

Goethe opens a Mine

Herald

On 7 May 1773, Goethe wrote a letter to law professor Ludwig Julius Friedrich Höpfner. He acknowledged being in possession of Höpfner's Spinoza book which his friend Merck had passed on to him, and asks whether he might study it a while longer. He uses a surprising metaphor for his interest in Spinoza's ideas.

*"I only want to see how far I am able to follow this man in his shafts and ore seams."*¹

Goethe was an expert at turning a phrase, and three years before he took on the responsibility of opening a real mine, this phrase was uncannily prophetic; how far would he be able to follow the promise of riches in the ore seams hidden under the Thuringian forest?

Introduction

The mine in Ilmenau had operated since the 15th century on silver and copper bearing schist², but in May 1739 a breach in the dam holding water used to drive the machinery caused widespread flooding in the town. With no water to power the waterwheels, the pumps stopped pumping, and the shafts and tunnels were rapidly filled with ground water - the mine literally drowned. This was a huge economic loss for the town, already in one of the poorest regions of Saxony. Mismanagement of the local finances led to further impoverishment. It was one of Goethe's first official tasks to create order here.

For twenty years, between 1776 and 1796, Goethe was actively involved with the legal, financial, and engineering aspects of re-opening and running the Ilmenau mine, 35 miles SE of Weimar. Many years later he would claim that he was encouraged to study Nature in order to *"give practical advice to the Duke in his various ventures"*. But the source of his deep interest in Nature lay much deeper, and his experiences as mine manager had a negligible influence on the development of his geognostic ideas, which were more or less fully formed by the time the mine was officially opened, and only a minor influence on his literary output. Even the figure of the geologist Montanus in Wilhelm Meister's Journeyman Years (first published 1821) is more interested in reading the "script of Nature" than in digging up her treasures.

In Goethe's 'Fairy Tale' of the green snake and the beautiful lily, gold, silver, bronze, and a mysterious mixed metal, as well as precious stones, play important if puzzling roles, but the action which takes place underground takes place in a subterranean temple, rather than a mine.³

The mine was reopened with the sinking of a new shaft in 1784, but the project was doomed to failure from the start. An ill-fated decision, unanticipated volumes of groundwater, and the collapse of an adit eventually led to the mine's closure. Debts had mounted steadily, and shareholders were repeatedly asked to invest more money. In 1796 they decided to cut their losses, and forfeited their shares. With no hope of further investment the venture was wound up. The total yield of copper and silver had been negligible, and the investors lost their money.

¹ <http://www.zeno.org/Literatur/M/Goethe,+Johann+Wolfgang/Briefe/1773>. All translations from German, including Goethe's poems are my own, with the exception of Longfellow's translation of "Wanderer's Nightsong".

² Schist is a common medium-grade metamorphic rock formed from mudstone or shale.

³ https://web.archive.org/web/20070929202046/http://www.newview.org.uk/green_snake.htm
New View, Summer 2003.

Goethe and the Duke of Weimar

Goethe was introduced to Prince Carl August of Saxe-Weimar-Eisenach in Frankfurt in the summer of 1775 in a meeting arranged by Carl Ludwig von Knebel⁴. They immediately became friends, and Carl August spontaneously invited Goethe to visit Weimar where he was soon to become Duke. Goethe arrived in Weimar in November 1775, just a month after Carl August's investiture in October.

He originally intended to stay only a few months, but was persuaded to stay longer, and in fact stayed in Weimar for the rest of his long life. He was given a small house and garden outside town near the Ilm river, and moved in on 21 April 1776. He was appointed to the Duke's privy council on 11 June 1776. The depth of his feelings for the Duke are expressed in a letter to his friends Johann and Charlotte Kestner:

“Dear children. I have so many things from hour to hour that throw me about; recently my own feelings, now, in addition to these, I have to carry and put right the confusions of others. Only this much: I am staying here. I can enjoy my life where I am, as I am, and support and be of service to a most noble person, as circumstances will allow. The Duke, with whom I have now been in close contact for almost 9 months, in the truest and most intimate meeting of souls, has finally bound me to his government, from our love, a marriage has arisen, may God bless it.

He has given me a position and a voice in his privy council, and the title of Privy Councillor, and we are hoping for the best.

*A lot of good dear people are also here, and they are happy for me to stay, although some matters do not really suit me. Addio, hold me dear.”*⁵

Their first task was to improve the Duchy's precarious financial situation. The Duke was keen that this was not to be achieved by more loans and higher taxes, but by promoting and investing in the local economy. Reopening the abandoned copper and silver mine in the impoverished village of Ilmenau appeared to be a good way of doing so.

Goethe's first visit to Ilmenau took place in May 1776, when he had to deal with the aftermath of yet another fire⁶. Goethe was faced not only with the smouldering ruins and ashes of what had been people's homes, but also with the crumbling buildings and decaying infrastructure of the mine, but witnessed first-hand the poverty and feelings of hopelessness amongst the mining families who had remained in Ilmenau after



Goethe's drawing of a derelict surface mine

Fom: Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*

⁴ Carl Ludwig von Knebel (1744-1834) was the tutor of Carl August's younger brother Prince Frederick Constantin.

⁵ Letter to Johann and Charlotte Kestner, Weimar, 9 July 1776. Johann and Charlotte Kestner were the engaged couple with whom Goethe briefly and innocently lived a *ménage à trois*, in Wetzlar, where his father had intended him to start his legal career in 1772. In his 1774 best-selling novel *The Sorrows of Young Werther*, Goethe based the characters of Albert and Lotte, with himself as Werther, on his Wetzlar experience. He altered some of the more obvious references to the couple in the revised 1787 edition.

⁶ The previous fire had been in 1752.

the flooding of 1739. The Seven Years War (1756-1763), and two successive crop failures in 1771 and 1772 had further weakened the resilience of the local population⁷.

Goethe took the hardships suffered by the poverty stricken population very much to heart, and spared no efforts in providing bread “*for the poor moles*” as soon as possible. It also became part of Goethe’s official duties to reform the local tax system, which had fallen into disarray. In this he was successful, and in the following years the district’s finances gradually improved, for example with the establishment of a porcelain factory.

He discussed the project with experienced miners, the so called ‘miners in leather’ (*Bergleute vom Leder*), and those with a professional training in the mining industry, the ‘miners with feather’ (*Bergleute von der Feder*), as well as legal and financial experts. It required seven years of preparatory work to overcome all the legal and financial obstacles before the mine could be re-opened. On 24 February 1784 a new shaft, the *Neue Johannes*, was inaugurated with a festive speech from Goethe. Was it an omen that he, (surely the only time in his life?), was at a loss for words?

After another twelve years of unremitting hard work and setbacks, the roof of an adit⁸ collapsed, water could no longer drain away, and the mine was flooded; this time by water channelled into the mine to drive the machinery. This tragic outcome affected Goethe so deeply that he stayed away from Ilmenau for 17 years.

As a seventy-five-year-old, he took stock of his experiences in and around Ilmenau: “*I came to Weimar highly ignorant in the study of Nature, and only my wish to be able to give practical advice to the Duke in his various ventures, buildings and investments, drove me to study Nature. Ilmenau cost me a great deal of time, effort and money, but I also learned something from it, and acquired a conception of nature, which I would not want to exchange at any price.*”⁹

Planning and Preparation

The years between 1776 and 1786 demanded his full engagement with the project. He took his new responsibilities seriously, and attended to the smallest detail, driven by his social ideals, and his efforts to improve the lot of the poverty stricken villagers he had met on his first visit. Although he wrote to Charlotte von Stein that he was “*living with body and soul in rocks and mountains*”¹⁰, he was mainly involved with clearing historical debts, negotiating legal obstacles, and securing sources of future finance. In all this he was successful, and in 1784 the mine was finally operational, and in good hands, so that the 37 year old Goethe felt able to depart for Italy in September 1786.

⁷ The great European famine 1770/1772. <https://en.wikipedia.org/wiki/Famine#Europe>.

⁸ An adit is an almost horizontal tunnel into an underground mine, by which the mine can be entered, drained of water, ventilated, and minerals extracted at the lowest convenient level.

⁹ In a conversation with Chancellor Friedrich von Müller on 16 March 1824. Quoted in: Manfred Wenzel (1987) *Der Ilmenauer Bergbau und sein Einfluß auf Goethe als Dichter und Naturforscher*, Medizinhistorisches Journal 22,1 pp 3-27. Also at <http://www.zeno.org/Literatur/M/Goethe,+Johann+Wolfgang/Gespr%C3%A4che/%5BZu+den+Gespr%C3%A4chen%5D/1824>.

¹⁰ Letter to Charlotte von Stein, 8 September 1780. Charlotte von Stein was lady-in-waiting to the dowager Duchess Amelia (Carl August’s mother). For many years she was a close friend and intimate confidante of Goethe, and had a profound effect on his life and work. She was born on Christmas Day 1742, and died on Epiphany Day 1827. For more about Charlotte von Stein see my essay ‘*Goethe Climbs a Mountain*’.

On 13 February 1776 Carl August informed Weimar's privy council of his intention to reopen the mine. On the same day he asked mine inspector Friedrich von Trebra (see box), based at the time in Marienberg in the Ore Mountains (*Erzgebirge*), to prepare an assessment of the likelihood of success in such an undertaking. This assessment was based entirely on historical records, as the underground works (*Unter Tage*) were no longer accessible. Von Trebra reported on 6 May that in his opinion '*supported by good reasons*' the project would be worth while attempting.

On 3 May 1776 Goethe rode to Ilmenau for the first time, accompanied by one of the Duke's cavalymen. His task was to report on a fire which had swept through the town the previous day. In his letter to the Duke the following day he wrote that the fire had already been extinguished when he arrived, and that the damage was limited. He listed possible causes, including the devil, witches, and arson; all the "*usual rumours*". Goethe used the opportunity to take a first look at the abandoned mine, and visited a nearby coal mine still in operation. In his letter he wrote that he had "*sadly seen the old smelters. But the scenery is glorious, glorious!*"

In July Carl August gathered a committee of experts in Ilmenau for discussions on the best (and least expensive) approach to reopening the mine. The committee consisted of:

- Friedrich Wilhelm Heinrich von Trebra (1740-1819), graduate of the Freiberg Mining Academy, and supervisor of mines for the Bureau of Mines at Freiberg.
- Johann Friedrich Mende (1743-1798), chief mining engineer (*Kunstmeister*) in neighbouring Saxony.
- Johann Gottfried Schreiber (1746-1827), graduated from the Freiberg Mining Academy in 1773, appointed mine surveyor and supervisor in 1776. He moved to France in 1777, initially to Chalanches in the French Alps, to bring order to the recently discovered silver mines there, later to Moutier, where he became director of the Mont Blanc mining academy, the first such institution in France.

The Duke was accompanied by his councillors and advisors, which included Goethe, who wrote to his friend Merck on arrival: "*We've arrived, and we'll see whether we can get the old mine going again. You can imagine how I'm drawing my way through the Thuringian forest. The Duke is after deer, I'm after landscapes, and even on the hunt I take my portfolio along.*"¹¹ It appears that besides the discussions which took place about the derelict mine, both had other interests in mind as well.

The young Duke was a passionate hunter, and would often spend days away from his official duties with likeminded friends, his dogs and his horses. Goethe had no interest in this. His interest lay in improving his drawing skills. He made many drawings and sketches, including the abandoned pithead of the *Duke Wilhelm Ernst* shaft and the dilapidated remains of a surface mine with its hand winch bridges.

The still accessible *Getreuer Friedrich* shaft was inspected, and a tour of nearby coal mines was arranged. Goethe studied the historical records, and brushed up on his "*Chymie*" (chemistry). Because a considerable section of the copper bearing seam had been largely exhausted, von Trebra recommended digging a new shaft between Ilmenau and Roda near the Sturmheide. This was accepted, optimism carried the day, and the decision was made to reopen the mine. Later von Trebra would write: '*We*

¹¹ Letter to Johann Heinrich Merck, 24 July 1776. Merck (1741-1791) was a German writer and critic, and co-founder in 1772 of the periodical "Frankfurter Gelehrte Anzeigen", in which some of Goethe's earliest pieces were published. They became lifelong friends, and wrote each other often about a variety of subjects. Merck was especially interested in fossils. Several failed business ventures and misguided speculation, as well as the death of all five of his daughters, led him to take his life in June 1791.

*believed that the riches the mine would provide were as certain as the ducats the father must provide when the son is a student; and we were mining students.*¹²

The discussions with von Trebra made such a strong impression on young Johann Voigt¹³ that he decided there and then to choose mining as a career. He later recalled: *'I was so impressed by the way he approached geology, that it was not difficult for me to make the decision to dedicate myself fully to this [career], and to return immediately to Freiberg with him.'*¹⁴

Friedrich Wilhelm Heinrich von Trebra (1740-1819)

One consequence of the need to rebuild the economy of Germany after the Seven Years War (1756 - 1763) had been the establishment of the Freiberg Mining Academy in Saxony in 1765. It was given the task of educating not only professional geologists, but also the engineers and chemists needed to manage the machinery, and to refine the extracted ores. The committee of experts summoned to Ilmenau in 1776 were all graduates of the Freiberg Academy.

Von Trebra grew up in a mining family in Saxony. He initially studied law, philosophy, mathematics, and natural science at the University of Jena, but his practical abilities and inclination towards geology and engineering drew him to the newly founded academy in his native Saxony. In 1766 he was the first student to graduate from the Freiberg Academy.

His first position was as assessor for the Bureau of Mines (*Oberbergamt*) at Freiberg. He rapidly acquired considerable technical knowledge and his practical abilities resulted in his appointment as inspector of mines at Marienberg in Saxony in 1767. He introduced many technical improvements and brought the mining industry in the region to a new level of prosperity. He was strict in enforcing the regulations, and infractions were harshly punished.

In recognition of his services Trebra was named Commissioner of Mines (*Kommissionsrat*) in 1770 and, in 1773, assistant supervisor of mines for the Bureau of Mines at Freiberg. In 1776 the Duke of Weimar commissioned him to conduct a study of the underlying copper-bearing schist near Ilmenau. The committee of experts summoned to Ilmenau in 1776, was headed by Trebra. There he met Goethe, who was soon to take charge of the Ilmenau mines. They remained good friends for over forty years.

In 1779 Trebra became an inspector of mines for the government of Hannover, working for more than a decade at Zellerfeld in the Harz Mountains. Here he took the lead in successfully developing the metal-mining industry of the Upper Harz region. His tireless efforts to increase the productivity of the mines under his jurisdiction finally led to his appointment, in 1791, as royal supervisor of mines for Electoral Brunswick-Lüneburg in the mining city of Clausthal.

Trebra resigned his post as inspector of mines in 1795 and retired to his estate, Bretleben, on the Unstrut River. There he devoted himself to breeding sheep, growing hemp, operating a distillery, and producing saltpeter and starch. This retirement was regretted by many, not least by Goethe, but it did not last long.

In 1801 he accepted an offer from the government of Saxony of a post as chief mining inspector and director of the *Oberbergamt* of Freiberg, thereby becoming head of the Saxon mining industry. He stayed in this post until his death in 1819. He was highly effective in this capacity; and in recognition of his outstanding accomplishments, he was appointed a commander of the Royal Order of the Saxon Civil Service.

Goethe was keen to learn all aspects of his new profession. He took his first geology lessons from Schreiber, and in August he learned how to carry out a silver assay¹⁵ (*Silberprobe*) from the gold and silver smith G. M. Häcker. His earlier alchemical studies came in useful, and it took him only a few days to master the process.

¹² Quoted in Max Semper (1914) *Die geologischen Studien Goethes*, p.26.

¹³ Johann Carl Wilhelm Voigt (1752-1821) was the younger brother of Privy Councillor Christian Gottlob Voigt (1743-1819) who was a member of the Duke's entourage that day.

¹⁴ Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, Nationale Forschungs- und Gedenkstätten der klassischen Deutschen Literatur in Weimar, p.43.

¹⁵ The testing of a metal or ore to determine its ingredients and quality, in this case the separation of silver and copper by means of lead.

Together with the Duke he thoroughly explored the Thuringian forests around Ilmenau, finally returning to Weimar on 14 August. He wrote to his friend Herder, who was preparing to move his family to Weimar, and for whom Goethe was arranging accommodation.

*“Dear brother, we are in Ilmenau. For three weeks we have been living in the Thuringian forest, and I am living my life in crevasses, caves, and forests, in ponds, under waterfalls, and underground, browsing contentedly in God's world. The question of your coming is settled. Don't worry brother, all according to your convenience; in the meantime the smell of the oil paint in your house will be gone. And we're all right, too, kept busy by all manner of work. We'll meet again, new and whole.”*¹⁶

The Weimar Mining Commission was established on 18 February 1777. Its founding members were, in addition to Goethe:

- Johann August Alexander von Kalb (1747-1814), who served as director until 1780.
- Privy Councillor Johann Ludwig Eckardt (1732-1800) who served until 1783.

On 18 April 1780 Goethe took over the directorship from von Kalb who had resigned. He was now responsible for all mining operations in the Duchy.

Privy Councillor Christian Gottlob Voigt (1743-1819) was appointed a member of the Commission in 1783, after Eckhardt had resigned. He served until the Commission was liquidated in 1813.

His younger brother, Mining Inspector Johann Carl Wilhelm Voigt, joined the Commission as secretary in 1783, and also served until its liquidation. He moved to Ilmenau in 1789. Goethe was instrumental in persuading the Duke to make these appointments:

*“Most serene highness, etc. etc.,
Your most royal serenity will undoubtedly have the grace, after the retirement of Privy Councillor Eckhardt from the Mining Commission, to fill his position with another member, for which we without prejudice propose Councillor Voigt.
May your serenity allow me this opportunity to make another subservient submission. Joh. Carl Wilhelm Voigt the younger, after he by the grace of your serenity attended the Freiberg Academy, and studied the geology of both the Saxon and the Harz mountains, and has thereby been able to extend his knowledge, has so far eagerly desired to serve your serenity in one way or another. Perhaps your grace would not be reluctant to have him appointed to the Mining Commission as secretary.
It is true that the work required in this capacity will not fully occupy him, but not only will the hoped for activities around the Ilmenau mine increase the work needing to be done soon, but he will thereby also be able to further qualify himself, and perform useful services for your serenity in these and perhaps other areas of expertise. His skills and his good will deserve the highest testimony. Should your grace condescend to give this matter some consideration, the most gracious orders to be issued upon this matter will be followed with complete reverence for our duties, with which we sign.
Your honour etc. etc. Commissioner. Weimar 29 Aug. 83.”*¹⁷

In November 1777 Goethe took a break from his responsibilities in Weimar, and spent two weeks exploring the Harz mountains on horseback. There were several reasons for this difficult winter journey. The official reason was to increase his understanding

¹⁶ Letter to Herder (1744-1803), Ilmenau, 9 August 1776. Goethe had met Herder during his student days in Strasbourg, and was instrumental in having him appointed as General Superintendent of the Lutheran church in Weimar, a position he took up in the autumn of 1776.

¹⁷ Letter to Duke Carl August, Weimar 29 August 1783.

of the mining industry in the Harz region. He therefore included a visit to Friedrich Trebra, who had relocated to Zellerfeld, and toured with him the mines at Goslar and Clausthal, as well as the smelting works at Andreasberg. The other was to climb the Brocken, the highest peak in the Harz region¹⁸.

In June 1781, a meeting of the representatives of the courts of Weimar, Gotha, Weimar-Eisenach and Saxony took place to discuss and clarify the legal questions related to the re-opening of the mine. Goethe presented a detailed report of the history of the local mining industry. He suggested that the periods of inactivity resulted not from unfavourable geological conditions, but from “*external circumstances*”, which included financial mismanagement, profiteering, and sheer incompetence. The mine’s recent history was a result of a “*most unfortunate combination of circumstances*”, which led to an “*irresolvable confusion*”¹⁹. Goethe had by this time familiarised himself with the local geology, and included in his presentation a short description of the geology around Ilmenau.

Ilmenau



Ilmenau in the time of Goethe. By Georg Melchior Kraus, 1776 (Detail)

<http://www.goethezeitportal.de/wissen/topographische-ansichten/orte-und-zeiten-in-goethes-leben-ilmenau.html>

Between 1776 and 1796 Goethe visited Ilmenau on 28 occasions, usually on official duties, but also to find peace and relaxation. During such times he drew, pursued his geognostic studies, wrote poetry and love letters. At the first signs of spring in 1776 he was “*looking around*” Thuringia, and wrote to his friend Merck that he was already familiar with a “*considerable patch*”²⁰.

Having left behind the bustling city life of Frankfurt, he was inspired by the remoteness and natural beauty of the forests surrounding Ilmenau. His growing feelings for Charlotte von Stein found sustenance along its streams and glens. The unspoilt landscape inspired



Mists rising from the valleys near Ilmenau.

Wikimedia commons

¹⁸ See my essay *Goethe Climbs a Mountain*.

