince of Fürstenberg, by order of Augustus II, issued the following report announcing the discovery: "We have succeeded, with apparently worthless substances, which are found in abundance in our regions, not only to produce red pottery of much better quality than the terra sigillata from India... but also crockery and dishes of beautifully mixed colors. Despite their sophistication, they are so sturdy that they can be easily worked, engraved and polished as with jasper or porphyry; in addition, they possess all the other qualities that are admired in the Indian utensils. Our craftsmen also proposed a number of pieces of white porcelain, whether or not covered with a layer of glaze, so that we are assured of being able to use porcelain from our regions, that by its translucency and its other qualities will compete with that of East Indies". When Böttger's first attempts were successful, the Elector of Saxony at Meissen immediately founded a manufacturer at Meissen on March 6, 1710, which would remain famous. They worked in the greatest secrecy to maintain the monopoly. The precious earth was brought in sealed wagons and under army guard. Böttger practically remained a prisoner. All the craftsmen who helped him were under close supervision and were threatened with imprisonment if they dared to reveal anything about the processes. The first objects of this manufacture are made of yellowish earth, with a glaze layer full of tiny air bubbles. The colors were matte: yellow, blue, green, iron red, purple and pink. In 1713 Böttger came up with a very typical iridescent purple, later succeeding in firing gold and silver on the glaze.

Industrial spies and departing workmen took Meissen's manufacturing secrets to Vienna and Venice, where the Du Paquier and Vezzi factories were founded in 1718 and 1720 respectively. Craftsmen from Vienna then went on to work at the Doccia factory near Florence. A workman who defected from Vienna in 1747 eventually spread knowledge of Meissen's formula all over Germany.



*Italian porcelain from around 1770, portraying an alchemist and his assistant.
From the The Metropolitan Museum of Art, New York, NY*