

# Alois Senefelder – The Invention and Early Days of Lithography

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In the spring or summer of 1796, a dejected young man wandered along the shores of the River Isar near Munich. His father had died a few years earlier and his mother was left alone with eight children. He had therefore been forced to interrupt his legal studies at the University of Ingolstadt in Bavaria. Having failed as an actor, he had had some success as a playwright. But it was difficult to find publishers and he had decided to print the play himself. The only problem was that he did not have the money to buy the necessary equipment. Alois Senefelder – as the young man was called – tried to find cheaper ways to do the printing. He had tried writing in reverse on copper plates, but this was time consuming and he could not afford enough plates. In his quandary, he had even considered serving as a substitute for an acquaintance in the army. This would get him 200 guilders with which he would be able to afford to continue his experiments. But he was turned down. Because he was born in Prague (1771), Senefelder was considered an Austrian, and Bavaria was at war with Austria. On his walk, he met a friend who suggested a glass of beer in the nearby Wollgarten. It was here that Senefelder came across a slab of Solnhofen limestone, which he picked up. He scraped the stone with his knife, revealing the stone's texture. This gave him the idea that it might be possible to etch out raised figures, letters or notes on the stone, and that these might be printed in the same way that one prints with wooden boards or metal plates. The thought cheered him up and he took a few stones home with him. Happily he told his mother that he had made an invention. Now everything would change for the better. The home of the Senefelders became filled with stones on which Alois had written letters and notes, both in reverse and the right way round.<sup>1</sup>The first step had been taken towards the invention of lithography.

Alois Senefelder was a multi-talented young man who already at school had taken an interest in chemistry and mechanics. He appears to have been strongly motivated by the solving of practical problems. He must have been stubborn and have had a knack to seize an opportunity once it came his way. In 1818, Senefelder published a book about his invention in which he described how it had happened and what one should do to be a successful lithographer.<sup>2</sup>In it, he recalled how his mother had asked him to make a list of the laundry that the washerwoman would come to collect. Because there was no paper in the house, he wrote down the list on a slab of limestone with a special ink

that contained soap. Then he wondered what would happen if he poured acid on the stone. The result was raised letters that could be printed.

Senefelder began printing texts, pictures, and sheet music in particular. He had a friend from his time in the theatre who was a musician and a composer, Franz Gleissner. In 1796, Senefelder printed twelve songs for Gleissner with a clavier accompaniment, using lithographic relief printing on a converted copperplate press. In 1797, Senefelder made a little vignette of a burning house to illustrate a song about a great fire in the small community of Neuötting; the customer was the bookseller Joseph Lentner of Munich. The text was by Johann Michael von Sailer, the bishop of Regensburg and a pioneering pedagogue. It was the first picture printed by Senefelder. School Inspector Steiner, director of the state textbook publishing house in Bavaria, happened to see the picture and encouraged Senefelder to continue developing the stone press to print pictures. Senefelder regarded himself as being such a mediocre draughtsman that it was not worth while for him to continue. Instead, he developed a method for transferring etchings and copper engravings onto the lithographic stone by means of transfer paper.

By this time, Senefelder had a competitor, a pedagogue called Simon Schmid, who, like Senefelder, worked with both stone etching and relief printing. Schmid wrote the texts on a stone with molten wax, a material that was not as smooth as the wax-soap developed by Senefelder. Schmid had been commissioned by Steiner to print posters of poisonous plants. However, Steiner was dissatisfied with the result and turned to Senefelder. As a first commission, he would print a book of sheet music with church songs. Steiner wanted to print the music and the text together in a book printing press. Senefelder's solution was to print the letters in ordinary type, while the notes were engraved. He mixed plaster, butter and alum and painted a polished limestone with the mixture. After engraving the notes in reverse, he filled the cavities with warm sealing wax, scrubbed away the mixture of plaster and pressed the sheet with text in a book printing press. Senefelder had developed a kind of stereotype.

To solve the problem of writing in reverse, Senefelder wrote the text and the notes with a soft pencil on paper, which was then drawn through a press with a stone base, with good results. This encouraged him to try to find an ink mixture that could be transferred from paper to stone and then from stone to paper, thus achieving a text that could be printed directly from the stone without any processing. After extensive experimentation Senefelder succeeded in coming up with a usable ink. It was during this work that Senefelder discovered that gum in combination with diluted acid prevented the thick ink from sticking onto the prepared

surface. As a transfer medium, paper presented some problems. “Could not a stronger material, perhaps the stone plate itself, be so prepared that it would take ink or colour only on the parts covered with fatty ink, while the wet parts of the stone resisted it?” Senefelder had noticed in relief printing that, if the space between the letters was damp, the ink did not stick to the surface. He took a cleanly polished stone, inscribed it with a piece of soap, poured thin gum solution over it and then swabbed the stone with black ink. “All the places marked with the fat became black at once, the rest remained white. I could make as many impressions as I pleased; simply wetting the stone after each impression and treating it again with the sponge produced the same result each time.” Senefelder gave no date for this, but it is thought to have been in 1798. Senefelder himself called the invention ‘chemical printing’. The term lithography did not make its appearance until a few years later.