¹⁹ Quoted in an article by William H. Carter (2014) in ‘Monatshefte’, 106,4 p. 569.
https://www.jstor.org/stable/24549968?read-now=1&seq=20#page_scan_tab_contents
See also Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.38.

²⁰ Letter to Merck, 8 March 1776.

him to record what he saw in numerous drawings and sketches, many of them dedicated to her. The three drawings below are from <http://www.goethezeitportal.de/wissen/topographische-ansichten/orte-und-zeiten-in-goethes-leben-ilmenau.html>

And so, during the weeks he spent in discussions with the committee of experts in July and August 1776, he had a great deal more on his mind. Goethe was deeply in love, and found time to express his feeling in words and in sketches.

“I started to draw something on the other side [of this sheet], but couldn’t get anywhere, and so I would rather write in the cave under the Hermannstein, my favourite place, where I would like to live and abide. . . It’s raining, and I’m sitting behind a shelter of fir branches. Waiting for the Duke who will also bring a gun for me. All the valleys are steaming up against the spruce trees. (NB. I drew this for you.) In the cave under the Hermannstein. July 22, 1776.”



The Hermannstein cave
Goethe drawing July 1776

The cave at Hermannstein, a porphyry rock on the north-western slope of the Kickelhahn²¹, became a symbol of the joys of his newfound love. He spent many hours there; drawing, and reflecting on his good fortune. It was important for him to be able to share this place with Charlotte not only on paper, but also in reality: *“I opened your note with trembling hand, full of joy that you are nearby again. I thought you were in Weimar. Dearest lady we are still in Ilmenau; just come. You have been near me a hundred thousand times. I have been drawing only for you; not much, but my heart is in it.*



Exit point of the Kammerberg adit near Ilmenau.

Goethe drawing July 1776

Adieu Angel, I’m going to Stützerbach to finish a drawing for you. Love, you’ll give me a new life if you will come again. I can’t tell you anything. The Duke will be delighted. Addio. 2 Aug. 1776.”

On 6 August Charlotte came to see him, and they spent the day exploring the Hermannstein cave, highly unusual behaviour for an aristocratic lady of the court,

and married to the Duke’s equerry at that.

Two days later he wrote to her: *“Your presence has had a strange effect on my heart; I cannot say how I feel. I feel well, but so dreamy. I was unable to draw yesterday. . . Today I want to go to the Hermannstein, and draw the cave if possible. I also have hammer and chisel to write the inscription.²² I have received your note. I swear to you that I do not know how*



Abandoned pithead.

Goethe drawing July 1776

²¹ A prominent local hill near Ilmenau.

²² Goethe chiselled a big S in the rock face of the cave.

I feel. When I think that you were with me in my cave; that I held your hand as you bent down and wrote a sign in the dust!!! It's like being in the spirit world. A feeling without feeling."²³

He made no secret of his feelings for Charlotte von Stein, as he made clear in the letter to Herder quoted above: *"I have again the angel Stein, she went via Meiningen and Ilmenau back to Weimar. For a whole day my eyes did not leave hers, and my cryptically closed heart has thawed. Adieu. Greet your wife and stay dear. 9 Aug. 1776."*

But he did more than draw and write love letters. On March 19, 1779, Goethe wrote the fourth act of the prose version of *Iphigenia* in the hut on the Schwalbenstein, and on 6 September of the following year, he was inspired to carve the beautifully simple "*Wanderer's Nightsong*", possibly the most famous short poem in the German language, into the boards of the hunting hut on the Kickelhahn, where, according to a letter to Charlotte von Stein, he had spent the night. The translation is by Longfellow.

Even though he had no interest in boar hunting, the forests and mountains of Ilmenau provided Goethe with unlimited opportunities for other youthful escapades with the young Duke and his entourage, especially in the nearby village of Stützerbach, which was the scene of some extra-ordinary youthful drunkenness. On occasion the proprietor of the local trading post watched in dismay as his barrels of pork and beer were rolled down the hillside. Needless to say, the damage was made good from the Duchy's perpetually depleted coffers.

Wanderer's Nightsong

*O'er all the hilltops
Is quiet now,
In all the treetops
Hearest thou
Hardly a breath;
The birds are asleep in the
trees:
Wait, soon like these
Thou too shalt rest.*

Goethe later recalled to Eckermann²⁴: *"We were often close to breaking our necks; extreme hunting over hedges, across ditches, and through rivers, uphill and downhill, exhausting ourselves for days on end, and then camping under the stars. That was what he enjoyed."*

Goethe was very much aware that as tutor to the young Duke he was primarily responsible for the moral development of his princely friend, but he was only able to achieve this when he had brought order into his own life. The numerous administrative, economic, and legal issues which had to be resolved before the mine could begin production helped him focus his mind and concentrate on his responsibilities. His social ideals, which included providing work and bread for the "*poor moles*" in Ilmenau, as well as the support of Charlotte von Stein, were crucial in tempering Goethe's wilder side.

In a short poem written in 1776 he sums up his situation. Originally entitled "*Einschränkung*" (*Restriction*), later published as "*Dem Schicksal*" (*To destiny*) the poem describes his struggle to find himself in a society to which he felt no allegiance, held only by a bond of friendship to a person whose main interests at the time held no attractions for him.

Einschränkung

*Ich weiß nicht, was mir hier gefällt,
In dieser engen, kleinen Welt
Mit holdem Zauberband mich hält?
Vergeß' ich doch, vergeß' ich gern,
Wie seltsam mich das Schicksal leitet;
Und ach, ich fühle, nah und fern
Ist mir noch manches zubereitet.
O wäre doch das rechte Maß getroffen!
Was bleibt mir nun, als, eingehüllt,
Von holder Lebenskraft erfüllt,
In stiller Gegenwart die Zukunft zu
erhoffen!*

*"I do not know what pleases here;
What holds me in this small and narrow land*

²³ Letter to Charlotte von Stein, 8 August 1776.

²⁴ Conversations with Eckermann, 23 Oct 1828.

*With sweet enchanted band?
I do forget, and do so readily,
How fate does guide me in strange ways.
Alas, I feel that far and near
Much has been prepared for me.
Oh, if only the right measure could be struck!
What remains for me now, as, enclosed,
But filled with sweet life's forces,
To hope for the future in the quiet present!"*

The Geology of Ilmenau

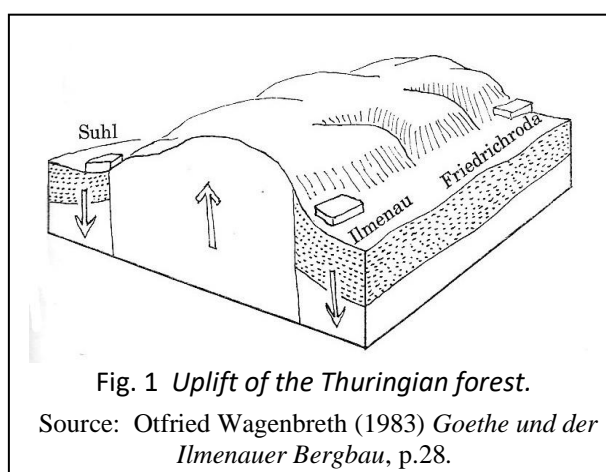
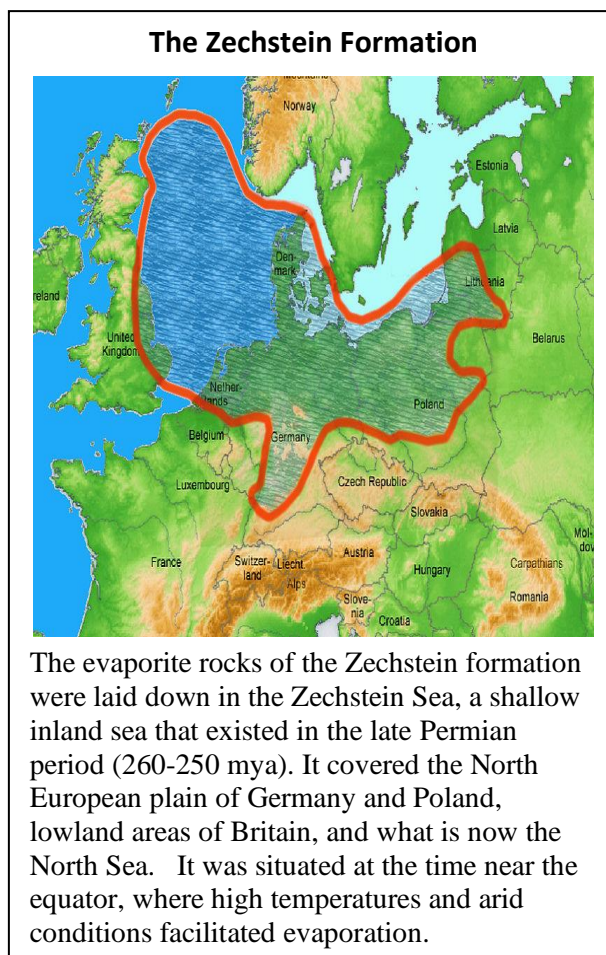
Much of Europe North of the Alps is underlain by thick beds of red sedimentary sandstone given the name *Rotliegend* ('red-lying' in German). They were deposited by wind in a warm dry climate 250 to 300 mya (million years ago)²⁵.

Above the *Rotliegend* lies the Zechstein formation, a water-soluble mineral sediment resulting from concentration and crystallization by evaporation in a shallow inland sea. The Zechstein formation is an 'evaporite' (no surprises here), in this case consisting of limestone and gypsum.

Between the *Rotliegend* and the Zechstein formation is a thin layer of sedimentary shale, which has metamorphosed into slate or schist, known as *Kupferschiefer* (copper schist) for its high copper content.

As originally laid down, this layer is high in sulphur compounds that are typical of silt deposited in stagnant shallow marshland. Where faults have allowed mineral-rich groundwater to circulate through this layer, the sulphur has oxidized metal ions to metallic sulphide ores. From the Middle Ages into the modern era, this thin but widely dispersed ore bearing lode has been of immense importance as a source of copper, silver, lead and zinc across much of northern Europe.

The ore content of the copper schist is variable, reaching 5% in the best regions. The copper schist around Ilmenau was initially barren (ore free). The fact that a profitable mining industry was able to develop around Ilmenau since the 15th



²⁵ The scientific notation used by geologists for geological time is Ma (Mega annum = one million years); mya (million years ago) reads easier, and will be used in this essay.

Century is a result of subsequent geological events on the edge of what is now the Thuringian forest. Between 100 and 30 mya a wedge of earth's crust was uplifted, in places by as much as 1000 meters. (See Figure 1.) Along the edge of this uplifted crust (geologically speaking, the fault zone) the Zechstein strata were dragged up, and placed at a steep angle. (See Figure 2.) This tectonic movement, acting over millions of years, produced unimaginable frictional forces, which cracked and fissured the rocks. This allowed ground water to circulate more freely than in the unaffected rocks nearby.

Groundwaters circulating deep underground reach temperatures as high as 300°C, high enough to dissolve metals and other minerals from the red sandstone lower down, and concentrating them in the copper schist where lower pressures and the higher porosity provided ideal conditions for their deposition. In this way the steeply inclined copper schist strata came to carry the highest proportions of metal ore.

Around Ilmenau the Zechstein formation includes a layer of dolomite (Calcium magnesium carbonate) above the limestone (Calcium carbonate) and gypsum (Calcium sulphate), See Figure 2.

It is an irony of fate that the tectonic upheavals which Goethe refused to recognise towards the end of his geognostic life were the very forces which brought about the copper and silver deposits around Ilmenau, which he sought to exploit at its beginning.

Above the dolomite lies the *Buntsandstein* a sequence of coloured sandstones laid down during the Lower Triassic period

(250 to 245 mya), and found below the surface of large regions in Europe. This is followed by *Muschelkalk*, a sequence of shell-bearing limestone and dolomite beds of the Middle Triassic Period (245 to 230 mya), and *Keuper* beds, rock strata consisting of dolomite, shales, and evaporites laid down 230 to 200 mya.

Goethe begins his Geognostic Studies

Goethe returned from his second Swiss journey in January 1780. He brought back a large number of rocks and minerals, the start of what would become a collection of more than 9000 specimens²⁶. not counting the thousands he gave away over the years to friends and natural history collections. He did not hesitate to ask his friends to collect for him. Here is a letter to Sophie von La Roche, a friend from his Frankfurt days.

“It has just occurred to me that you might be able to feed one of my favourite inclinations if you would be so kind. Since my involvement with the mine in Saxony I have dedicated myself body and soul to mineralogy. If you could by means of some happy-to-serve spirit, of which there are legion at your merest nod, bring something

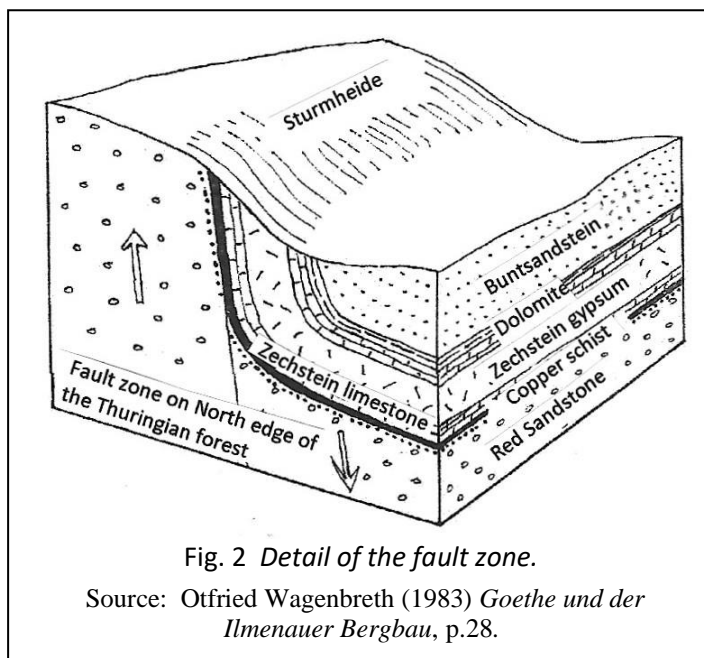


Fig. 2 Detail of the fault zone.

Source: Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.28.

²⁶ Today kept in the Goethe museum in Weimar.

together from your part of the country, or elsewhere, you would prepare a feast for me. Since I do not demand bread, but only ore and rocks, it should be possible. Addio!"²⁷

In 1780 Johann Voigt completed his studies at the Freiberg Academy. The mine had not yet reopened, and Goethe decided to make use of his expertise by commissioning him with a detailed geological survey of the Duchy, and beyond. He was instructed to identify the different rock formations, their elevation, and "*the order in which they follow each other*". He was to make notes of the strata containing fossils, paying particular attention to "*Bufonites*" (recognised today as shark teeth). In addition, he was to be on the lookout for formations where rocks could be quarried for building and road works.

Voigt was happy to oblige. Geology as a science was in its infancy, and he was keen to break new ground. He brought back countless specimens, which Goethe added to his rapidly growing collection. Goethe found it hard to learn from books, but he learned a great deal from Voigt's professional expertise, especially from his descriptions and classification of the rocks and minerals in the collection. Voigt's careful and thorough observations during this summer would later lead to a sharp difference of opinion with Abraham Gottlob Werner, his teacher at the Freiberg Academy²⁸.

Goethe also made use of the work of Georg Füchsel²⁹, a native of Ilmenau, who in 1761 had published a geognostic history of the earth in Latin, (*Historia terrae et maris*) based on his observations in Thuringia. He realised that sedimentary rock formations consisted of layers (strata) which had been laid down over long periods of time. '*In the formation of deposits, Nature must have followed present-day laws. Every deposit forms one stratum, and a series of strata of the same composition represents a formation or an epoch in the history of the globe.*'³⁰ The strata were laid down under changing conditions, and could be identified by their minerals, and the fossils they contained. He identified 13 stages of deposition (one of which was the *Muschelkalk* mentioned earlier) which he called 'Timelines' (*Zeitläufe*).

The 1780 Geognostic Expedition

In September 1780 Goethe, together with the Duke and several officials, were in Ilmenau as members of the Duchy's circuit court. There were robbers and 'fences' (dealers in stolen goods), and even a murder case, to be brought to trial. Finding time between the formal proceedings, Goethe together with Johann Voigt, Carl August, Josias von Stein (the Duke's equerry), and George Batty³¹, undertook fact-finding

²⁷ Letter to Sophie von la Roche, 1 September 1780. Von La Roche (1730-1807) was a writer, and later became the grandmother of Bettina von Arnim.

²⁸ See my essay, *Goethe and Basalt*.

²⁹ Georg Christian Füchsel (1722-1773) was a physician, geologist, and originator of the concept of stratigraphic formations. His stratigraphic map of Thuringia, published in 1762, was the first of its kind, predating by more than 50 years the first stratigraphic map of Britain, prepared by William Smith in 1815. His idea that geological processes required long periods of time, was so radical that no-one was able, or dared, to take it further, until in 1785 the Scottish geologist James Hutton in published his ideas on what today is called 'deep time'.

³⁰ Quoted in Gabriel Gohau (1990) *A History of Geology*, p.102.

³¹ George Batty, originally from Yorkshire, was an agricultural engineer based in Eisenach. He had successfully carried out agrarian reforms in Hesse-Darmstadt, and Goethe, who was on the lookout for a qualified person to improve agricultural methods as part of the agrarian reforms instigated by Carl August, put forward his name at the suggestion of his friend Merck. Batty was appointed Commissioner and Inspector of Crown lands in June 1779. Both Goethe and Carl August were impressed with his reliability and sturdy character, and he remained in Weimar until the end of his life.

excursions of Ilmenau and the Weimar Oberland. The purpose of these excursions was not only to discover more about local geology and the mining industry, but also to find ways of making better economic use of the forests, the fields, and the land under cultivation - better drainage was an urgent need. Goethe, still very much in love, arrived in Ilmenau before the others, and went out on his own to visit again his favourite retreat.

That evening he wrote to Charlotte von Stein: *“My best, I went into the Hermannstein cave, to the place where you were with me, and kissed and kissed again the S, which is as fresh as if it had been carved yesterday, so that the porphyry breathed out its earthy perfume. . . After 8 – I was half asleep when provisions from Ilmenau arrived, also the wine from Weimar, but no letter from you. . . .”*³²

On 7 September, the party toured silver and copper mines, and ascended the 800 meter high Schneekopf. He wrote to Charlotte von Stein at home in Weimar:

“Ilmenau 7 September, evening. My excursion has been successful, and I’m sitting here resting, while you are surrounded by a swarm of people, and illuminations have been prepared. We have ascended the high peaks and crawled into the depths of the earth, and would have dearly wished to discover traces of the Almighty’s forming hand. One day there certainly will appear a person able to see it all clearly. We want to prepare the ground for him. We have discovered quite beautiful and important matters, which give the soul a boost and expand it in truth. If only we could soon give the poor moles from here employment and bread. The view from the Schneekopf is very beautiful. Good night. I am tired.”

The following day he wrote about the local people he had interviewed during the court proceedings: *“People are oppressed by the curse that should have fallen on the serpent; they crawl on their bellies and eat dust.”*

Goethe found the emotional demands of his work difficult, and that evening he regained his composure by allowing the poet in him to speak:

“I would like you to hear something human, and am tempted to fill the page with translations from the Greek. But first I owe Lingen a word, and will probably be able to put something together before bedtime.”

He read as *“cleansing and purification”* the ‘Golden Verses’ of Pythagoras, and translated a short passage from the original Greek into German hexameters, which he considered *“unmelodic and inexpressive”*, but which he wanted to send her *“at least through my mouth and pen.”*

“And when you have done it,

Porphyry

Porphyry (from the Greek for *purple*) was Goethe’s favourite rock. It is a volcanic rock containing crystals of feldspar embedded in a compact dark red or purple groundmass. Rocks with a porphyry structure are formed in two stages. First magma slowly cools in the earth's interior. In the depths, large crystals form which float in the melt. If the magma then rises quickly as in a volcanic eruption, the remaining liquid magma cools down very quickly and crystallizes, producing numerous microscopic crystals, the matrix or groundmass. The faster the cooling takes place, the finer the structure of the matrix. The large crystals, which are clearly visible to the naked eye, are called phenocrysts. They usually have a size between a few millimeters and several centimeters.



³² Letter to Charlotte von Stein, Ilmenau, 6 September 1780.

*You will realise the unalterable being of gods and men,
Within which all things move, by which all is bounded;
You will quietly see Nature, unchanging in all things,
Will hope for nothing impossible, and yet play your part in life.”*

Refreshed in spirit, he ended his letter by writing about the progress he has made in his geognostic work. His enthusiasm was obvious, but it would be another four years before he began to tentatively put his ideas in writing.

“I am living with body and soul in rocks and mountains, and am very happy about the broad insights which I have gained. We have covered a lot of ground during the past few days, and have been able to come to a number of conclusions. My new perspective on the world is incredibly exciting. Tomorrow morning we will continue from here.”

The following day was another difficult one. Goethe was depressed by the conditions of extreme poverty with which he came face to face in the village tribunals, and the afflictions driving people, helpless in their extreme need, to violent and brutal acts.

On 11 September the geognostic party visited an iron mine, and Goethe reported to Charlotte von Stein: *“.. we have been hammering on all the rocks. Stein is as delighted by oxen, as we are by granite. The Duke doesn't seem to care for either; on the other hand, the sight of so many rifles in the factory perked him up again. I have used every free moment of the day devising a scene for a new tragedy. . . We have been in the Stahlberg near Schmalkalden, and have made an abundance of observations. You still have to become an earth friend; it's all too beautiful.”*³³

In his daily letters to Charlotte von Stein he also noted the improvements in drainage and irrigation which Batty had instigated. *“Yesterday we saw the meadow improvements which Batty has made in three villages. He works hard, and will achieve a lot more before winter. The beautiful weather has suddenly become overcast, the mountains are covered in mist and clouds, and it's not pleasant anymore. My nature closes like a flower when the sun turns away.”*³⁴

Reports to Johann Merck and Duke Ernst II of Saxe-Gotha

The day after his return to Weimar Goethe wrote a long letter to Merck³⁵, the final section of which is a good summary of the progress in his geognostic explorations. Without pretending to understand how things came to be the way they are, he now had a clear idea of how rock strata lie one on top of the other. He had advanced far

The Golden Verses of Pythagoras

‘When you have made this habit familiar to you,
You will know the constitution of the Immortal
Gods and of men.
Even how far the different beings extend, and
what contains and binds them together.
You shall likewise know that according to Law,
the nature of this universe is in all things alike,
So that you shall not hope what you ought not to
hope; and nothing in this world shall be hidden
from you.’

https://en.wikipedia.org/wiki/Golden_Verses

Goethe's German translation reads:

*“Und wenn du's vollbracht hast,
Wirst du erkennen der Götter und Menschen
unänderlich Wesen
Drinne sich alles bewegt und davon alles
umgränzt ist,
Stille schau die Natur sich gleich in allem und
allem
Nichts unmögliches hoffen, und doch dem
Leben genug seyn.”*

³³ Letter to Charlotte von Stein, Schmalkalden, 11 September 1780.

³⁴ Letter to Charlotte von Stein, Ostheim, 18 September 1780.

³⁵ Letter to Johann Heinrich Merck, 11 Oct. 1780.

enough that he felt able to offer Merck a short article for publication in the *Frankfurter Gelehrte Anzeigen* (Frankfurt's scholarly announcements).

“Now I have to give you some news about my mineralogical investigations. I have surrendered myself, since my position entitles me to do so, to these sciences with a complete passion, and as you already know their appeal, I have great pleasure therein.

“A young person [Johann Voigt] who has studied at the Freiberg Academy and has brought with him an extraordinarily clear nomenclature, and a wide-ranging knowledge of the details, is of the greatest benefit to me. For this is exactly my weak point. I haven't been able to identify the names of individual specimens, which are usually so confusing, nor certain other concepts. (NB. The Freiberg Academy really deserves a lot of praise.) And so I have been letting this person travel the country for about half a year, as I will have written to you, and do not crudely limit myself to the letter of the law, as the Kursachseners do,³⁶ as to whether this or that mountain belongs to the Duke of Weimar or not. I think the mineralogist should be like a deer that browses regardless of territory.

“And so I pursued my brief explorations and [Voigt's] assignments from the summit of the Inselberg, the heights of the Thuringian Forest, into the regions of Würzburg, Fulda, Hessen, Kursachsen, beyond the [River] Saale as far as Saalfeld and Coburg. I have collected most of the rocks and minerals in these regions, and discovered that, to my way of seeing, the tiny bit of metal which lures toiling men into the depths, is always of the least importance. By means of all this, as well as by the bits and pieces of some of my predecessors, I am in a position to offer a short essay, which is certain to be interesting. I now have the most general ideas and certainly a clear concept of how the strata are arranged and lie on each other, without pretending to be able to explain how it has come to be this way.

“Now that I've read the miles of geological pages in our regions, and because I can't learn anything from books, I am only now starting to study and make use of the experiences of others. This field, as I am only now becoming aware, has only recently begun to be cultivated with great diligence, and I am convinced that with so much endeavour and assistance, a single great individual able to encompass the world on foot or in spirit would recognize and describe this uniquely assembled globe once and for all. Buffon³⁷ may already have done this in the highest sense, which is why the French, the German-French and the Germans say that he has written a novel, which is very well said, because the respectable public knows everything extraordinary only through the novel.”

“Have you read de Saussure's³⁸ ‘Voyage dans les Alpes’? The small section which I have been able to read gives me a lot of affection and confidence in this man. I intend, when I

³⁶ Kursachsen is the neighbouring Electorate of Saxony.

³⁷ Georges-Louis Leclerc, Comte de Buffon (1707-1788) was a French natural scientist and mathematician. In *Les époques de la nature* (1778) Buffon discussed the origins of the solar system, speculating that the planets had been created by the collision of a comet with the sun. He estimated the age of the earth to be 75,000 years, which he divided into seven evolutionary epochs (which he called revolutions). The book won wide acclaim, but his speculations were so revolutionary that it was referred to as a novel (*Roman*), i.e. a work of fiction, by Johann George Adam Forster (1754-1794) natural scientist and travel writer, who commented in a letter to a colleague ‘You will without doubt have read that wonderful novel, Buffon's ‘Epochs of Nature’. It is indeed contagious, when one reads a well written book, even if it only contains sweet dreams. . .’ Quoted in Wolf von Engelhardt (2003) *Goethe im Gespräch mit der Erde*, p.66.

³⁸ Horace Bénédict de Saussure (1740-1799) was a Genevan geologist, meteorologist, and Alpine explorer. *Voyages dans les Alpes* (published in 1779) is a compilation of the experiences, experiments, and observations he made in the Swiss Alps. Goethe had met him in November 1779 while on his second Swiss journey.

have finished the book, to ask him, or another Genevan I know, for specimens of the rocks he describes. It is the only way to come to an understanding. I don't know how it is with you, but you can see that I am serious. If you are willing and able to collect for me specimens of this kind, you would make me very happy. NB. We have discovered quite undisputed volcanoes, an enormous crater, ash, crystals of tourmaline, lava glass [obsidian], lava, taras stone, and all manner of basalt, not laboriously collected over a large area, but everything in close proximity of each other, and plainly visible.

“Add to this what we know from Kassel and Frankfurt, and all this is now exercising my mind. I would be very happy if you wanted to contribute something from your side, if need be only through Hesse. I wanted to tell him my thoughts about what I wish to have investigated, and whoever wants to help me from his region will receive in exchange a complete ore and mineral collection from here, with a few words to make the sequence clear.”

He wrote a similar long and detailed letter to Duke Ernst II of Saxe-Gotha, with whom he was on friendly terms and who shared his scientific interests. This letter gives an important clue to Goethe's approach to geognosy, in that he compared concepts derived from observation to concepts derived from scientific theories. An enthusiastic Goethe described Johann Voigt's approach to geognosy like this: *“Neither fables nor ancient tales, neither doctrines nor opinions, keep him from looking (schauen). He carefully separates what he sees from what he expects or concludes. Every correctly recorded observation is invaluable for those who follow, in that it gives them concepts derived from observation (anschauende Begriffe), increases the sum of his own experiences, and finally combines as it were [the opinions of] several people into a unified whole.”*

He hopes that the graduation of more and more students from the Freiberg Academy will overcome the confusion caused by the lack of a consistent terminology, and then adds *“one more thing. In this matter, as in a thousand similar ones, concepts derived from observation are infinitely preferable to scientific concepts. When I stand on, in front of, or inside a mountain, observe its shape, nature, the thickness of its layers and crevices, and call to mind the component parts and arrangements in their natural formation and position, in a living way, as it were, I feel with a living observation (Lebhaften Anschauen) a dim suggestion in the soul, thus has it come about! Yet how little of all this can I send you with broken off specimens, or, on the other hand, with generalized cross-sections.”*³⁹

He enclosed with the letter a cross section of the Duchy's geologic formations which had been prepared by Voigt.

The understanding Goethe achieved of the region's geology during this year is impressive. The mine had not yet opened and Goethe was still dealing with difficult legal and financial questions. He was studying geognosy for its own sake, and the *“the tiny bit of metal”* luring men into the depths of the earth was of no importance to him. Later, when the first ore had been brought to the surface, this would change.

1782

On 10 April 1782, at the instigation of Duke Carl August, Goethe was elevated into the hereditary nobility by Kaiser Joseph II. This made his life at court easier, but also brought with it more responsibilities, because as a privy councillor who was also a member of the nobility, he could now be entrusted with diplomatic missions to other courts. Six years have passed since the decision was made to re-open the mine, but Goethe kept his geognostic eyes open, and never lost sight of the plight of the peasants:

³⁹ Letter to Duke Ernst II of Saxe-Gotha, Weimar, 27 December 1780.

“During these past days I have tried hard to concentrate my thoughts on the clods of soil and clay, and am now more convinced than ever that a person who has spent his life at the card table cannot become a farmer. One has to be born and bred very close to the earth to gain something from her.

It is now a sublime, wonderful spectacle when I ride over mountains and fields, because the origin and formation of the surface of our earth, and the food that people draw from her becomes clear and vivid to me at the same time; allow me when I return to lead you to the summit of a high rock in my own way, and show you the kingdoms of the world and their glory.”⁴⁰

He had experienced *“the kingdoms of the world and their glory”* on the summit of the Brocken in December 1777, when he gazed down on hills and vales shrouded in mist from the snow clad summit. Now, more than five years later, he realises that the *“sublime, wonderful spectacle”* includes the peasants in their struggle to grow enough food for themselves and their masters.

“You’ll still remember with what attention and zeal I roamed through the countryside when I sought to familiarize myself with the variations of the terrain. I know this now like the back of my hand, and I can give an account of every hill and meadow. Based on this foundation I can move forward confidently. I now intend to continue and establish what use Nature makes of the soil, and what Man makes his own. I can assure you that when I ride out with Batty, who doesn’t have theories, my theory always agrees with his correct practical assessment. You can imagine that I am very pleased about this.

And so I work my way through all the social classes, see the farmer demand from the earth his meager reward, which would be sufficient if he had to sweat only for himself. But you know that when the aphids sit on the rose branches and have happily sucked themselves green and plump, then the ants come and suck the filtered juices out of their bodies. And so it goes on, and we have brought it so far that in one day more is always consumed at the top than can be provided from below.”⁴¹

On a journey visiting the Saxon courts in May he noted, *“good soil, well mixed by the last retreating waters of the old ocean”⁴²*. He made notes of the various formations, and at a sandstone quarry situated well above the slate/schist (*Tonschiefer*) strata he noted, with a nod to Buffon⁴³: *“Should one have the opportunity and inclination to follow through the revolutions of the old world, this would be a noteworthy location. One would be convinced, as I am, that here one would be able to locate the highest level of the ancient waters.”⁴⁴*

In June, as befitted a newly minted member of the nobility, he relocated into a larger house on the *Frauenplan*, thereby moving into the town itself. He had since his arrival in Weimar lived in the *Gartenhaus*, the garden cottage in the park on the river Ilm, outside the town limits.

He was also working closely with Herder in writing the geological chapters of Herder’s *Outlines of a Philosophy of the History of Man*, first published in 1784, and kept him informed about his geognostic discoveries:

“I have been diligently climbing about on the rocks, and have found much that will be useful for me. I also believe that I have discovered a very simple principle, or rather

⁴⁰ Letter to Charlotte von Stein, Meiningen, 12 April 1782.

⁴¹ Letter to Carl Ludwig von Knebel, 17 April 1782.

⁴² Quoted in Wolf von Engelhardt (2003) *Goethe im Gespräch mit der Erde*, p.80.

⁴³ See footnote 34.

⁴⁴ Engelhardt, p.80.

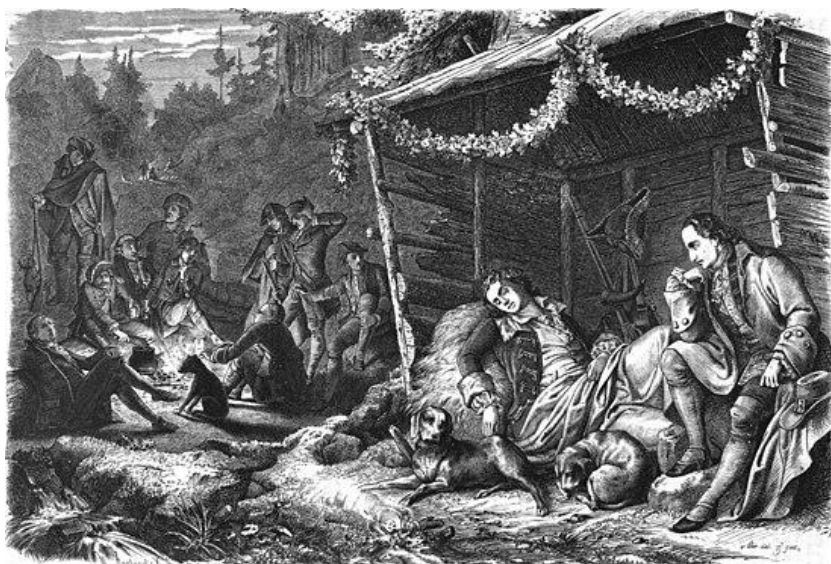
applied it in such a way that it completely explains the formation of the larger rocky masses.

“In our diplomatic work I am only interested in a single issue and that has been dealt with. There is anyway no joy to be found there. The poor always have to carry the sack, and whether it’s too heavy on the left or the right shoulder is pretty much a matter of indifference to them.”⁴⁵

The Ilmenau Poem

In 1783 Goethe wrote a poem, simply entitled “*Ilmenau*”, which he dedicated to Carl August on his 26th birthday, which was celebrated on 3 September. Goethe himself was 26 when he arrived in Weimar. Eight years had passed, and this very personal poem sheds light on Goethe’s innermost feelings during these years, and on his close relationship with Carl August. He expresses his love for the Thuringian forests and his concern for the people who lived there. The poem describes with remarkable frankness the youthful excesses which he and the young Duke had shared. It acknowledges the past, and celebrates the future by recognizing the inner maturity both had achieved during these years.

He had been well aware since his arrival in Weimar that the main reason for him being there at all was to temper Carl August’s wild and impulsive, pleasure seeking nature, and to counsel him in the responsibilities of government. He did after all, receive a substantial salary from the Duchy’s exchequer to do just that.



Karl August und Goethe nach der Jagd bei Ilmenau.
Originalbild von Theobald von Oer.

Karl August and Goethe after the Hunt near Ilmenau
Original drawn in 1861 by *Theobald von Oer*.
Goethe Museum, Düsseldorf.
Wikimedia commons

Shortly after the Duke’s death in June 1828, Goethe spoke to Eckermann⁴⁶ about the poem and described the hunting camp to him:

“We had built small huts at the foot of a rock and covered them with fir branches so that we could spend the night on dry ground. Several fires were burning in front of the huts, and we cooked and fried what the hunt had given. Knebel, for whom the tobacco pipe didn’t get cold even then, sat next to the fire and delighted with all kinds of dry jokes while the wine bottle went from hand to hand. Seckendorf, the slim man with the long, fine limbs, was comfortably stretched out against the trunk of a tree and was humming all sorts of poetic things. The Duke lay in a deep sleep in a similar little hut. I myself sat in front of it, by glowing coals, in all sorts of heavy thoughts, also in surges of regret about the various calamities that my writings caused ... ”

⁴⁵ Letter to Johann Gottfried and Caroline Herder, Eisenach, 20 June 1784.

⁴⁶ Conversations with Eckermann, 23 Oct 1828.

“*Ilmenau*” was written in just three days, between 30 August, when Goethe wrote to Charlotte von Stein that he intended “*if possible*” to write a poem for the Duke’s 26th birthday, and 3 September when he presented it.

In the poem Goethe describes the beauty of the landscape around Ilmenau and the difficult life of the local people. He gives a vivid description of an evening in an overnight camp near Stützerbach, following a day of boar hunting, the Duke’s favourite activity during the first years of his reign. The company is relaxing round a campfire, and it is possible to identify some of the hunters; for example the pipe-smoking “*lanky figure from an ancient hero’s tribe*”, sucking his pipe is Karl Ludwig von Knebel, and the Duke himself is characterized in intimate detail. But Goethe, who had celebrated his 34th birthday the previous week, is equally honest about his own feelings. He had been in Weimar for eight years, but was still unsure about whether it was the right place for him. The mine at Ilmenau is barely mentioned, but his concern for the poorest people in the Duchy is clearly expressed. Goethe ends the poem on a positive note, an admonishment to the Duke to face the future, his own and that of his people, with a clear sense of his responsibilities. See addendum.

Negotiations, Old Debts, Raising the Capital

Goethe was fully aware that in the past the biggest financial losses from the mine in Ilmenau had been borne by the Weimar treasury, and that it was still chronically in debt. His observation that “*if it were not a kind of passion with his serenity not to drop an undertaking from which something good could be hoped for, once he has embarked on it, it would hardly have been possible under these circumstances to ever get the project going again.*”⁴⁷ was therefore entirely correct.

The treasury of the impoverished Duchy was unable to provide seed-capital for the venture, so that private investors were needed. To cover the start-up costs an initial offering of 165 shares was taken up by the Duke’s inner circle and the local nobility in July 1776.

Negotiations with Saxony and the Duchies of Gotha, Meiningen, Hildburghausen, and Coburg were long and drawn out. The Duchies did not wish to relinquish their rights to a share of any future profits (the so-called ‘mining tenth’), but were unwilling to make any financial contributions. Goethe noted that had the Weimar government not acted “*in the best open minded and equitable manner, it would have been within their rights to exclude them (the other Duchies) from their share in the ‘tenth’.* For, whatever may be said against it, it remains the clear letter of the law that benefits can only be enjoyed according to the degree of effort and participation.”⁴⁸

Goethe had good reason to keep the neighbouring courts on his side. The machinery to be installed in new shaft was dependent on water from a canal passing across the territory of Gotha. Although he

Some German mining terms

Bergamt = local mining authority.

Bergrat = Mining Councillor.

Oberbergrat = Chief Mining Councillor.

Bergmeister = mine manager.

Oberbergmeister = senior mine manager.

Geschworener = inspector.

Gestänge = a system of rods transferring movement.

Gewerken = shareholders.

Gewerkschaft = shareholding company.

Glückauf! = Good luck!

Kunstgezeug = machinery.

Kux = share.

One *Lachter* = two meters.

Markscheider = surveyor.

Oberbergamt = Chief Mining Supervisory Authority (Office).

Stollen = adit.

Trum = vertical space in a shaft designated for ladders, piston pumps, ore hoists, etc.

Unter Tage = underground.

Zubußen = legal obligation to provide additional finance when required by the company.

⁴⁷ Quoted in Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.45.

⁴⁸ Quoted in Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.44.

was on good terms with Duke Ernst II of Gotha, the mere possibility of a serious disagreement might well interrupt this essential resource. From Hildburghausen the delivery of wood for construction and charcoal for smelting was envisaged. Although Johann Voigt had returned from Freiberg as a fully qualified mining engineer in 1780, further professional support from Saxony would be essential.

Goethe wanted to solve the debt problem in a similar equitable manner. A loan of 70,000 Thaler, made before flooding brought all mining activity to a standstill in 1739, had never been repaid, and any assets remaining after 1739 had long been pilfered or destroyed. Although there was no legal obligation to do so⁴⁹, but rather to instil a feeling of trust and confidence in the new initiative, and to enable the newly formed share holding company to start “*in the clear, and free from all obligations*”, Goethe negotiated an agreement with the sole heir of the family who had made the loan. She would be paid a lump sum of 6000 Thaler plus an annual pension of 300 Thaler until her death.

Trebra had calculated that 25000 Thaler would be needed over three years to get the mine going again. After that profits from the sale of smelted metals⁵⁰ would be sufficient to cover costs.

A second share offering was launched in December 1783, advertised by a prospectus signed off by Councillor von Eckardt, but almost certainly drawn up by Goethe. ‘*Information about the former mine at Ilmenau, together with suggestions about re-opening it by means of a shareholding company*’⁵¹. It contained a short history of the mine, its current condition, the proposal for its re-opening together with an analysis of the projected costs, and an invitation to take part in the project by providing capital. It became Goethe’s responsibility to find buyers for the issue of 1000 shares (*Kuxe*).

Ownership of the shares guaranteed not only a share in the profits, paid as quarterly dividends, but also a share in the losses, particularly in the debts and other obligations of the company. If more capital was needed for whatever reason, the shareholders were responsible for providing it. Failure to do so would result in their shares being forfeited without compensation.