While developing the process, Senefelder designed many presses. The first were modified copper or book printing presses. Finally, he designed his own lithographic press, the pole press, in which pressure is exerted onto the print surface by a moving scraper blade, a leather-covered board of hardwood at one end of a long pole, the upper end of which was attached to a hinge. The lithographic stone is placed in a wooden frame mounted on a bed. Senefelder got the idea from his first attempt of printing with a cloth-covered board that was passed over the print sheet. From his experiments with the book printing press, he borrowed the construction that lays paper over the type, the tympan. Senefelder used the same construction for placing the paper over the stone.

He had established a partnership with Franz Gleissner, whose salary as a violinist in the Bavarian Court Orchestra funded Senefelder’s experiments. In 1799, they received a royal franchise, that is, exclusive rights to the invention in Bavaria. Alois’s two brothers, Theobald and George Senefelder, were hired and taught the process along with two other apprentices.

An innovation such as the invention of chemical printing, or lithography, does not happen in a vacuum, but in what might be called an innovation space, a context in which ideas emerge. In its simplest form, this space comprises the history of how and why Senefelder worked with graphic techniques and how this eventually led to his 1798 invention of lithography. But on closer inspection of the space, one can see that, in addition to the driving forces, it also includes opportunities, whether economic, social or technical, that can lead one step further from the previous one. Obstacles and failures are not the least important factors, because they steer the process in directions other than those anticipated originally. Senefelder himself speculated that, had he been able to afford

to print his plays, or had he succeeded with his stereotypes, he would never have invented lithography. But how a process develops depends above all on the opportunities available. One crucial opportunity was that in Munich there was plenty of limestone from Solnhofen in the Bavarian Jura mountains. An important factor was also that no expensive chemicals or equipment were needed for the process, apart from the printing press. The latter could initially be constructed by local carpenters. The chemicals were such as were available at home or used by printers. Another contributing factor was that chemistry, not least thanks to Antoine Laurent Lavoisier's discoveries, had become a fashionable science of the day. Senefelder had in fact taken an interest in chemistry when he studied law at the University of Ingolstadt. This meant that he already had a chemical frame of reference when he began the innovation process. Moreover, he had such a deep interest in mechanics that he had planned to publish a handbook on the subject.

Alois Senefelder was the kind of inventor who deliberately and methodically works to find a solution to a problem, which in Senefelder's case was an inexpensive printing technique. He was not alone with his need. Others who became interested in the potential of lithography early on were music publishers or sheet music printers, educators and artists. Eventually the authorities too saw the benefits. Once an invention has been made, a critical factor for success is the network of innovators/innovations that can be built up subsequently.

For stone printing, the printing of sheet music was a real door opener. Composers such as Franz Gleissner and Abbé Vogler worked actively with stone printing. Music publishers, such as Hans Makarius Falter in Munich and Johann Anton André in Offenbach am Main, contributed to the spread of stone printing and to the fact that it could be developed into the mature printing technology of lithography.

The person who was most influential in the spread of lithography outside Bavaria was the music publisher Johann Anton André in Offenbach am Main. He is famous for two things. In 1799, he bought from Constanze Mozart, the widow of Wolfgang Amadeus Mozart, the composer's entire musical estate. On the same trip he also visited Alois Senefelder in Munich, buying the rights to his invention outside of Bavaria. Senefelder and Gleissner would set up a lithographic print shop in Offenbach and equip it with all the necessary tools, presses and lithographic stones, and to impart to André and his staff the necessary knowledge for using the lithographic technique. Senefelder and Gleissner could continue to operate their print shop in Munich, but they undertook not to enter into any agreements with others, or to take on new partners into their own venture. They were also forbidden to disclose the

lithographic technique to anyone other than André or his trusted employees.

For Johann Anton André, this agreement meant that he entered an entirely new competitive situation relative to other music publishers in that he was able to produce sheet music at one-fifth of the cost of etching the same notes in copper. André was a true entrepreneur and saw the whole of Europe as his market. For Senefelder, the agreement meant that he now had the necessary peace and quiet to develop the lithographic printing technique further. All in all, Senefelder was in charge of the technology, while André ensured that it was usable and could be disseminated. Thus, they were each dependent on the other.