There was a great deal of enthusiasm and optimism that the shares would be sold quickly. Interest was expressed as far afield as Berlin, where not only bankers, but also private individuals bought more than 100 shares⁵².

One thousand shares were offered at 20 Thaler each (about a month’s wages for a craftsman), of which the first ten had to be paid for immediately, the next five at the opening of the mine, and the rest one year later. All employees of the company were granted generous terms of employment and exemption from taxes, provisions notably progressive in an age still informed to a large extent by feudal customs. A local mining authority (*Bergamt*) with offices in the Ilmenau town hall was established in 1784. Its members were a lawyer, and engineer, a secretary, a miner representing the workmen, and an auditor.

Goethe also played an important role in setting up a code of practice for the officials employed by the mine. On the day before the official opening on 24 February 1784,

⁴⁹ According to Saxon law all capital investments and financial claims from a mining company were voided when the company ceased to operate. In the event of a new entrepreneur or company reopening a mine in the same district, no claims could be made against them.

⁵⁰ Metals present as sulphides (see *The Geology of Ilmenau* section above) could be extracted from their ores by a process involving heating and melting.

⁵¹ Quoted in Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.45.

⁵² Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.86.

the “*Instructions for the Mining Administration*” were issued. Not only should the supervisors work in harmony with each other, but their conduct in relation to the miners should be mild and lenient (*glimpflich*)⁵³.

Buyers, whether companies or individuals were limited to a maximum of ten shares. Shareholders were able to dispose of their shares, including the obligations attached to them, as they saw fit. They could be inherited, sold, given away, or pawned.

Carl August bought share number one, his family a further 29. When the company was formed he (as Duke) was entitled to 3% of the copper produced for the first 3 years, and 10% of the profits thereafter. Goethe was careful, he bought only 3 shares; share number 100 for himself, plus one for Charlotte von Stein’s youngest son Fritz, age 19 at the time, to whom Goethe was a mentor, and one for the lad to whom Goethe would be handing the pick after his first ceremonial stroke planned for the opening ceremony. The Duchy’s younger generation was important to Goethe.

His friends Herder, von Knebel, and Merck also bought shares; Wieland bought ten. Local villages (in the form of municipal communities), and tradesmen such as the Ilmenau blacksmith also bought shares. Duke Ernst II of Gotha, a personal friend of Goethe, bought ten. Professionals in the banking and mining sectors also showed an interest such as the Silesian Mining Director, Count Friedrich Wilhelm von Reden, and the son of Frankfurt banker, Johann Willemer⁵⁴, who both bought the maximum number of shares.

An additional 24 ‘free shares’ (*Freikuxe*) went to the town and the church. These were exempt from obligations. Goethe was actively involved in the sale of the shares, and wrote to many of his friends asking for their financial support. Until the mine was shut down in 1798 he personally signed each and every one of the shares sold.

*“I have recently been overwhelmed by my correspondence, and apologise that you have not heard from me for so long. Herewith I am including invitations to the Ilmenau Mine. In earlier times the Nürnbergers were very interested, and perhaps we can pick up at least one or two shareholders there. We have already sold 500 shares, and will open the new Johannes shaft during Carnival. It gives me a great deal of pleasure that after so many obstacles, this enterprise is finally ready [to commence].”*⁵⁵

To his friend Duke Ernst II of Saxe-Gotha, the neighbouring Duchy, he wrote,

*“Most Serene Duke,
Most Gracious Lord,*

[I] hereby convey most subserviently ten shares with their certificates as signed [by me], and commend the new project, together with the shareholding company to your mercy. I have not easily undertaken something with so much hope, confidence, and under such fortunate conditions, as when this enterprise was inaugurated, and the general [expression of] trust seems to be in accord. Already almost half of the shares have been sold, and more interest is being expressed daily. I enclose a report of the simple ceremony inaugurating the new shaft, as well as the speech which I gave. May your

⁵³ Sigrig Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, p.38.

⁵⁴ Johann Jakob Willemer (1760-1838) was a wealthy Frankfurt banker. He first met Goethe in 1777. His third wife was Marianne Jung (Marianne von Willemer from 1814) actor, dancer and singer who inspired and collaborated with Goethe on the *Suleika* Book of the *West-Eastern Divan*, published in 1819.

⁵⁵ Letter to Carl Ludwig von Knebel, 8 January 1784.

serenity look upon them with favourable eyes. . . I commend myself to your grace and reverently sign myself, your serenity's subservient subject."⁵⁶

The Grand Opening, 24 February 1784

By January 1784, 400 shares had been sold. This was considered enough to officially reopen the mine by starting to dig the new shaft. 24 February was Shrove Tuesday, traditionally a holiday (*Fasching*) in the mining communities.

The local dignitaries gathered in the largest room available (in the post house). The miners paraded with their banners, and congregated in front of the building, where Goethe held a speech. There are reports that he lost the thread of what he was saying for long, silent minutes. Without losing his composure he simply looked at his listeners with a steadfast gaze. The stillness was complete. Goethe's mere presence kept his audience spellbound⁵⁷.

Then he gathered his wits again, and finished his speech as if nothing had happened. Was it an omen? Or did Goethe freeze when he realised that the name of the lad to whom he planned to hand the pickaxe after his first ceremonial stroke, Christoph Friedrich Höhn, had the same name as Johanna Höhn of Tannroda, executed for infanticide less than three months earlier?⁵⁸ Was he thinking of his rather more compassionate portrayal of Margarete's infanticide and her subsequent execution in his *Urfaust*? Or did he experience a sudden panic at the possibility of failure, as he faced the about to be employed miners standing shivering in the cold?

In his opening speech Goethe said⁵⁹:

"At last the moment which this town has been waiting for almost half a century, and I myself have been anticipating with longing for the past eight years, has arrived. The festival which we are celebrating today was one of the first wishes of our most gracious Duke at the inauguration of his government, and we rejoice for him and for the common good, that this wish too is finally coming to fruition. . .

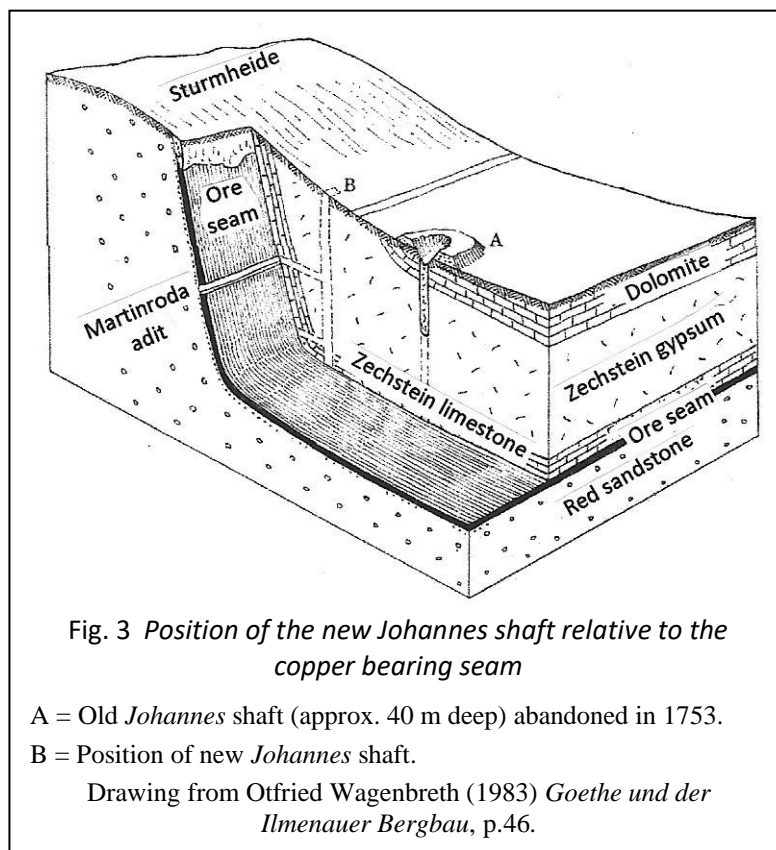


Fig. 3 Position of the new Johannes shaft relative to the copper bearing seam

A = Old Johannes shaft (approx. 40 m deep) abandoned in 1753.
B = Position of new Johannes shaft.

Drawing from Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.46.

⁵⁶ Letter to Duke Ernst II of Saxe-Gotha, Weimar, 15 March 1784.

⁵⁷ <https://www.faz.net/aktuell/feuilleton/buecher/rezensionen/belletristik/der-gruene-aus-weimar-1149108.html>

⁵⁸ In November 1783 Goethe, as a member of the privy council, had cast his vote to retain the death penalty for infanticide, which followed a request by Carl August for clarification on the matter. This decision meant that Johanna Höhn, who had already been convicted of infanticide, was subsequently executed.

⁵⁹ Johann Wolfgang Goethe, *Schriften zur Geologie, Mineralogie, Meteorologie*, dtv Gesamtausgabe 38 (1963) p.8.

Let us not look with indifferent eyes on the small opening that we are going to make in the surface of the earth today; let us not regard the first stroke of the pickaxe as an insignificant ceremony! No; we want to experience the importance of this act vividly, to rejoice with heartfelt feelings that we were destined to bring it about, and to bear witness to it. . .

This shaft, which we are starting today, is to become the door through which one will descend to the hidden treasures of the earth, and through which those deep seated gifts of Nature are to be brought into daylight. We ourselves will be able, if God has ordained it, to go up and down, see for ourselves, and behold with the greatest joy what we can now only imagine in spirit. . .

Yes gentlemen, you too will do this. Every subject and citizen of Ilmenau can benefit from, as well as harm, the mine which we are opening today. Every new undertaking is like a child who is supported with small deeds, deeds which an adult would not consider worth their thanks. And so I ask everyone to look upon our project in this way. If everyone, even the least among us, does what they can, according to their means, to foster it, it will certainly prosper.

Right now, right from the very start, is the time to support the work, to protect it, remove obstacles, clear up misunderstandings, suppress contrary emotions, and thereby to contribute to the common good. Once the mine is in full operation, once the wellbeing of the region has been strengthened as a result, and the town of Ilmenau is lifted again to its old prosperity, everyone, no matter who, whether they have done much or little, will be able to say to themselves: I too have not been idle, I too have lovingly taken on this enterprise when it was still a child, which has now grown into an impressive maturity. I have nurtured it, protected it, and cherished it, and to my great joy it will live on for posterity. Yes, may posterity bless us for what we are undertaking today, and may we benefit from their blessing!

And now we do not want to linger any longer, but to approach the place to which all our aspirations are directed. But before that to enter the house of God, the Lord who has established the mountains, hidden treasures in their depths, and given reason to Man, to bring them forth into the light of day. Let us ask Him to support our intentions, to accompany us into the depths, so that at last the metals, which are more often used for evil rather than for good, are produced only for His honour and for the benefit of Mankind.”

A procession, led by the town’s flag waving schoolchildren in their Sunday best, marched to a point determined by chief mining inspector Schreiber⁶⁰. This spot was marked by a circle of braided green spruce branches. See Figure 3. Goethe was handed the pickaxe, and made the first stroke. A triple *Glückauf!* resounded⁶¹. He passed the pickaxe to Christoph Höhn who made his mark. After him representatives of all ranks of town life took their turn, and the day ended in festivities and merrymaking.

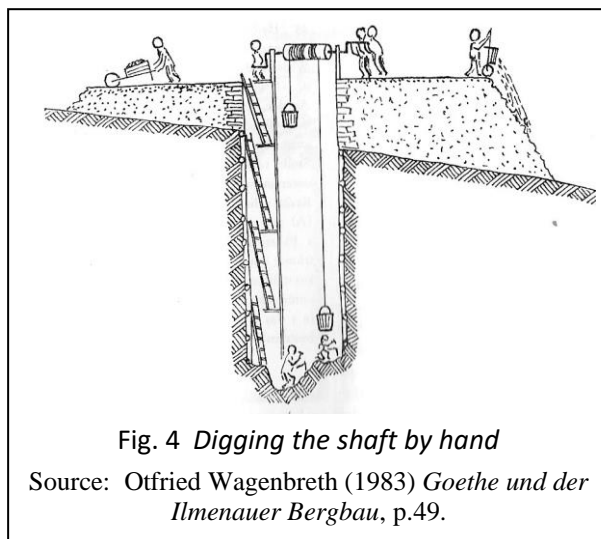


Fig. 4 Digging the shaft by hand

Source: Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.49.

Progress

⁶⁰ This was August Benjamin Schreiber (born 1734), the older brother of Johann Gottfried, who had moved to France in 1777.

⁶¹ Traditional miners’ greeting. Good luck!

Goethe kept everyone informed, and wrote to several of his friends, still asking them to invest in the company by buying shares:

“The beautiful petrification that you sent me has long since arrived. Apologies that I have not yet told you, and thanked you for it. There is nothing to compare with it in the entire cabinet in Jena. It is a nautilus, not an ammonite, and therefore unusual because it is so big and wide, and not compressed. Thank you for being interested in our new venture in Ilmenau. Half of our shareholders have already been found, and new enthusiasts are joining us daily.

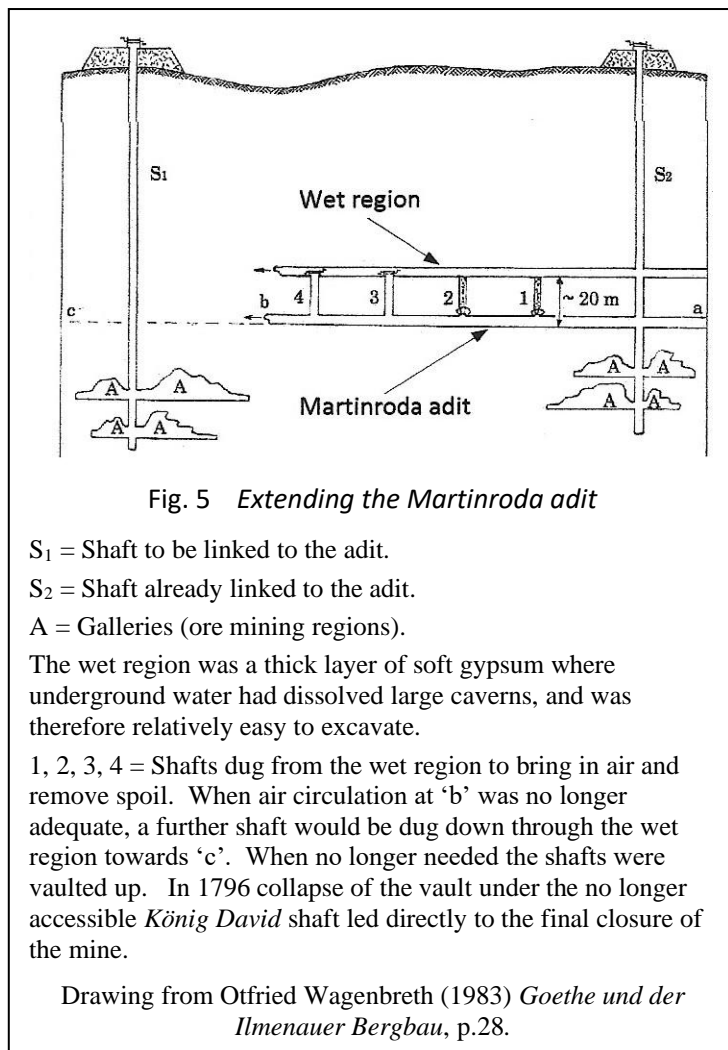
In the shaft itself, things are going very well. We are already 16 Lachter (32 meters) down, and have reached the gypsum, within which we will stay until we are almost on the seam. The sixteen Lachter are supported by timber, and this section of the shaft will be walled out later. We only have a few men on the job, but they are good workers, and until now their conduct has been of the best. The enterprise can be recommended with a clear conscience. The Commission runs the administration for free⁶² and therefore the shareholders pay only for the managers and the actual work. Farewell. Forgive me for dictating this letter, I'm losing my ability to write.”⁶³

To Charlotte von Stein he wrote: *“I hope that you also enjoyed this beautiful day, and thought of your (friend). How I would have wished you at my side. As soon as we arrived, I hurried to the new shaft, the object of so many hopes and wishes. It's all looking good, and the whole operation is proceeding nicely. There are no tougher obstacles to overcome than those that have already occurred, and I'm hoping for the best.*

Today we took a long and very pleasant walk to see the old ponds and ditches, some of which have to be repaired. I wished and trusted that I would one day be able to walk the most beautiful part of the way with you.”⁶⁴

And to Carl August:

I only came back from Ilmenau on Friday the 15th. We found several matters which needed attention, and since we considered it important to do things properly, we could not rush the work, as would have been possible for a routine paper exercise. I hope that the operation will prosper for your joy and satisfaction. Already, at a small cost, and in



⁶² Goethe had waived his professional fees.

⁶³ Letter to Carl Ludwig von Knebel, 24 April 1784.

⁶⁴ Letter to Charlotte von Stein, Ilmenau, 5 October 1784.

a short time, a great deal has happened. In a few weeks they will reach the wet regions, and before Easter the adit.

We have corrected the inventory, descended into the new shaft, and walked through the

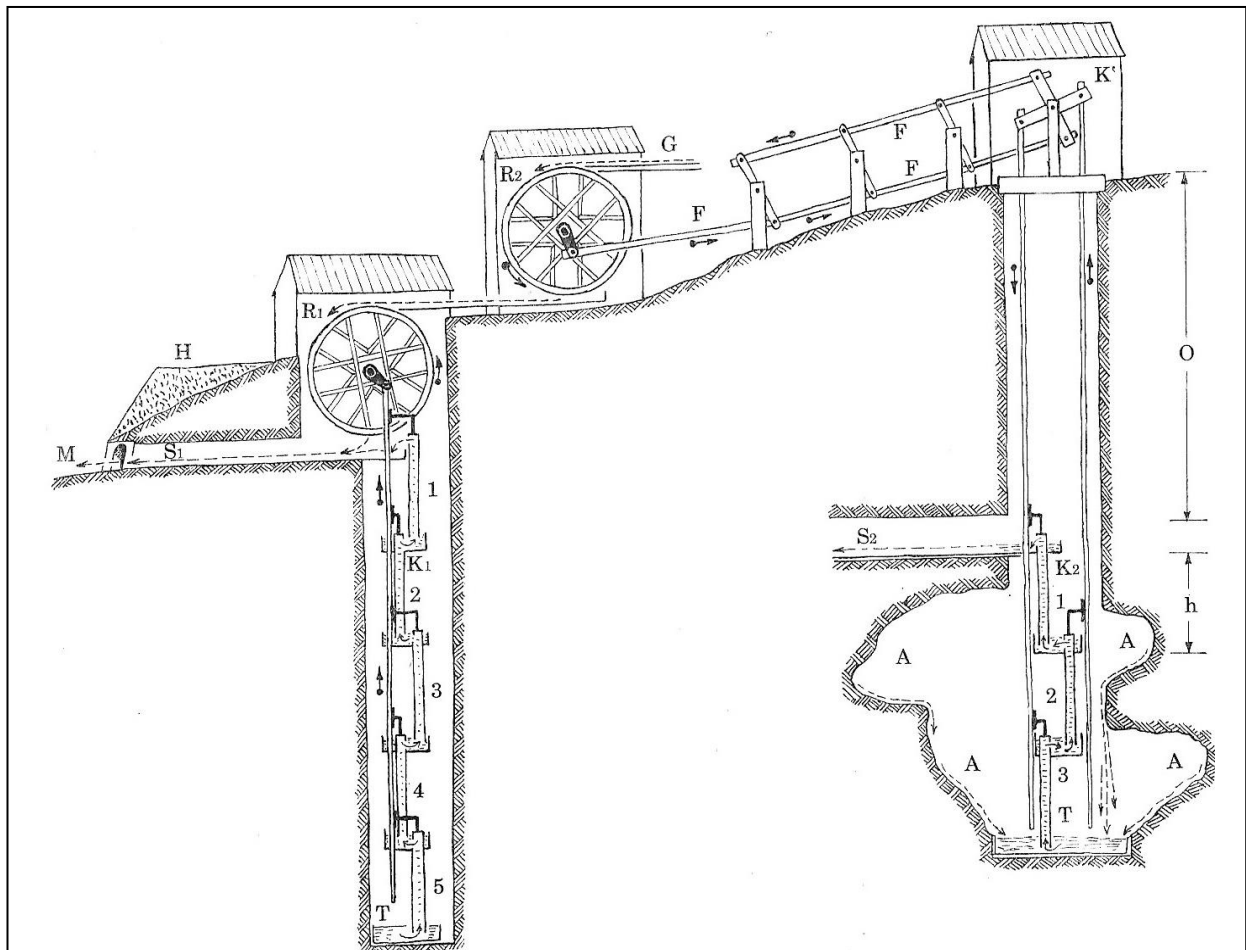


Fig. 6 Mining machinery in the middle of the eighteenth century
Waterwheels Piston pumps Linkage rods

Arrows = Direction of motion. Dotted lines = direction of water flow.

K' = Pithead. G = Millrace.

R₁ = Waterwheel partially underground, and R₂ = Waterwheel at ground level.

H = Spoil dump. M = Adit exit point. S₁ and S₂ = Shallow and deep adits.

K₁ = Set of 5 piston pumps lifting ground water into adit S₁, driven by a common system of linked rods.

K' = Transmission cross transferring horizontal into vertical motion.

F = Rods linking crankpin on waterwheel via transmission cross to linked rods driving set of 3 piston pumps, K₂, lifting water into adit S₂.

A = Ore removal areas with ground water flowing down to T.

O = Depth of adit below ground. h = height of a single piston pump (10m).

Source: Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.23.

adit from the 10th light hole. We walked the canal as far as the Freybäcker pond, and set in motion a secret deal to bring the fatal cutting mill, on Gotha's territory, into the company by acquisition. We have made the preliminary arrangements necessary for the management of the canals and construction of the machinery, diligently examined the accounts, personnel and equipment, and by careful attention to the slightest matters, have given the functions of the junior officials, I hope, a good direction."⁶⁵

⁶⁵ Letter to Carl August, Weimar, 18 October 1784.

The Martinroda Adit

Time and again water proved to be the undoing of mining activities in Ilmenau. Percolating groundwater was pumped out by pumps driven by waterwheels. Both the groundwater and the water used to power the pumps needed to be continuously removed. This was achieved by an adit (*Stollen*) The further down an adit met the shaft the less the distance water needed to be pumped up to the level of the adit.

The Martinroda adit was a tunnel which ran underground for almost 7 km at an approximate gradient of 0.4%. It began at a depth below ground level of 105 meters in the new Johannes shaft, reaching open ground just 25 meters lower at its end point in Martinroda.

Most of its length was constructed during the 17th and early 18th Century. A short length was added to connect it to the new Johannes shaft begun in 1784.

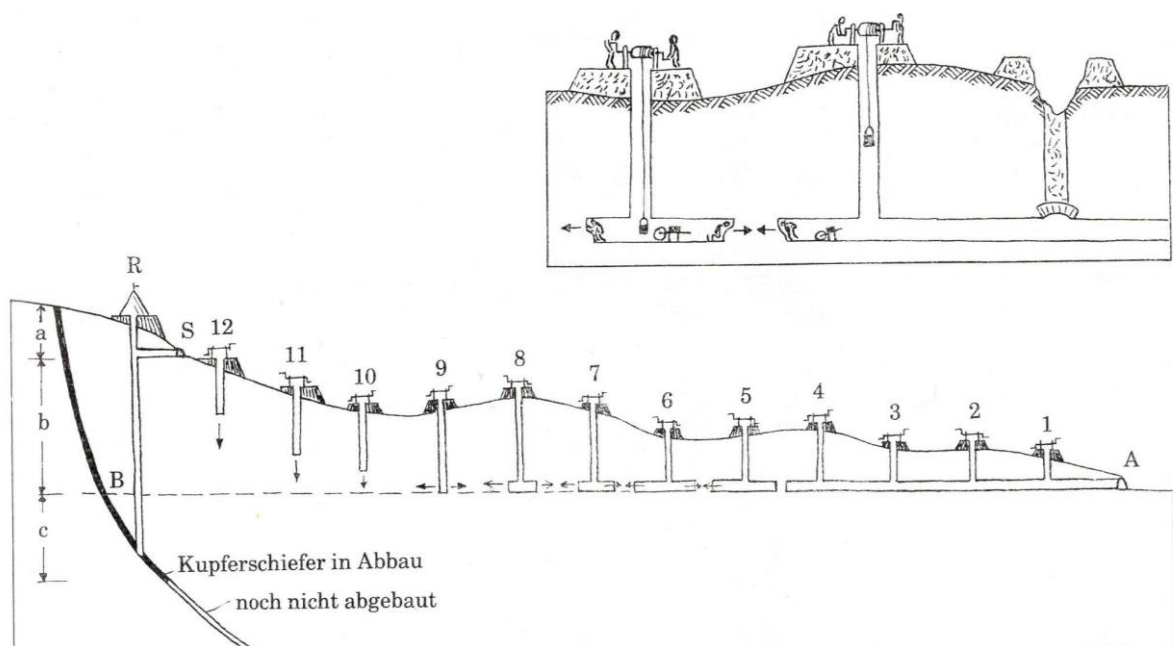
At approximately 250 meter intervals access shafts ('light holes', *Licht Löcher*), providing light and air, were dug from the surface down into the adit as excavation progressed. When the access shaft had reached the required depth (usually between 10 and 40 meters), excavation of the adit proceeded in both directions. We can only marvel at the accuracy of the surveying methods used to set out the adit.

Excavations began in 1592. From each access shaft a team of six men working in shifts averaged about 25 cm per week, or 12 meters per year. The spoil was carried to the nearest access shaft in wheelbarrows, winched up in buckets by hand, and used to level the area around the access shaft. It took ten teams each working from an access shaft 30 years to complete almost four km. After completion of each section the access shafts were vaulted and backfilled with rubble from the next. Slow work indeed. In 1624 disruption caused by the 30 years war and the subsequent lack of finance put a stop to all mining activities.

The Ilmenau mines were opened again in 1680, and work continued on the Martinroda adit, with the intention that it would eventually carry away water from the four shafts in operation at the time. The ore bearing schist was reached in 1694, and the adit now followed the lode, reaching the four shafts in 1706, 1712, and the last two in 1717. Four generations of men had worked on this major project.

During this time three dams had been constructed along the Ilm on ground well above the shaft entrances, together with a canal to carry the water to the pitheads, where six waterwheels had been installed either at or below ground level. At the end of 1717 water from the Ilm was led along 12 km of canal, powered six waterwheels, and was discharged through a 7 km adit into the Gera river. A remarkable achievement!

After 1694 a different technique was used to drive forward the adit. Instead of access shafts from the surface, these were dug from a second tunnel about 20 meters above the adit. This was the so called 'wet region' where solution of the porous gypsum by groundwater had left large underground chambers and hollows. As before, each shaft was vaulted and filled with spoil from the next when no longer needed. This saved a lot of digging, and hence money and time, but was to lead directly to the catastrophe of 1796. See Figure 5 *Extending the Martinroda adit*.



Profile of the Construction of the Martinroda Adit

Drawings from Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.15.

The work was straightforward, but proceeded more slowly than Goethe's optimistic prediction. The shaft measured about 1.5 meters by 3.5 meters. Between one and one and a half cubic meters of rock (between 2.6 and 4 tonnes) were winched up each day, using a three-man winch, and dumped near the pit mouth. The "wet regions" were reached at 80 meters, and in June 1785 the Martinroda adit (tunnel) was reached at a depth of 100 meters. The adit had been extended, and cleared all the way to the 'mouth' at Martinroda, so that from here any percolating groundwater could be easily drained away down the tunnel's slight gradient.

Below the level of the Martinroda adit the shaft was widened by adding one meter on either side, making it 1.5 by 5.5 meters. See Figure 7. The extra space would be used to install the pipes in which groundwater would be pumped up and led into the adit. The gypsum was relatively soft and stable, and did not slow the excavation work more than expected. There were another 135 meters to go, but so far everything was going according to plan.

A depth of 142 meters was reached in September 1785. The three-man winch could cope with loads from a maximum depth of 180 meters. Beyond this human strength was no longer adequate. During the autumn months a water powered capstan with reversible waterwheel was constructed and installed at the pit head. Water was provided by extending the canal already in existence by several kilometers. The entire length of the long disused canal needed to be checked for leaks. The waterwheel was ready in November 1786, and the canal now ran from Stützerbach to the Johannes shaft, a distance of almost 10 kilometers. Goethe took a personal interest in the work and was on site several times during the winter months of 1785-86.

"I took a long walk today, along the entire length of the canal, where the water for driving the machinery flowed towards me, for the first time in many years making its way along here again. There were all manner of clouds, mist, fog, flurries of snow and sleet, hail and graupel, constantly changing in the atmosphere, but the morning was clear and pleasant, and the mountains very beautiful. . . I am bringing back some good edible dried mushrooms, you can see with what kinds of vegetation I'm surrounded here.

I have Linnaeus's botanical philosophy with me, and hope to finally be able to make use of the solitude, and read it from beginning to end. I have only ever read short sections. I am having some interesting botanical ideas again, and have made a vow not to touch any rocks this time.

*In my warm cozy room I only miss your presence, everything else is calm and comfortable."*⁶⁶

A note he wrote on 11 November indicates the extent of his work: *"Increase the height of the weir using a suitable log; culverts at the Sturmheide; masonry work and turf as far as the Johannes shaft; mill race from the end of the canal to the waterwheel. 3 men, 8 days."* In February 1786 there was more work to be done: *"Replace or repair the bottom in various places; make good water loss with turf or wall, clay or loam."* In order to prevent the water from freezing during the winter months Goethe had the canal covered with planks.

All this took time, but Goethe was satisfied with the progress. Most of the shareholders had paid their second instalment, and a slow trickle of new investors kept the finances on an even keel. Goethe left for Italy in September 1786, confident that the project was in good hands. He was kept up to date with developments by his

⁶⁶ Letter to Charlotte von Stein, Ilmenau, 8 November 1785.

deputy, Privy Councillor Christian Voigt, who had joined the Mining Commission in 1783.

Once the mine was up and running Goethe's direct involvement gradually became less. Besides the two years he spent in Italy, he was often away for lengthy periods. He travelled to Italy again in 1790 to meet and accompany the dowager Duchess Anna Amalia back to Weimar. As Duke Carl's senior diplomat and advisor he was often away on diplomatic missions, and was expected to accompany him on military campaigns as well, most notably in 1792 and again in 1793, when he joined the Duke and his army, in their support of the Prussian forces as they attempted to push the revolutionary '*sans culottes*' back into France.

Correspondence from Italy

*"I am delighted by [your news of] the mine. Now that the driving mechanism [the waterwheel] is functioning, the rest will be driven along as well. If the rope holds, the patience of the shareholders will hold as well."*⁶⁷

*"It would not have been easy for me to receive a greater joy from home than the news of the progress of the Ilmenau mine gave me. In my thoughts I am so attached to this project that nothing could be more desirable than to hear that it is steadily advancing."*⁶⁸ Goethe was always happy to receive good news. Even in Italy he still carried overall responsibility for the mine, although he had left the day-to-day decisions to Christian Voigt.

But not all the news was good. In September 1787 the base of the gypsum was reached at a depth of 230 meters, and the Zechstein limestone was breached. Almost immediately a strong flow of groundwater began to fill the shaft, and excavation had to be stopped. Voigt reported that the miners had to hurry up the ladders to stay ahead of the rising water. Within days the shaft filled with water all the way up to the Martinroda adit, from where it was able to drain away. This was the beginning of a five year long battle with groundwater, before the first ore was brought to the surface.

In Italy Goethe was relieved that someone was on site to deal with the not unexpected setback, and remained upbeat:

*"Just as I have spent so many good and happy days with you in our enterprise, so I would have dearly liked to share with you the unpleasant and difficult hours which you have had to work through in Ilmenau recently. Both incidents, the fallen bucket, as well as the upwelling water, were predictable, and not beyond expectations. I really would like to hear how the wise and prudent actions you took brought everything back on track again. When I read your letters I can't express how much I wish to be back again on our rocky hills. But the time will come again, I hope to our mutual enjoyment."*⁶⁹

But he was also thinking ahead, and hoping to drop some of his responsibilities once he returned to Weimar. On 23 October he also wrote to Carl August suggesting that "some young men were drawn into the Ilmenau works", for there would likely soon come a time when "you and I would have to give our thoughts and attention a new direction". He suggests that a young person who had recently joined the ministry might be persuaded in one way or another to take on the responsibility of the mine, "so that we could hope, at least for the foreseeable future, that our principles are complied with, and see our efforts continued in the same direction by others."

⁶⁷ Letter to Christian Voigt, Rome, 3 February 1787.

⁶⁸ Letter to Christian Voigt, Naples, 23 March 1787.

⁶⁹ Letter to Christian Voigt, Rome, 23 October 1787.

The strong flow of groundwater from the Zechstein limestone had been expected, and the waterwheel constructed in 1785/86 (to power the capstan hoisting up the ore) had

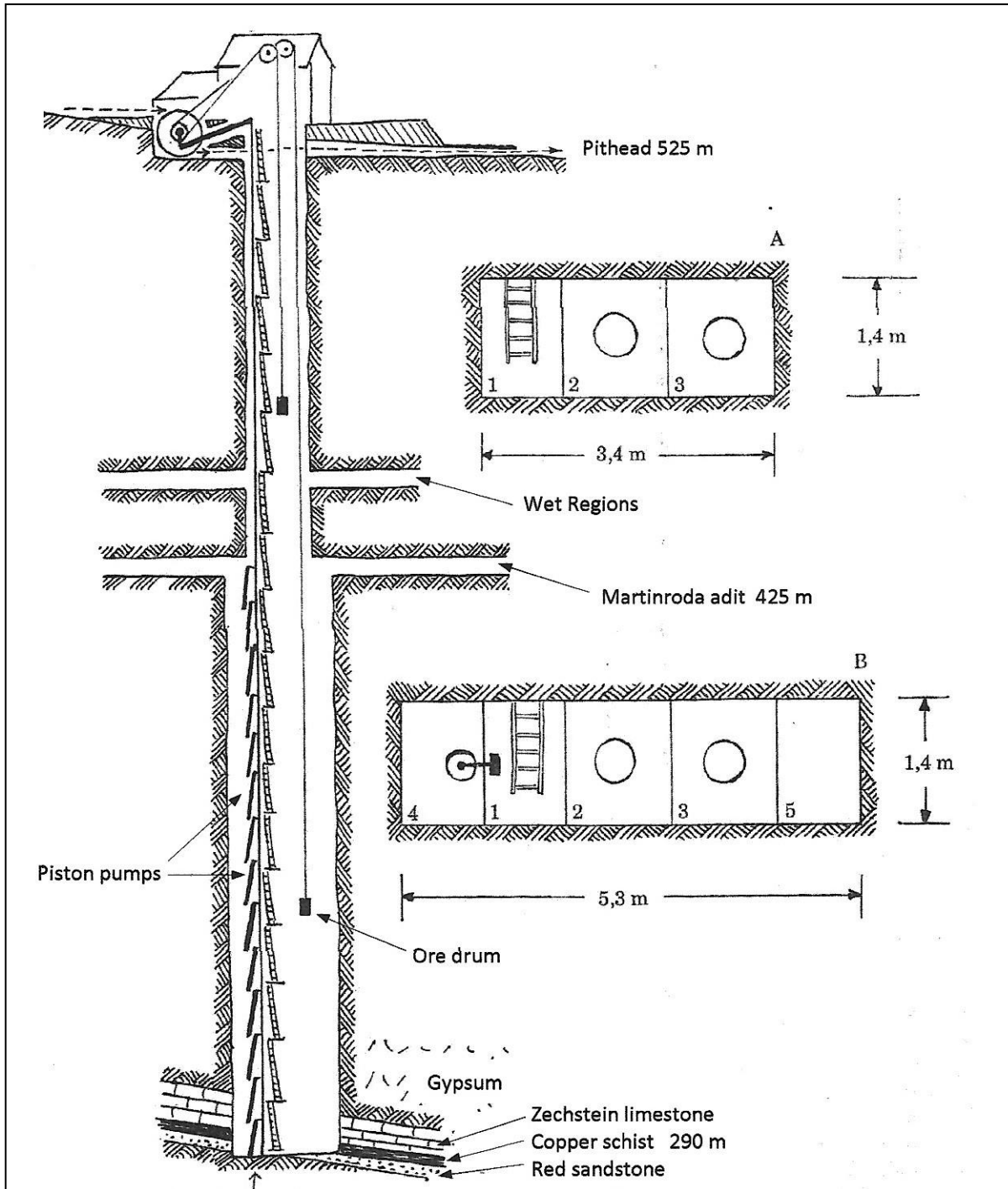


Figure 7 Profile of the Johannes shaft after the flooding in November 1787

Approximate heights in meters are above sea level.

The reversible waterwheel at the pithead lifts and lowers the drums used to remove the spoil. A crankpin attached to the side of the waterwheel enables the rotational motion of the wheel to be changed into the longitudinal motion of a series of connecting rods, which drive a set of 14 piston pumps in space ('Trum') 4.

Cross-sections on the right: Shaft dimensions (A) above, and (B) below the Martinroda adit.

- 1 Space ('Trum') for ladders.
- 2 and 3 Space for hoisting and lowering ore drums.
- 5 Additional space created for future piston pumps.

been fitted with a crankpin, which would enable it to drive a series of piston pumps.

These consisted of 10 m lengths of hollow wood pipes with an internal diameter of 8 inches. Water was 'pumped' up the pipe by pulling up a wooden piston, in which holes had been drilled, but closed by a leather diaphragm. The piston, effectively a one-way valve, was pulled up the pipe, and the water drawn up was drained into the adit.

When the water level in the shaft had dropped to the bottom of the pipe, a second 10 meter length was installed. The water drawn up was led into a trough from where the first pipe drew it up into the adit. And so on. In this way a 'run' of 14 ten meter pipes was installed, and on 18 November the shaft was dry. See Figure 7.

Excavation could now continue into the Zechstein limestone. Goethe was still in Italy and was happy to receive the good news, but still wanted to divest himself from some of his responsibilities on his return. He wrote to Carl August, and made a suggestion:

*"The assured good progress of the mine makes me infinitely happy, and we can now go ahead with renewed efforts. In Voigt you have a capable worker; give him a young man to assist him with the Ilmenau work. I have already written to him about the proposal. He will talk to [privy council member] Schmidt and the matter will be presented to you."*⁷⁰

But even before Goethe had written this letter, in December 1787, and again in early January 1788, water broke through the newly exposed limestone in increasing volumes, and could no longer be managed by the single 'interim' waterwheel at the pithead. Goethe wrote to his deputy:

"We are still fortunate with our mine. We now know where we stand, and must always remind ourselves that it would be foolish to despair when we come up against what could have been foreseen. 2nd February.

*"I was prevented from finishing this letter, now it shall certainly be sent off today. I have just received your letter of 14 Jan. and thank you for your kind thoughts. May the new wheel be as successful as the interim wheel, and bring us down to the depths, and may your continuing hard work be recognized everywhere as I recognize it. Believe me, that as a token [of appreciation] I will certainly do everything in my power to extend the limits of your domestic situation."*⁷¹

A strong flow of groundwater in the limestone region had been expected, and the method to deal with it had been planned in advance. (Hence Goethe had referred to the first waterwheel as an 'interim' wheel.) Work immediately began on excavating a recess, 10 meters by 10 meters by 2 meters wide, just above the Martinroda adit. A nine meter diameter water wheel with crankpin was constructed under the supervision of mining inspector Baldauf, who had been summoned from Schneeberg, to drive a second 'run' (series) of 14 piston pumps, which this time had a diameter of 12 inches. Water to drive the wheel was led 100 meters down the shaft by 'ducting', constructed from wood planks. The work took six months to complete, and the wheel was set in motion in August 1788, shortly after Goethe's return from Italy in June.

But by this time 40 shareholders had already given up hope and relinquished their shares. It was all taking far too long. It had taken a year, from November 1785 to November 1786, to install the first waterwheel, which could have been constructed, and the canal extended, while the spoil was still being winched up by hand. Perhaps there was not enough money to pay for both jobs at the same time. Or was it poor planning?

⁷⁰ Letter to Carl August, Rome, 25 January 1788.

⁷¹ Letter to Christian Voigt, Rome, 2 and 9 February 1788.

Back in Weimar

After his return from Italy, Goethe was slow to bring himself up to date with progress at the mine. He was confident that Christian Voigt had everything under control, and there are letters from this time between Goethe and Voigt which indicate that he is still seriously considering handing in his resignation. Christian Voigt did not want to lose a colleague who was an intimate friend of the Duke, and appeared not to mind having to do most of the work: *‘Please hold dear for both of us this first business bond, which led me to you, that it may continue to thrive between us, even if you might be prevented from participation on a day-to-day basis.’* Goethe’s reply is anything but clear. *“Also, I will gladly continue to carry our common responsibilities, at least in name and spirit, if you so wish it.”*⁷²

Goethe continued in his role as director of the Mining Commission. In fact he was reluctant to relinquish this role even after all mining activities had ceased. Before he visited Ilmenau again after his long absence, he wrote to Voigt expressing his strong support of his colleague’s efforts:

*“It was with great pleasure that I heard that you have arranged everything well, and to your satisfaction. The wheel must really be an impressive machine, rotating with dignity in the darkness. The fact that you have already managed [to pump out] several Lachter, is also a good start. You can imagine how much I wish to be with you. The Ilmenau project must always remain worthwhile to me and that includes your presence. Your hard work makes everything doubly interesting to me.”*⁷³

It took another six weeks before he went to Ilmenau on an inspection tour, which he reported to the Duke:

*“Then I rode to Ilmenau where they are seriously busy pumping out the water. As soon as a [piston pump] section is in place, the Lachter are quickly pumped out, but bringing them down into position is cumbersome, even dangerous work. Meanwhile, the wheel seems to be very well built, and with its crank pins and crosses⁷⁴ appears quite formidable in the dark. The twelve- and eleven-inch [diameter] sections raise an enormous torrent of water. The water level is now 25 Lachter under the adit. I climbed down to see for myself the work that is necessary to install and adjust the sections. By the way, everything looks well organized and tidy.”*⁷⁵

One has to admire Goethe’s fitness and courage. Climbing the slippery wet ladders, with the incessant noise of the rushing waters cascading down the wooden ducts, groundwater dripping down the sides of the shaft, all in poor light, required stamina and perseverance.⁷⁶

It soon became apparent that the flow of groundwater into the shaft was stronger than had been anticipated. The “formidable” wheel was working perfectly, but was unable to draw down the water further than 60 meters below the adit. At this level water from the limestone at the bottom of the pit flowed in as fast as it could be pumped out.