The fundamental discoveries for the development of chemical printing had now been made, but much work remained to be done before lithography matured as a graphic medium. With the cooperation between Alois Senefelder and Johann Anton André, chemical printing entered the diffusion phase. Senefelder and André were both very much involved in the process, each in his own way. Senefelder was mostly interested in being able to control the use of the invention in the area of his franchise, Bavaria. From the Bavarian viewpoint, Offenbach lay abroad, in the county of Isenburg near Frankfurt am Main. Senefelder was also very interested in obtaining a franchise for Austria. André, however, had much broader visions. He envisioned lithographic establishments in London, Paris, Vienna and Berlin, printing the music of his company.

Senefelder moved to Offenbach, and after just fourteen days the new press was in place and he could begin to print music for Johann Anton André. The first lithographically printed music in Offenbach was published as early as January 1800. Big plans were drawn up. The brothers of Johann Anton André would be engaged in the firm and new printing plants set up in London, Paris and Berlin. Senefelder himself would handle Vienna. In December 1799, the Gleissner family also moved to Offenbach. Franz Gleissner was charged with music printing and proofreading. Even Theobald and Georg Senefelder worked for André for a short while. Soon, André was able to discontinue half of his ten copper and zinc presses.

Together with his younger brother, Philipp, Johann Anton André had travelled to England to acquire a patent on the chemical printing method. The English patent law required that the inventor apply personally for an English patent. Reluctantly, Alois Senefelder travelled to London. After six months, on 20 June 1801, a patent was granted for *A new method and process of performing the various branches of the arts of printing on paper, linen, cotton, woollen and other articles*. Senefelder's patent application is the main source of information on early lithographic techniques. He maintained that his invention consisted of three parts:

- the process,
- the discovery of a new base material, and
- the construction of printing presses for lithographic printing.<sup>3</sup>

It was Senefelder himself who introduced the usual description of his version of planographic printing, the opposition between grease or resin and other substances, in particular liquids containing vegetable gum or some acid. He also pointed out that one could draw on the stone with any of the substances in either category, provided the ink was compatible with the category in question. In other words, one could draw and print with substances in the first category, but just as well with substances in the second. Regarding the base materials, the patent application does not limit itself exclusively to lithographic stone, but also covers other possible base materials.

Senefelder's chemical method was introduced to a group of artists in London, either by himself or by Georg Jacob Vollweiler, who had been hired by André, and their work was published between 1803 and 1807 under the title *Specimens of Polyautography* with sheets, among others, by Salomon Gessner, Benjamin West and Henry Fuseli (Heinrich Füssli).<sup>4</sup>

Johan Anton Andre even had plans for opening a lithographic print shop in France. In 1801, the younger brother, Friedrich Andre, applied for a *brevet d'importation* which was granted two months later, in February 1802. Shortly after, André installed a press in Charenton to print music. In 1803, he sold the rights for printing from stone and moved to Paris. After a short spell in Germany, Friedrich André returned to Paris where he installed his third press. In all probability it was not a success, for he began selling licenses to other printers instead. The quality of French lithographs was very uneven, and they could not compete with the Germans, although many Frenchmen travelled to Germany and Munich to learn the craft. One of these was Napoleon's brother, Louis, who made a lithograph with ink in Munich in 1805, *Four officers of the Imperial Guard*. Colonel Baron Lejeune made a drawing of a Cossack on the Senefelder brothers' press, while another colonel, Lomet, also executed several lithographs. Back in France, the colonels showed their work to Napoleon who, although intrigued, hardly encouraged adoption of the technique, since it could be used for spreading hostile propaganda. In other circles, however, the technique awakened great interest. Dominique Vivant Denon, Napoleon's art emissary who was appointed director of French museums and the Musée Napoléon in 1804, came to Munich in 1806, where he made a lithograph. In 1809, he returned to Munich and made another lithograph, *Rest during the Flight into Egypt*.<sup>5</sup> In Paris, he installed a lithographic press in his

studio, a press which for a long time was the only lithographic press in France. Attempts were made now to get Senefelder himself to come to Paris, but these failed.

Alois Senefelder travelled to Vienna in 1801 to obtain the franchise for lithography in Austria, which he received in 1803. Senefelder called his printing house "Kk privilegierte Chemische Druckerei". In an advertisement in the *Wiener Zeitung*, Senefelder announced that he would print music, smaller images, tables, IOU forms, instructions, bills of lading, price lists and all kinds of printed matter. Senefelder wanted to start a business printing patterned cotton fabrics. In the early days in Vienna, he was almost entirely occupied by efforts to accomplish this and to print music, while artistic lithography was completely sidelined. Senefelder's businesses in Austria did not go particularly well, because he had to sell the printing works almost immediately. Nevertheless, it was not until 1806 that he returned to Munich.