A second even bigger waterwheel (with a diameter of 12.3 meters) was installed in a second recess cut into the opposite side of the shaft just above the first. This would drive a second, separate ‘run’ of 14 piston pumps, thereby doubling the rate at which

⁷² Quoted in Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, pp.58,59.

⁷³ Letter to Christian Voigt, Weimer, 16 August 1788.

⁷⁴ Goethe is referring to the cross transferring horizontal into vertical motion. See Fig. 5.

⁷⁵ Letter to Carl August, 1 October 1788.

⁷⁶ See https://de.wikipedia.org/wiki/Bergm%C3%A4nnische_Kunst for technical details of a waterwheel and moving ladders.

water could be removed from the shaft. The work began in February 1790. Goethe wrote to Carl August:

*“Mining Inspector Baldauf has arrived, an upright man with whom we hope to conquer the underground Neptune. Live well in the upper world and keep me dear.”*⁷⁷

On 17 September 1790 all was ready. Christian Voigt had gone down into the shaft, and reported his impression of the big moment: *‘Everything was ready, and a solemn silence prevailed, only the splash of the dripping waters could be heard. The colossal wheels were stationary, waiting. Suddenly a rushing noise like a roaring wind could be heard. Water cascaded down the ducts, and in a moment everything was alive, even ensouled, to help carry out the grand plan. The new wheel swung round willingly, more regular than the old. Cranks and connecting rods moved smoothly, without creaking or scraping. At the same moment the hostile waters began their retreat.’*⁷⁸ The new wheel lifted 600 liters per minute, a remarkable performance for the time.

Goethe was not present on the big day, as he had been obliged to follow his boss to Breslau (now Wrocław in Poland) in Silesia, where Carl August had assumed command of a cavalry regiment, part of a show of Prussian force before the signing of the treaty of Reichenbach between Prussia and Austria.⁷⁹ The troops were bored, but Goethe and Carl August made good use of the time to tour the Silesian mines, which were the first in Europe to make use of coal as a source of power.

They saw two Newcomen atmospheric engines in action in Tarnowitz. These had been installed in 1788, and ‘teething’ difficulties were still experienced in their operation. They also inspected a water column pump, which makes use of the hydrostatic pressure in a column of water. Goethe made sketches of both types of pump, and although Newcomen’s engine was considered for use in Ilmenau, it was decided not to import one, as no-one in the Duchy had any experience in operating it.

“For the kind thoughts and the messages passed on to me I cordially thank you. I would have liked to come up with some news from here as well; [but] everything is at a standstill, and we had to make a move in order not to fall asleep. His Serenity the Duke has made a tour to Tarnowitz, Cracau, Censtochowa, and Wielitzka, on which I accompanied him. Earl Reden⁸⁰ also joined the company, and we spent very pleasant and useful days, even though most of the sights along the way had little by way of charm and interest. In Tarnowitz I consoled myself about Ilmenau; they have to lift a far greater volume of water, although not from such a great depth, and still hope. Two fire machines are working here, and another one is being constructed. In addition a horse powered capstan lifts water from four shafts. I’ll explain more on my return. The Silesian mines are interesting enough.

*But now I also wish that we could be released from Breslau, for in spite of some good things, it continues to be a desolate life here. Because everything is at a standstill, all the troops, who are not at home here, are longing for their own hearths.”*⁸¹

⁷⁷ Postscript to a long letter to Carl August dealing with matters of state, Ilmenau, 18 February 1890.

⁷⁸ Quoted in Wagenbreth, p55.

⁷⁹ The treaty had already been signed on 27 July, before Goethe’s arrival, but the Prussian army of 200,000 men, encamped in southern Silesia, could not be disbanded until both Russia and Turkey had consented to the terms.

⁸⁰ Friedrich Wilhelm von Reden (1752-1815) graduated from the Freiberg Academy in 1777, and in 1790 he was Director of the Silesian Department of Mines. He was a friend of Goethe’s, and had bought ten shares.

⁸¹ Letter to Christian Voigt, Breslau, 12 September 1790.

The flow of groundwater near the bottom of the 'Neue Johannes' shaft proved to be exceptionally strong. With both waterwheels and piston pump runs working flawlessly, they only managed to draw down the water in the shaft to 130 meters below the adit, which was almost, but not quite at the bottom of the shaft. Spirits sank. It would be possible to cut a third recess and install a third, and even a fourth, waterwheel, but there was not enough space for another run of piston pumps in the shaft. Mining Inspector Baldauf was needed urgently.

Baldauf had commitments elsewhere, but was able to free an evening in Freiberg for an all-night meeting with Christian Voigt and mining engineer Süß on 26 January 1791. In the early hours of the morning, after lengthy deliberations, and with hope for a solution rapidly fading, a simple answer was found. Space for the additional piston pumps could be created by arranging for the buckets carrying up the spoil to run one above the other, instead of next to each other. Voigt reported that *'We jumped up and hugged each other for joy at the fortunate idea, the simplicity of which in no way detracts from its huge value.'*⁸² The details of the plan and its costs were worked out, and presented at the first formal shareholders meeting, which Goethe called for 6 June 1791 in Ilmenau.

Here he has the difficult task of persuading the remaining shareholders to invest more money (*Zubußen*). Debts were mounting and 7800 Thaler would be needed for the new installations. Goethe's eloquence carried the day, but did not prevent a further 174 shareholders from forfeiting their investment, rather than provide further finance to keep the operation going. The remaining shareholders reluctantly agreed to stump up the money. The accumulated debt of 5000 Thaler would be partly financed by the sale of (shareholder's) land. In his closing speech on 11 June Goethe anticipated that *"unless a completely unpredictable event took place, the ore bearing seam would be reached within a year"*⁸³. Work began immediately. Two more waterwheels and associated pumping equipment were

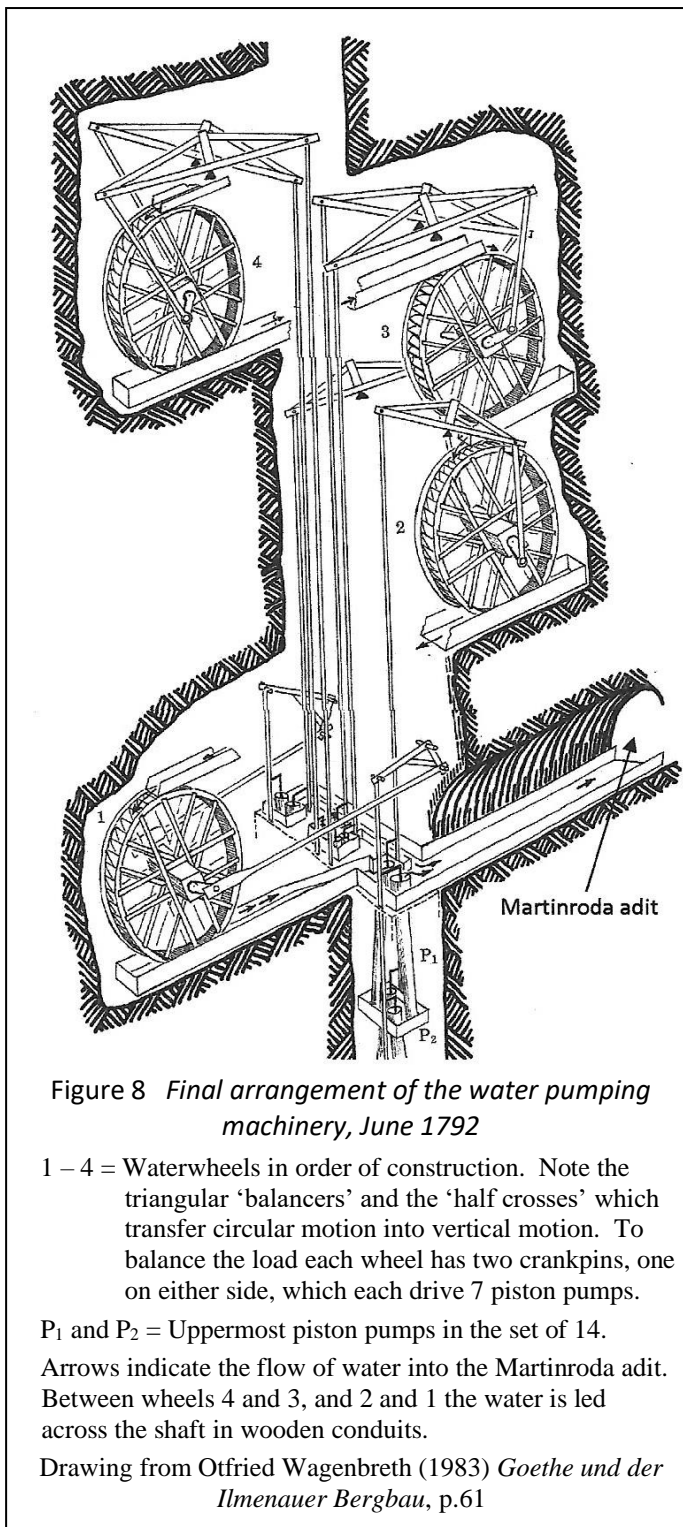


Figure 8 Final arrangement of the water pumping machinery, June 1792

1 – 4 = Waterwheels in order of construction. Note the triangular 'balancers' and the 'half crosses' which transfer circular motion into vertical motion. To balance the load each wheel has two crankpins, one on either side, which each drive 7 piston pumps.

P₁ and P₂ = Uppermost piston pumps in the set of 14.

Arrows indicate the flow of water into the Martinroda adit. Between wheels 4 and 3, and 2 and 1 the water is led across the shaft in wooden conduits.

Drawing from Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.61

⁸² Quoted in Wagenbreth, p 56.

⁸³ Quoted in Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, p.51.

installed as had been suggested by Baldauf, and one year later, on 28 June 1792, the shaft was “dry”. See Figure 8.

The Zechstein was only four meters thick at this point, and the ore bearing seam was reached in a matter of days. The pumps worked as planned, and on 3 September, Carl August’s birthday, a large crowd gathered at the pithead to watch as the first ton of ore, garlanded with flowers, was brought to the surface. Trumpets sounded, drums rolled, and Voigt reported that ‘many present at the scene wept for joy’. The ore was tipped into wheelbarrows, and presented to the onlookers. Amidst loud cheers, and cries of ‘Long live the Duke!’ and ‘Long live Goethe!’, ‘the crowd rushed forward. Everyone wanted to take home a piece of the new ore seam’⁸⁴, and the wheelbarrows were emptied in minutes. But, to the regret of all present, neither his Serenity, nor the director of the Mining Commission had been able to attend the ceremony.

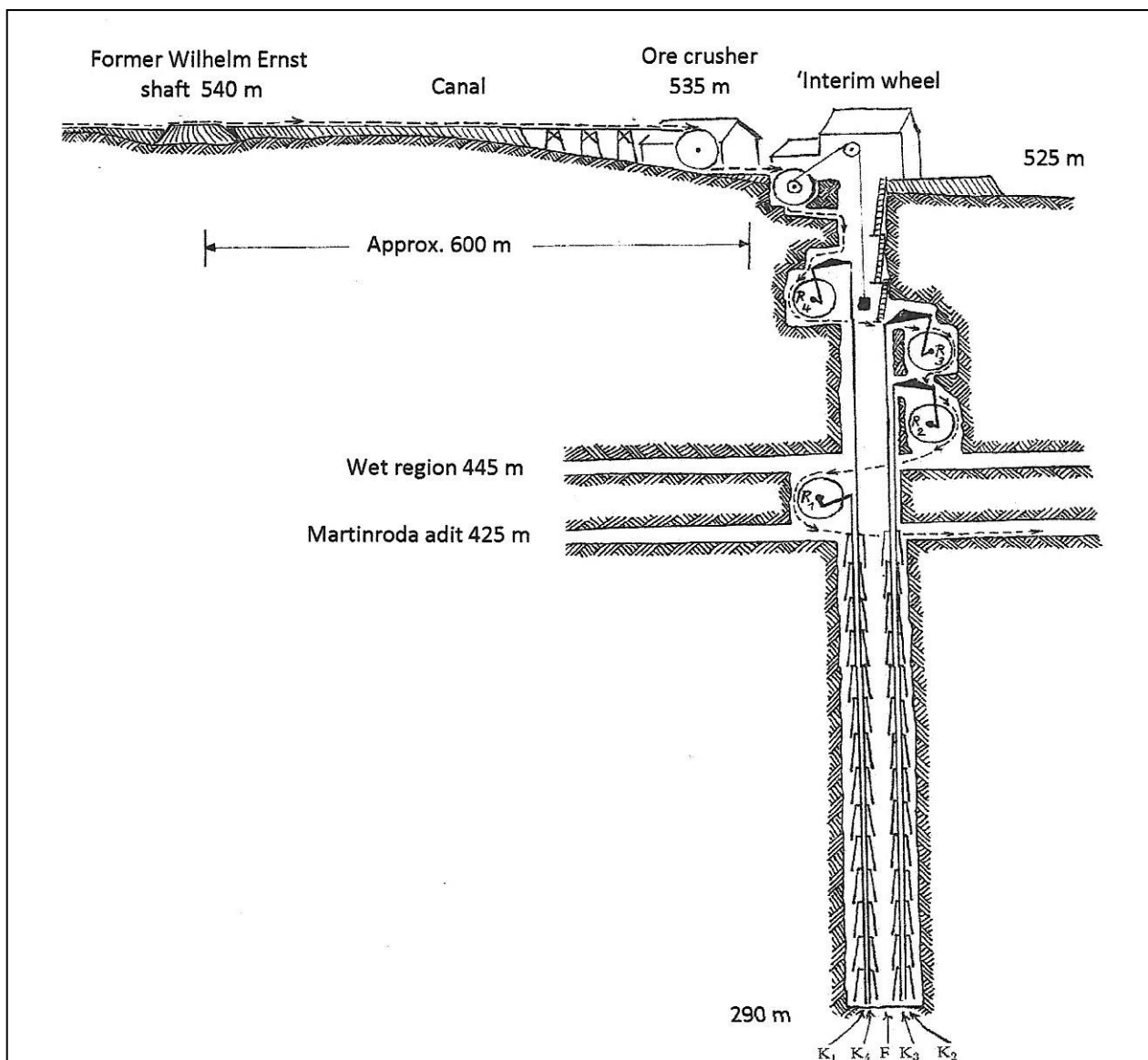


Figure 9 Overview of the new Johannes shaft and machinery 1792 - 1796

Approximate heights in meters are above sea level.

R₁ – R₄ = Waterwheels driving pumps.

K₁ – K₄ = Connecting rods each with 14 piston pumps.

F = Space (‘Trum’) for ore buckets.

Dotted line = Direction of water flow powering six waterwheels in all.

Drawing from Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.61

⁸⁴ From Christian Voigt’s report, quoted in Wagenbreth, p.58.

The French Campaigns

Carl August had had little choice but to place his small army in the field in support of the Prussians on their campaign against the revolutionary ‘sans culottes’, in the hope of entering Paris to restore the monarchy. As an official senior advisor Goethe was expected to be a part of the military entourage. As a boy he had experienced the French occupation of Frankfurt during the Seven Years War, had even taken a liking to the French civilian governor, Comte de Thoranc, who had been billeted at his home for a number of years (1759-1763), but now Goethe had no interest in military matters.

*“Against my maternal home, bed, kitchen and cellar, tent and primitive conditions (Marquetenterey) will compare badly, especially since I have not the slightest interest in the deaths of either aristocratic or democratic sinners.”*⁸⁵

Christian Voigt again represented him while he was away, and they kept in touch. Goethe is optimistic about both the military undertaking and the final push to reach the ore seam in Ilmenau.

“Making predictions about what is going to happen based on what is happening now, and occasionally casting a side glance at the map, exercises our minds a great deal. So much is clear, the undertaking is dragging on. It was always going to be enormous, no matter how big the means are.

*We know how difficult it is to raise the small amounts of water from the depths even with four waterwheels. Whatever decisions you make in our mining operations have my approval in advance, but I would like to hear that the seam has been reached. Perhaps this will happen as we enter Paris.”*⁸⁶

The Prussian forces had captured the fortified town of Verdun on 29 August, but they were subsequently heavily defeated at the Battle of Valmy on 20 September, and were forced to beat an ignominious retreat. As if in an “evil dream” Goethe wrote to Herder on 16 October, he felt himself “trapped between deprivation and anxiety, affliction and anguish, between rubble and corpses, mud and excrement.”

But there was one piece of good news during these dark days. Goethe had received the news from Ilmenau, and wrote back on 15 October. “We may well congratulate ourselves on the Ilmenau seam, even though the whole business is now more or less as it was at the beginning. I would have scarcely believed that we would reach this point before the Prussians would have reached Paris.” In the same letter he also reported on the terrible hardships suffered by the retreating Germans. “We have in these six weeks endured and seen more weariness, destitution, sorrow, misery, and danger, than in our entire life. This campaign will be recorded in the annals of history as one of the most wretched ever undertaken. I hope to write to you soon from Frankfurt, and with more calm and composure. I hope to be with you soon, and to talk to you as usual.”⁸⁷

The French did not seriously pursue the fleeing Germans, but it took another three weeks of “anxiety, toil and misery” before Goethe reached Düsseldorf and safety (on 6 November). He arrived back home in December where bad news awaited him. The ore brought to the surface was of an exceptionally low grade, and attempts to extract copper and silver had proved unsuccessful. Initially this did not discourage anyone, as it was believed that the shaft had entered the seam in an ore free zone purely by chance. Excavation of the ore was continued in three directions, and optimism prevailed. See Figure 10. Christian Voigt wrote that ‘everything now came together in

⁸⁵ Letter to Goethe’s friend Friedrich Heinrich Jacobi, Frankfurt, 18 August 1792.

⁸⁶ Letter to Christian Voigt, Verdun, 10 September 1792.

⁸⁷ Letter to Christian Voigt, Luxembourg, 15 October 1792.

an orderly fashion, and since one could reasonably hope for a higher yielding ore on a daily basis, it was a pleasure to be engaged'.⁸⁸

From May until the end of August 1793 Goethe was involved in another of Carl August's military campaigns; this time joining the German coalition forces in the siege of Mainz (April to July 1793), which the French had captured on 21 October 1792. This time the Germans were successful, and the siege was lifted on 23 July 1793. Many years later Goethe wrote a vivid account of his military experiences.⁸⁹

Extracting Copper from the Ore

During Goethe's absence, the ore brought to the surface was regularly tested for copper and silver content. It soon became apparent that the ore found in the *Luisen* and *Prinz Bernhard* galleries was completely 'dead', i.e. contained no copper or silver, but that from the *Carl August* gallery showed promise.

In 1793 96 men were employed on the project, including 18 men responsible for the maintenance of the Martinroda adit. On 12 April 1793 Goethe prepared his sixth report for the shareholders. He wrote that "despite the concerns initially expressed by a large proportion of the shareholders about the not inconsiderable volumes of water, it is now possible to say with certainty that these have been completely brought under control by the four strong machines. No new water sources are being struck nor are any

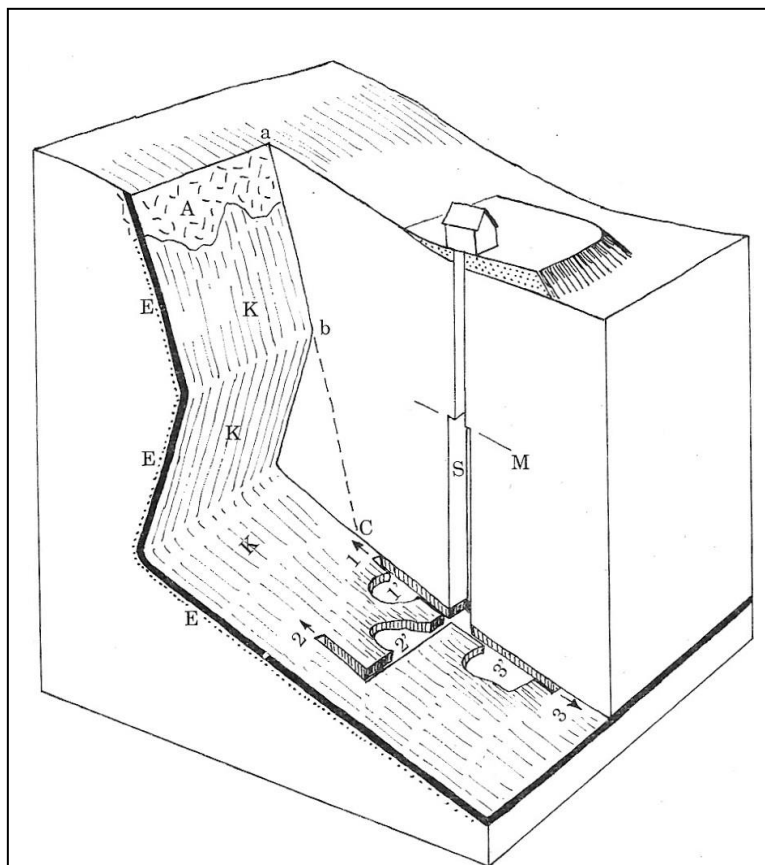


Figure 10 Searching for higher grade ore

- M = Martinroda adit.
- S = Completed shaft.
- K = Copper schist ore seam.
- E = Red sandstone.
- 1, 2, 3 = Directions in which mining proceeded after the first disappointing copper extraction results.
- 1', 2', 3' = Working areas; the *Carl August*, *Luisen*, and *Prinz Bernhard* galleries.
- A = Area previously mined as a surface mine.
- a – b = Inclination of the ore seam known from previous work.
- C = Point at which Johann Voigt believed that the steep, more productive, section of the ore seam would be reached.

Drawing from Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.59

⁸⁸ Wagenbrett p.59.

⁸⁹ "Campagne in Frankreich, Belagerung von Mainz", (*Campaign in France, Siege of Mainz*), published in 1822. Goethe's narrative of the unsuccessful campaign and the successful siege has become a classic text for the history of Franco-German relations during the revolutionary period. A product of recollection, historical hindsight, and considerable study of other published sources, it is a fascinating document of the military catastrophe exposing the decline of Prussian power since the death of Frederick II, which eventually culminated in Napoleon's devastating 1806 victory at Jena and Auerstedt.

to be feared, but their inflow has already been reduced to such an extent by the constant pumping of the machines, that they can be accommodated with three machines, and the fourth can be regarded as a reserve”⁹⁰. When Goethe returned home in August total debts amounted to 7300 Thaler.⁹¹

By the end of April 2500 tons of ore had been brought to the surface. This was enough to begin the smelting and refinement process. Chemical analysis of the ore continued to show low percentages of copper and silver, with somewhat more lead.

Goethe had taken the trouble to learn about metal extraction by amalgamation while in Silesia, and had written a letter to the Mining Commission suggesting that it be tried out on a small scale. The finely crushed ore is mixed with mercury, which forms an amalgam with any metals present. The mercury is driven off by heat, leaving the metals behind.

*“The various mineralogical and chemical observations I made on my recent journey through Silesia have brought me to the thought: whether one could not treat the copper schist just as well, yes, probably even more conveniently than other ores, by finely crushing it into a powder, and concentrating the metals in it. This would save us some considerable work and we could bring the powder immediately to amalgamation. I am sharing this idea for further consideration and would wish that at least a trial should immediately be made on a small scale.”*⁹²

He had suggested that such a trial could be carried out with the involvement of foreman Süß with a minimum of fuss and expense. As no ore from the Ilmenau mine had been brought to the surface yet, it would have to be procured from elsewhere, but Goethe estimated that at most a hundredweight would be sufficient.

But the amalgamation process was never attempted, and the decision was made to continue with the conventional smelting method, a relatively simple procedure. Heat changes the metal sulphides in the ore to metal oxides, the oxygen is driven off as carbon dioxide, leaving behind the pure molten metal. New kilns were constructed and in August the first ore was smelted. Unfortunately this left only slag and dross. Inexperience in controlling the temperature of an ore with not more than a trace of metal had resulted in sending what little there was straight up the chimney.

Christian Voigt complained bitterly: *“It is hard to believe how difficult it is to set up a new work, and experienced workers in a viable smelting works have no idea of the problems we face. With them everything is up and running, and long years of experience have taught them the best methods. Every stage of the process is carried out by skilled men, and should one of them drop out, others with experience who have been trained for the task take his place. All this is different in a place where mining is just beginning again.”*⁹³

In deep despair, Voigt also wrote to the Duke (on 2 September 1793): *‘Nevertheless, I am deeply concerned about the crisis. . . I have dedicated myself, body and soul, to the undertaking, and served it faithfully. I would therefore experience the failure of this, my child, with deepest sorrow.’*

Carl August had a big heart. Seventeen years had passed, and there was still no sign of any copper or silver. But instead of reproaches, or an insistence that the mine finally produces a metal, even lead would be preferable to nothing at all, he offered

⁹⁰ Quoted in Wagenbreth, p.60.

⁹¹ Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, p.55.

⁹² Letter to the Mining Commission, Weimar, 15 October 1790.

⁹³ Quoted in Wagenbreth, p.63.

Voigt comfort and support. On 10 September he replied: ‘. . . *You must therefore not lose courage, but continue to hope that everything will turn out all right. If however, nature is not favourable, the knowledge that you have sought the good to the best of your abilities, will be your compensation.*’⁹⁴

And so there was only one way forward. The extraction process had to be made more efficient. This required yet another investment in more effective crushing, washing, and smelting installations. Somehow the money was found, and work continued.

Goethe remained at least outwardly optimistic. On 7 December 1793 he accompanied Christian Voigt to Ilmenau, and chaired the second shareholders meeting on 9 December. With his recent war experiences in mind he reminded his audience of the bravery of the men doing “*the impossible in the defence of the Fatherland*”, and encouraged them to follow this “*heartening example*”. He was open and honest about the critical financial state of the enterprise, considering it “*big, necessary, costly, and in a certain sense dangerous*”, but explained that the obstacles put in their way “*are placed there by Nature, and the human spirit is called upon to overcome them*”⁹⁵. There was a tour of the Martinroda adit, and the newly established smelting works were inspected.

In spite of the confident mood he attempted to project, the shareholders insisted on a more detailed assessment of the situation, and a more secure financial footing for the company. On 12 December Goethe and Voigt ordered all activities both below and above ground to cease. The shareholders had refused to provide the money needed to pay the wages of the men. With the exception of the men required to keep the pumps going, everyone else was laid off. A year went by.

Goethe continued to lose interest in the mine, and in the summer of 1794 he left to Christian Voigt the task of persuading restless shareholders to put up more money at the third shareholders meeting. As the Duke’s favourite he was able to get away with this. In addition, his signature still appeared on every company share, and this would have been a far greater enticement for prospective buyers than the names of the Voigt brothers.

In December that year Voigt was ill, and Goethe faced the shareholders on his own. 5000 Thaler would be needed to cover maintenance costs and interest on loans for the following year. This was beyond the reach of the remaining shareholders, even with an additional loan from the Carl August’s Exchequer.

Goethe attempted to borrow money from the Prussian shareholders in Berlin. The response, written by Chief Mining Councillor Rosenstiel, arrived in March 1795, crushing his last hopes. Instead of an offer of more capital, came a severe reproach. The complete lack of any definite results had eroded the patience of the shareholders. The Director of the Silesian Department of Mines, Count Friedrich von Reden, was withdrawing from the company, and the bankers had their eyes on profitable investments, such as in the ‘*Prussian Maritime Trading Company*’ which was offering up to 5% interest on investments. The letter included a rebuke aimed directly at Johann Voigt and Goethe: ‘*the Neptunist versus Vulcanist arguments, the study of mineralogy and geognosy, too much science altogether has certainly damaged our work in Ilmenau; and I am not saying this as an empiricist, nor as an opponent of these sciences.*’⁹⁶

⁹⁴ Quoted in Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, p.88.

⁹⁵ Quoted in Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, p.60.

⁹⁶ Ibid. p.62.

The situation was critical, and Goethe turned to an experienced and highly respected natural scientist and mining engineer whom he had first met in 1794 in Jena. Goethe's interest in Alexander von Humboldt was prompted by the latter's botanical studies in Saxony in 1793. See *Alexander von Humboldt* textbox. But now he sought von Humboldt's advice about altogether more urgent matters, although he doesn't say so directly:

"Tell me from time to time something about your experiences, and be assured of my lively participation. As your observations are based on the element, mine from the gestalt, we cannot proceed fast enough to meet in the middle. I am grateful for the public acknowledgement of my contribution to your work; this proof of your friendly disposition is very complimentary to me.

*I am not yet giving up hope of visiting Ilmenau with you some day. As your activities, your hobbies, and your purposes keep you on the move, I hope to see you from time to time in our area, and to become more acquainted with what you think and do. I am certainly taking a lively interest in your progress. I acknowledge with sincere gratitude that you want to give me open and amicable evidence of our scientific connection, and await your essay in eager anticipation. Live well, so that your work continues undisturbed; remember me, and let me hear something about yourself from time to time."*⁹⁷

Christian Voigt was again left to face the shareholders alone at the shareholders meeting in June 1795. Intermittent attempts with different smelting techniques were tried from time to time, all to no avail. At the end of August Goethe, together with his five year old son August, celebrated his 46th birthday in Ilmenau. But he was mainly concerned with the vanishingly small yield of the smelting process, which he analysed in detail. He concluded that *"it is to be expected that our crushing and washing equipment, as well as our smelting process will yield distressing results"*, and that *"everything depended on a significant improvement of the quality of the ore"*⁹⁸. It was beginning to dawn on Goethe that the project was doomed. He confided in Christian Voigt:

*"I thank you most heartily for the messages you had the kindness to pass on to me. I have spent my time here diligently in my own way, and have made good progress with my work. Concerning the enclosed inquiries about the mine please respond respectfully; unfortunately, the enterprise looks more and more like a slowly extinguishing lamp."*⁹⁹

Another attempt to borrow money from Berlin was turned down in May 1796. The bankers insisted on a detailed business plan; failing this they would insist on the appointment of a 'mining expert' of 'proven integrity' to attempt to salvage the company.

In 1796 several shareholder meetings were held in Weimar, and on 6 July Goethe took the chair: *"The question we are asking of Nature can only be answered by working towards the seam and reaching it, . . . to maintain the honour of the Ilmenau mine and to guarantee its future existence."* He acknowledged that a critical point had been reached, but impressed upon his listeners that the way forward was to be found in mechanics and chemistry, *"which these days is with us to stay, and the influence of which has increased so remarkably."* He anticipated that *"skilful treatment"* of the ore

⁹⁷ Letter to Alexander von Humboldt, 18 June 1795. Von Humboldt was a senior mine manager (*Oberbergmeister*) in Prussia between 1792 and 1796. He ignored the invitation to visit Ilmenau even though he visited his brother Wilhelm in Jena in 1795.

⁹⁸ In a letter to Christian Voigt, 2 September 1795

⁹⁹ Letter to Christian Voigt, Jena, 3 March 1796.

would result in a “*realistic yield*”.¹⁰⁰ But Goethe ignored the root of the problem: the unexpectedly low metal content of the ore, the “*distressing results*” he had predicted the previous year.

At this point more than half the original shareholders had left the company, and those remaining were doing their own calculations. A shareholder who had paid 20 Thaler for a share in 1784, had by 1796 been obliged to make 7 further payments, totalling 51½ Thaler. This had been beyond the means of many, and they had had no choice but to forfeit their shares, which became the property of the company¹⁰¹.

Outwardly however, Goethe remained optimistic. He offered a reprieve to defaulting shareholders, and announced that the Duke would underwrite the outstanding loans. It remains unclear whether Carl August was aware of this announcement at the time. Either way, in a letter to Voigt three weeks later, Goethe deemed it prudent to “*mention*” to the Duke of the possibility that such a guarantee might be required:

*“You will probably have the opportunity to explain the situation to Serenissimo, and also to mention something provisionally about the possibility of the necessary guarantee ‘in supplementum’ for two years. If we remain pro-active in chasing up the obligations of the existing shareholders, and do all we can to find new ones, then I hope that it would not be necessary to ask for additional funds.”*¹⁰²

The lack of cash was having an effect on the “*poor moles*” as well. Delays in the payment of wages, intermittent work stoppages, laid off men, all had a demoralising effect on the whole enterprise, and still no metals of any worth.

A final push was initiated in an attempt to reach the steeply inclined section of the seam, where past experience had shown the copper content of the ore to be significantly higher. Johann Voigt had predicted that this section of the seam should be reached not far from the shaft. See Figure 10.

But another unpleasant surprise awaited them. The horizontal section of the copper schist seam extended much further than expected. The only possible explanation was, as Voigt correctly surmised, but was unable to explain, that the inclined section of the seam was thrust back over the horizontal section, i.e. the fault zone near Ilmenau was what geologists describe as a ‘thrust fault’. What for Voigt remained a geological riddle, can be explained today as a result of the tectonic upheavals giving rise to the Northern fault zone of the Thuringian forest.

There was little choice but to keep going, and work proceeded in the direction of the steeply inclined section, but now disaster struck. During the night of 24 October the Martinroda adit collapsed, fortunately without loss of life. Johann Voigt described what happened that night, and what follows is based on his report.¹⁰³

Catastrophe

It was two in the morning. Twelve miners were at work, close to the end of their night shift. Foreman Eichel, more than halfway down the shaft below the adit, was tending the pumps with his assistants. Everything was working well, 56 piston pumps were lifting impressive volumes of water from the bottom of the shaft into the adit.

Suddenly a torrent of water cascaded down the shaft, extinguishing his lamp. Eichel jumped up, and believing that his assistant at the adit entrance had lost control, he

¹⁰⁰ Quoted in Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, pp.63,64.

¹⁰¹ Figures from Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, p.65.

¹⁰² Letter to Christian Voigt, Weimar, 25 July 1796

¹⁰³ The report is quoted in full in Wagenbreth, pp. 63-67.

climbed up the ladder, water pouring down on his back. Arriving at the adit entrance he saw that instead of water flowing down the tunnel, it was coming the other way, flowing out of the tunnel, pouring into the shaft. Fortunately a miner, about to descend to take up his shift, was carrying a still working lamp.

Eichel immediately realised what had happened, grabbed the light, raced up the remaining 104 meters of ladders to the pithead, diverted the water flowing into the chute feeding the waterwheels, and raised the alarm. Then he scrambled back down the ladders to warn the twelve miners working at the rockface below, well aware that all three galleries were rapidly filling with water. He was just in time. Only 60 cm of air remained between the rising water and the tunnel roof. Eichel's presence of mind had saved them from either drowning or asphyxiation.

Alexander von Humboldt (1769 – 1859)

Although Friedrich Wilhelm Heinrich Alexander von Humboldt was interested in botany from an early age, he remained uncertain about the direction he wanted to give to his life. A year spent at the University of Göttingen opened his eyes to the world of science, with an emphasis on geology and mineralogy. He decided to enrol at the Freiberg Mining Academy, where supported by his prodigious memory, and driven by an endless thirst for knowledge, he developed an enormous capacity for hard work. After a morning sent underground, he attended classes in the afternoon, and spent the summer evenings combing the countryside for plants.

He left the Academy without a degree in 1792, but was immediately appointed to a Prussian government position in the Department of Mines as an inspector in Bayreuth and the Fichtel mountains. Humboldt was excellent at his job, travelling from mine to mine, reorganising neglected and deserted pits, so that the production of gold ore in his first year outstripped that of the previous eight years. During his period as a mine inspector, Humboldt demonstrated his deep concern for the men labouring in the mines. He opened a free school for miners, paid for out of his own pocket, which became an unchartered government training school for labour. He also sought to establish an emergency relief fund for miners, aiding them following accidents.

Humboldt's research into the vegetation around Freiberg led to the publication in Latin (1793) of his *Florae Fribergensis, accedunt Aphorismi ex Doctrina, Physiologiae Chemicae Plantarum*, which was a compendium of his botanical research. That publication brought him to the attention of Goethe, who had met Humboldt at the family home when Alexander was a boy. But Goethe was now interested in meeting the young scientist to discuss his book *Metamorphosis of Plants*, which he had published in 1790. An introduction was arranged by Humboldt's brother, Wilhelm who lived in the university town of Jena.

Goethe had also developed his own extensive theories on comparative anatomy. Working before Darwin, he believed that animals had an internal force, an *Urform*, that gave them a basic shape and then they were further adapted to their environment by an external force. Humboldt urged him to publish his theories. Together, the two discussed and expanded these ideas. Goethe and Humboldt soon became close friends.

Humboldt often returned to Jena in the years that followed. Goethe remarked about Humboldt that he had never met anyone so versatile. Humboldt's drive served as an inspiration for Goethe. In 1797, Humboldt returned to Jena for three months. During this time, Goethe left wife and son in Weimar to study with him in Jena. Together, they attended university lectures on anatomy, and conducted their own experiments. One experiment involved hooking up a frog leg to various metals. They found no effect until the moisture of Humboldt's breath triggered a reaction that caused the frog leg to leap off the table. Humboldt described this as one of his favourite experiments because it was as if he were "breathing life into" the leg.

During this visit, a thunderstorm killed a farmer and his wife. Humboldt obtained their corpses and analysed them in the anatomy tower of the university.

Humboldt soon became a member of the famous group of intellectuals and cultural leaders of Weimar Classicism. Goethe and Schiller were the leading figures at the time, but Herder, Wieland and Alexander's brother Wilhelm also played important parts in developing a new role for humanism.

Johann Voigt was roused from his bed, ran to the pithead where he met Schreiber, who had already been down to the adit, and realised it was no longer accessible. After several days the adit was entered through the disused *Getreuer Friedrich* shaft, and the blockage was discovered below the *König David* shaft, which had been vaulted after the adit's construction. Rubble filled the tunnel from floor to roof; only a trickle of water escaped between the top of the debris and the tunnel roof.

Attempts to clear the rubble were made during the following weeks, but a complete lack of circulating air repeatedly brought the work to a halt. Nausea forced even the fittest miners to seek fresh air. Ducts and bellows were brought in to try to improve

the airflow, but without success. Finally, after many months, the 'wet region', running twenty meters above the adit, (and which had been the main source of ventilation during its construction) was cleared, and the blockage was accessed from above. In the light of what was about to happen, this was indeed fortunate.

Clearance of the tunnel could now begin in earnest, with the rubble winched up by hand through the access shaft, and carted away. Slowly, layer by layer, the debris was removed. Then suddenly the dam formed by the rubble gave way and was carried down the tunnel by a brief, but raging torrent. Voigt wrote that this occurred during the '*Quartal Trinitatis*' (between 1 April and 30 June) in 1798. The records give no indication as to why experienced miners would initially try to clear a debris dam from below, fully aware of the volume of water held back only a few meters away. Nor why it took 18 months or more to clear away what turned out to be a relatively minor rockfall, extending a mere eight meters on either side of the original vaulting.

But the consequences were enormous. The Martinroda adit carried away not only groundwater, but also water brought in to run the underground waterwheels powering the pumps and other machinery. The pumps and waterwheels within the shaft were of no use as the water needed to drive them was unable to drain away. The mine was brought to a standstill.