Meanwhile in Munich, Hermann Mitterer, a teacher of drawing, who in 1791 had started an evening and full-time school for artisans, hired Senefelder's brothers Theobald and George to build a lithographic printing press for the school. It quickly developed into a highly efficient printing works by securing the services of many artists. Mitterer had also improved Senefelder's pole press by using a stationary scraper bar, under which the print plate could be moved with the help of a star-wheel or a lever, the type of press that is used to this day in lithographic printing. In the course of 1805 and 1806, Mitterer published an album of six lithographs of very high quality every month.

In 1806, Alois Senefelder returned to Munich. Together with Franz Gleissner, he established a printing company, funded by the Royal Library Director, Johann Christoph von Aretin. The collaboration lasted for four years. The printing works had five presses for printing sheet music, administrative works such as tables, circular letters, maps, etc., and for art. A highlight for the printing house was the publication of reproductions of Albrecht Dürer's drawings for Emperor Maximilian's prayer book, with Johann Nepomuk Strixner as the lithographer. These constituted the first maturity test for lithography as a reproductive medium. To follow up the reproductions with other drawings from the Royal Bavarian collections was too expensive for von Aretin, however, and he sold the company to the Director of the Royal Collections, Johann Christian von Mannlicher, who succeeded in carrying out the project at a profit.

Lithography as a graphic technique had now shown what it was good for, and Senefelder's work began gaining recognition. Eventually, he and Franz Gleissner became state employees at a newly established lithographic printing press in the Bavarian tax office, whose main

business was to produce economic maps. Senefelder was appointed Royal Inspector of Lithography, with an annual salary of 1500 florins. In 1808, Senefelder had published *Musterbuch der Lithographischen Druckerey*, a work that never went beyond the first booklet. As a government employee, he now had time to write his *Vollständiges Lehrbuch der Lithographie und des Steindrucks*, which consisted of two parts. The first part describes the development of lithography, the second is a manual on how to work with lithography. The book was published in 1818.

As Senefelder and Gleissner acquired what must be regarded as sinecures, Senefelder's constructive contribution to the development of lithography came to an end, although he never stopped developing and improving his invention. But the development of the technology lay in other hands, with those who every day in their respective lithographic printing companies strove to develop their products and production methods.

Translation: Tomi Snellman

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<sup>1</sup> Friedrich von Schlichtegroll, three letters on the invention of lithography, *Wöchentliche Anzeiger für Kunst- und Gewerbe-Blatt des Polytechnischen Vereins im König-Reiche Baiern, München* 1816. The letters are published in Hans Schneider, Makarius Falter (1762-1843) und sein Münchner Musikverlag, *Erster Band: Der Verlag im Besitz der Familie (1796-1827)*, Tutzing (Hans Schneider) 1993.

<sup>2</sup> *Vollständiges Lehrbuch der Steindruckerey enthaltend eine richtige und deutliche Anweisung zu den verschiedenen Manipulations=Arten derselben in allen ihren Zweigen und Manieren belegt mit den nöthigen Musterblättern nebst einer vorangehenden ausführlichen Geschichte dieser Kunst von ihrem Entstehen bis auf gegenwärtige Zeit. Verfasst und herausgegeben von der Gründer der Lithographie und chemischen Druckerey Alois Senefelder. Mit einer Vorrede des General=Secretärs der Königlichen Akademie der Wissenschaften i München, des Directors Friederich von Schlichtegroll* was published in Munich in 1818. The second, extended edition was published as early as 1821.

<sup>3</sup> Michael Twyman, *Lithography 1800—1850. The techniques of drawing on stone in England and France and their application in works of topography*, (Oxford University Press) London 1970, p. 26.

<sup>4</sup> *Specimens of polyautography consisting of impressions taken from original drawings made purposely for this work*, published on 30 April by P. André, Patentee, No. 5 Buckingham Street, Fitzroy Square, och J. Heath, No. 15 Russel Place, Fitzroy Square. A second edition was published in 1806 by André's successor G. J. Vollweiler. The twelve contributors were Richard Cooper, Sir Robert Ker Porter, Thomas Barker, Conrad Gessner, William Delamotte, Henry Fuseli, Thomas Hearne, James Barry, Richard Courbould, Henry Richard Greville (Earl of Warwick), Benjamin West, and Thomas Stothard. According to Twyman (1970), p. 28, note 5, no complete album has ever been found, so the exact order of publication cannot be reconstructed.

<sup>5</sup>Marked "Fait à la lithographie the Munich le 15 9bre 1809".