Goethe arrived in Ilmenau on 30 October, together with his 6 year old son August. He hoped that in the seclusion of Ilmenau he would

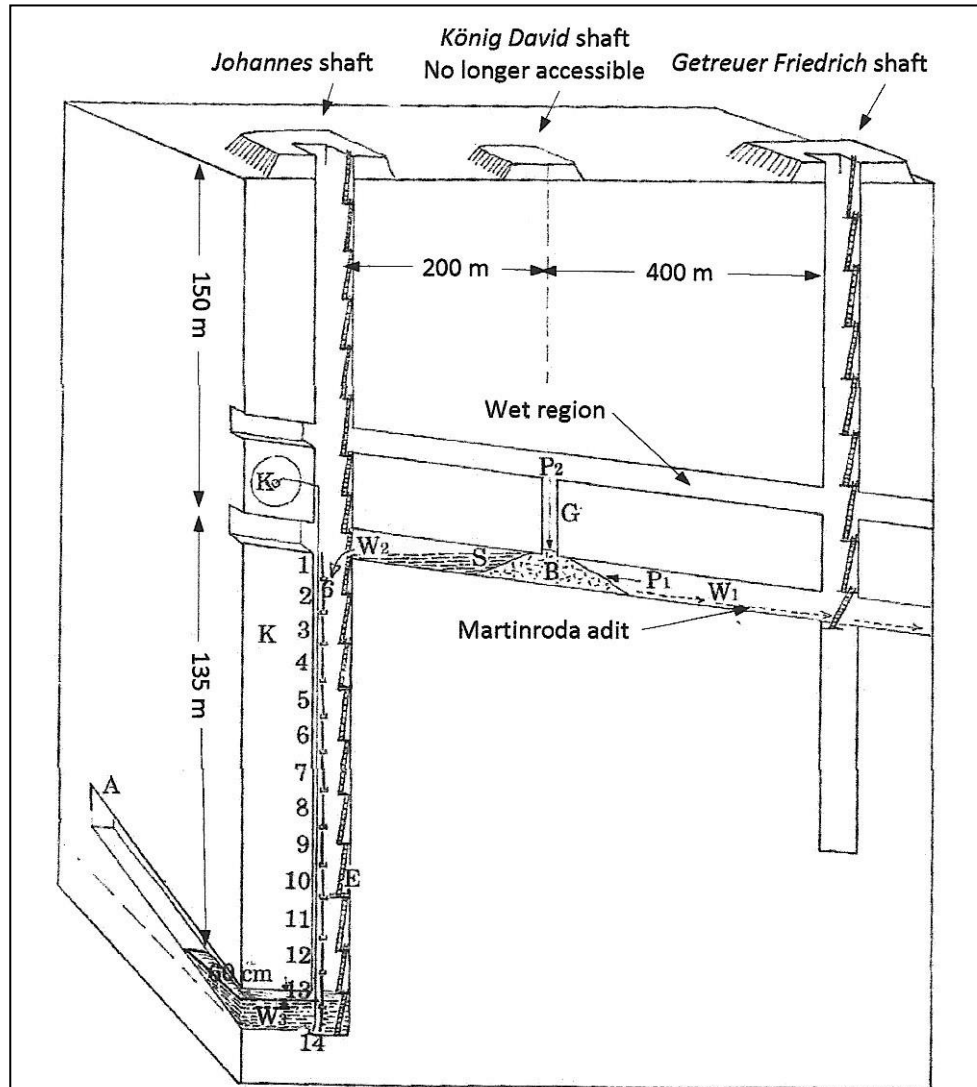


Figure 11 Block diagram of the roof fall based on Voigt's report

- E = Position of foreman Eichel at the time of the disaster.
- K = Waterwheel with set of 14 piston pumps.
- G = Access shaft near the *König David* shaft.
- B = Roof collapse. S = water backed up against the rubble as high as the adit roof.
- W₁ = Direction of normal water flow. W₂ = water cascading into the shaft.
- W₃ = Water level at the bottom of the shaft, just 60 cm below the roof of the tunnel leading into the work area.
- A = Area where the 12 miners were working.
- P₁ = First attempt at clearing the rubble, abandoned because of low oxygen levels.
- P₂ = Second, successful, attempt at clearing the rubble.

Drawing from Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.65.

find some time to work on *Hermann and Dorothea*,¹⁰⁴ but although there was very little he was able to do on a practical level in dealing with the disaster - he was duty bound in supporting the advice of the professionals - August needed more attention than he had anticipated, and kept him awake at night. After eleven days of unproductive meetings and contradictory reports he decided to return to Weimar.

His first report on the disaster at Ilmenau was to Christian Voigt:

“The beautiful weather that accompanied me here has been transformed by clouds, but it is still dry and pleasantly cool.

. . . it would be best if we make the Getreuer Friedrich shaft accessible again and that we use the ore buckets in the Johannes shaft to not only control the water level but to bring it down below the adit, thereby avoiding flooding the ‘wet region’; draining the adit to decrease the water behind the break would make the removal of the fallen rocks less dangerous. More details will follow when I have a better oversight.

Schrater died tonight, and something is dying for us. He is survived by his widow and their many children for whom we will have to show some degree of compassion. But we will probably be able to get rid of them with a small gratuity payment, because they are likely to return to Hessen.”

Goethe was distraught by the situation he found, and he realised that this was the end of his hopes for the town. He was so upset that his usual compassion for the long suffering poor was not in evidence for the grieving widow. Goethe continued the letter on the following day:

“We now have to wait until the Getreuer Friedrich shaft is accessible; I hope that this will be the case, and that the emergency equipment will be ready, before the end of the week, and perhaps even making a start on clearing up the break.

Unfortunately, a few buckets have gone into the shaft while bringing up the water; but there should be no concerns that we cannot keep the water at least <http://www.zeno.org/Literatur/L/Goethe-WA-IV,+Bd.+11> level with the adit. I will wait calmly until everything is in place and then return [to Weimar]. The rainy weather is making my stay here very somber and, notwithstanding my solitude I have not yet been able to get into a working mood; meanwhile, the foreman’s [Johann Voigt] mineral collection provides quite a pleasant and instructive diversion. Live well; I hope to see you again soon, and ask for some news about how things stand in political world of Weimar.”¹⁰⁵

In the next letter to Voigt dated 3 November, there is mention of a possible second tunnel roof collapse, and the miners refused to enter the adit. The situation remained complex, no one had a clear oversight, and many questions remained unanswered, even today. *“Worst of all are the speculations of a second break.”* Even if the adit had been accessed through the *Getreuer Friedrich* shaft on 3 November (unlikely), there would have been no time for a proper inspection. There were no further reports of a *“second break”*, and Goethe made no mention of it in his report to the shareholders on 8 November.

¹⁰⁴ *Hermann and Dorothea* is an epic poem in Greek hexameters about German refugees from the French occupation of the Palatinate (West bank of the Rhine), centered on the love of an established burgher’s son for a poor unwelcome refugee. It was completed the following year.

¹⁰⁵ Letter to Christian Voigt, Ilmenau, 31 October 1796.

It remains unclear just how much Goethe was involved on a practical level in dealing with the disaster. “*I am gradually persuading myself that my presence here is of some use*”, he wrote to Christian Voigt on 3 November, but he appeared to be more interested in the “*foreman’s mineral collection*” than in crisis management. He summed up the two tasks most urgently needing attention as first, gaining access to the roof collapse via the *Getreuer Friedrich* shaft from below, and second, lowering the water level in the *Johannes* shaft from above. This could only be achieved by using the ore buckets as scoops pulled up by the winch powered by the only functioning waterwheel (the ‘interim’ wheel) at the pithead. There was probably little he could have done by way of assistance here.

He prepared a sketch of the collapse for the meeting of the Mining Commission on 8 November 1796 See Figure 12. After describing the details on his sketch he continued:

“*Clearance has progressed far enough that it is now possible to see the opening left by the collapsed roof. Work will proceed in such a way that once it is possible to enter the opening, clearance will take place from above. Because there is still a considerable amount of water flowing through the rubble, we hope that gradually the flow of air will improve, and, as the rubble is cleared from above, the danger which a rapid breakthrough of the water would present not only to the workers, but also to the lower regions of the adit, will be averted by gradually drawing off the water.*”¹⁰⁶

He had intended to stay in Ilmenau until the situation had been brought under control. But little had been achieved by the time of

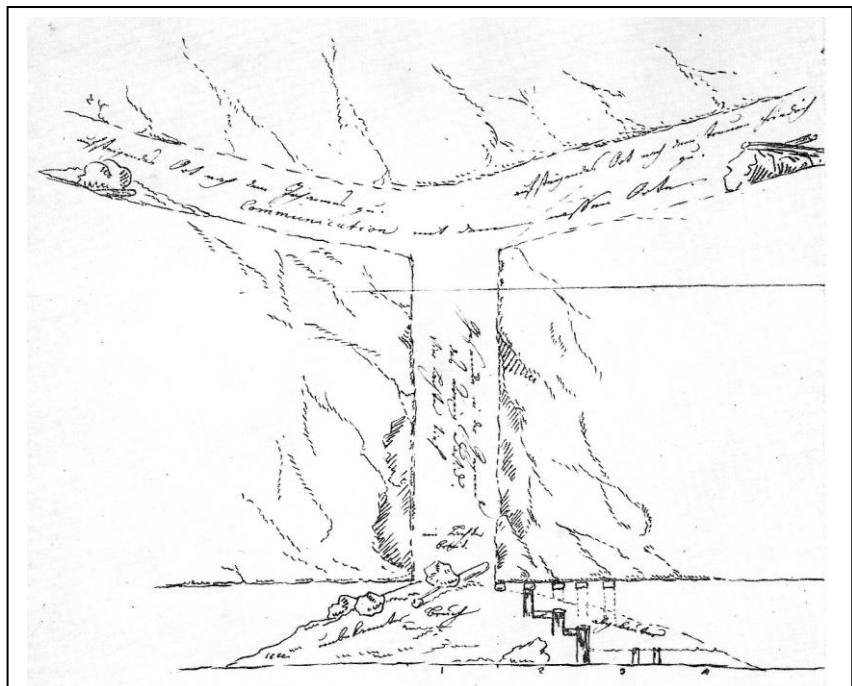


Fig. 12 Goethe’s sketch of the Martinroda adit roof collapse
 In his handwriting; top left: rising towards the *Johannes*,
 top right: rising towards the *Getreuer Friedrich*,
 middle: communication with the wet regions,
 vertical: collapse in the region of the *King David*,
 four Lachter deep, one Lachter wide,
 bottom left: unknown rockfall,
 bottom right: partially cleared.

Source: Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*.

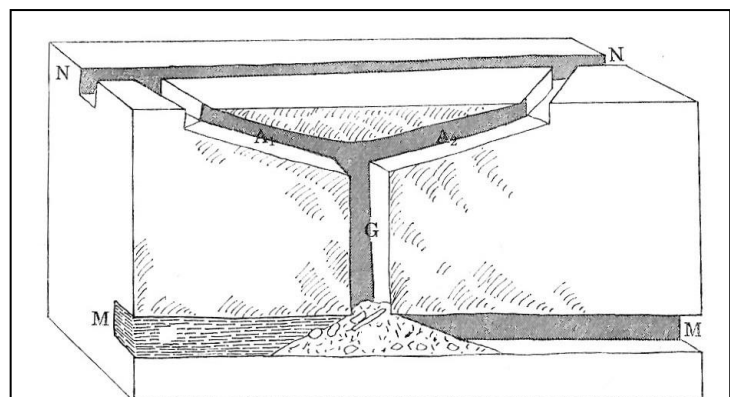


Fig. 13 Block diagram based on Goethe’s sketch of the Martinroda adit roof collapse

- N – N = Wet region.
- M – M = Martinroda adit
- G = Previous access shaft.
- A₁ = Tunnel rising towards the *Johannes* shaft.
- A₂ = Tunnel rising towards the *Getreuer Friedrich* shaft.

The water held back by the rubble is shown on the left.

Drawing from Otfried Wagenbreth (1983) *Goethe und der Ilmenauer Bergbau*, p.69.

¹⁰⁶ Quoted in Wagenbreth, p.67.

the shareholders meeting on 8 November, and Goethe returned to Weimar the following day. On 12 November he wrote to Schiller about his days in Ilmenau:

“By finding myself in direct contact with the rocks of the Earth, and through Voigt’s mineral collection, I have been led back to the Rocky Kingdom again. I am very pleased that I have been able, as it were by chance, to renew these contemplations, without which the famous morphology would not be complete. This time I have gained some good insights from these rock samples, which I will share with you when the occasion presents itself.

Otherwise, however, I did not see the hem of a muse’s dress, even for prose I found myself incapable, and neither production nor reproduction could be felt in the slightest. We must now patiently await developments. I do not know when I will be able to see you; for the time being I will not be able to leave here. Perhaps I’ll come for a day to greet Humboldt and discuss some matters. Live well and greet everything that surrounds you.”¹⁰⁷

He wrote not a word about the disaster which had struck the town.

After the Disaster

At the mine everything came to a halt, but once he was back in Weimar Goethe reconnected with his muse, and was soon hard at work on what he did best. *“Schiller is working diligently on his ‘Wallenstein’, the older Humboldt¹⁰⁸ on a translation of ‘Agamemnon’ by Aeschylus, the older Schlegel¹⁰⁹ on one of ‘Julius Caesar’ by Shakespeare, and insofar as I have reasons to think about the nature of epic poetry, I am at the same time prompted to be attentive to tragedy, whereby some special relationships are emerging.”*

He was still working on the epic poem *Hermann and Dorothea*, but was making plans to continue with *Faust*. Nor did he neglect his scientific work, and he was in Jena for several months to carry out scientific work with Alexander von Humboldt, about which he wrote to von Knebel.

“In addition, the presence of the younger von Humboldt, which alone is enough to fill an entire lifetime with interesting details, brings everything chemically, physically, and physiologically interesting into movement, so that it was sometimes quite difficult for me to withdraw into my own company.

If you now add to this the fact that Fichte has begun to publish a new account of his theory of science in the Philosophical Journal, and that I, due to the speculative tendency of the circle in which I live, must at least take a general interest in it, then you will easily see that sometimes one does not know which way to turn one’s head; especially if generous dinners shorten the night, and do not favor the moderation so essential to study. I am therefore looking forward to coming back to Weimar soon, to recover in a different circle of friends. The energy with which scientific matters are driven along, and the speed at which the young generation seizes that which can be acquired, is unbelievable. Meanwhile, live well in your peaceful garden where I hope to see you again at the end of the week.”¹¹⁰

¹⁰⁷ Goethe first mentions the idea of morphology in his diary on 25 September 1796, and had presumably discussed it with Schiller before he wrote the November letter.

¹⁰⁸ Wilhelm von Humboldt (1767-1835), older brother of Alexander was a philosopher, linguist and diplomat, founder of the university in Berlin now named after him.

¹⁰⁹ August Wilhelm Schlegel (1767-1845) was a poet, translator, and critic who with his younger brother Friedrich was a leading influence within Jena romanticism. His translations of Shakespeare became German classics.

¹¹⁰ Letter to Ludwig von Knebel, Jena, 28 March 1797.

In May he prepared a report of the situation at Ilmenau to be presented at a meeting of the privy council. As the mine was still at a standstill, this did not make good reading. He hoped to present a more optimistic picture by soliciting the advice of von Humboldt, for whom both he and Carl August had the greatest respect. With this in mind he had already written to the Duke in March,

*“Bergrat von Humboldt is here. He is a true Cornucopia of the natural sciences. His approach is extremely interesting and instructive. You could not learn in eight days from books what he presents in an hour.”*¹¹¹

In May 1797 Goethe again attempted to persuade Alexander von Humboldt to visit the mine. He hoped that Von Humboldt’s reputation, as well as his invention of a ‘rescue lamp’ which was independent of ambient oxygen levels, would persuade the miners to go back into the adit to finally get it cleared. Goethe managed to avoid attending the meeting, leaving Christian Voigt to make the presentation, and bear the “discomfort”. He advised Voigt on the best approach:

“Since his serenity, as I hear, has insisted on bringing the mine matter to Council, we will certainly, although not without some discomfort on our part, move beyond this matter; for from whichever angle I look at it, there seems to be no other way forward. I will mention a few things here that can perhaps be used in the presentation.

Let it be felt that we must have ready to present at the monthly Monday session a strong enough case to the deputies, and through them to the shareholders, insisting that they settle their obligations without further delay between now and St John’s tide [24 June], in order to stay more or less solvent until Michaelmas [29 September], by which time further payments will inevitably become necessary.

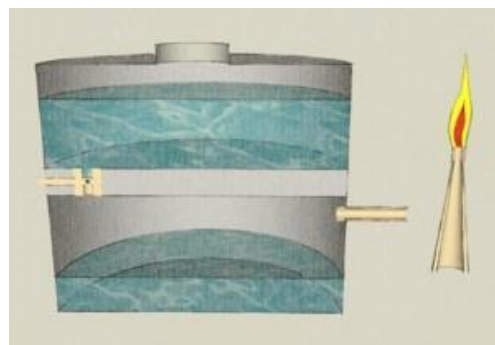
*You could also add that I hope to persuade Herr Bergrat von Humboldt to go up with me [to Ilmenau] next week to try out his lamps in situ, and to give the necessary guidance to those who will be using them. I am sending him an express letter today to ascertain the time most convenient to him.”*¹¹²

He received von Humboldt’s answer two days later, and communicated the disappointing news to Voigt: *“Oberbergrath von Humboldt has rejected my request, at least for the moment; perhaps I’ll win him over for this expedition when I come to Jena in about eight days.”*¹¹³

At the cabinet meeting on 4 May it was agreed that the Weimar treasury would finance the maintenance of the shaft, and that the Duke would continue to pay the interest on outstanding loans. Goethe was still nominally in charge but had already

Von Humboldt’s Rescue Lamp

Von Humboldt worked on the so-called rescue lamp (*Wetter Lampe*) in 1796. It was intended for rescue and recovery work underground in oxygen-poor surroundings. The lamp contained its own reservoir of air, and when this was used up the lamp went out. The open flame (the lamp was not a safety lamp!) burned for only relatively short periods, and the lamp was therefore unsuitable for operations lasting several hours. The air required for operation was pushed out of the reservoir by water flowing through a valve, and reached the flame directly through a hollow wick. Von Humboldt tested the lamp himself under varying oxygen-poor conditions underground, on one occasion losing consciousness.



Humboldt’s rescue lamp showing water and air reservoirs, the connecting valve through which water was drawn in by decreasing air pressure, and the hollow wick.

¹¹¹ Draft of a letter to Carl August, Jena, early March 1797.

¹¹² Letter to Christian Voigt, 4 May 1797.

¹¹³ Letter to Christian Voigt, Weimar, 6 May 1797.

delegated most of the necessary work to Christian Voigt. On 14 July he forfeited his only share – an ominous sign – and was clearly trying to put the problem of Ilmenau behind him. Yet he does not relinquish his position as director of the Mining Commission. Was it pride, or a wish to offer at least moral support to Voigt, or an inability to accept that he had failed the “*poor moles*” and their dependents?

Access to the ‘wet regions’ had been relatively easy to achieve, but the action plan Goethe had proposed the previous November could only be carried out if fresh air could be pumped into the adit. Von Humboldt’s rescue lamps were of limited use as the air in the lamp’s reservoir was soon used up.

For reasons never adequately explained, it took until May 1798 to finally clear the rubble and reopen the entire length of the adit. The most likely reason was that once the rubble under the disused *König David* shaft (see Figure 13) had been cleared it became more than obvious that the repairs neglected in 1784 could be neglected no longer. It also seems likely that the torrent of water carrying mud, rocks and rubble from the roof fall down the adit when the blockage was swept away exposed more weaknesses further downstream.

It would have now been possible to continue bringing up ore, and running more smelting trials. But the shareholders had had enough, and refused to stump up any more money. Every Thaler had been spent, and there was no money left to pay the wages. Christian Voigt wrote, *‘the last few remaining steadfast shareholders were scared off by the most recent misfortune, and no one was willing to make any more payments’*.

Goethe moves on

Goethe needed to get away, and during the summer of 1797 he planned an extended visit to his friend Johann Meyer¹¹⁴, staying at the time near Lake Zürich (Switzerland) to whom he wrote on 21 July, “*that my suitcase left for Frankfurt with the mail coach this morning, and that part of me is already on the move towards you; the body will now also soon follow the spirit and the clothes*”. He left Weimar on 30 July with Christiane and August for a few days with his mother in Frankfurt. Wife and son returned to Weimar, while Goethe continued on to Zürich via Stuttgart later in the month.

Goethe was uncertain whether he should cross the Alps into Italy for a third time, and there are hints in his letters that he was contemplating the possibility of going to Paris.

*“After that I want to visit our good Meyer, who has arrived at Lake Zürich, and, before I start on my way back, undertake some kind of short tour with him. I have no desire for Italy; I have no wish to observe the caterpillars and chrysalides of freedom [of the new Italian republics], I would far rather see the French butterflies emerge from their cocoons [in Paris].”*¹¹⁵

¹¹⁴ Johann Heinrich Meyer (1760-1832) was a Swiss painter, engraver and art critic. He had met Goethe in Rome in 1786, and moved to Weimar in 1790, living with Goethe until 1802. He became the second Director of the Weimar Drawing School (after Kraus) in 1795. A close associate of Goethe, he was often referred to as ‘*Goethemeyer*’. Goethe used his visit to Meyer in 1797 to gather material about William Tell about whom he intended to write a drama, a plan he soon abandoned and passed on to Schiller, who completed his drama *Wilhelm Tell* in 1804.

¹¹⁵ Letter to Ludwig von Knebel, Frankfurt, 10 August 1797. Napoleon had invaded Northern Italy in the spring of 1796, and had established two Italian republics (the ‘Cispadane’ and the ‘Transpadane’ republics, which merged to become the ‘Cisalpine’ republic the following year) under the protection of his army.

He forwarded his suitcase to Stuttgart on 24 August, but reveals very little of his plans for Switzerland. *“My suitcase has been dispatched to Stuttgart, and I will not hesitate to follow. My hope and joy to see you again soon is very great, prepare for me a spot in the countryside where we can live together for a while.”*¹¹⁶

Much to the relief of Christiane, who had written several letters imploring him to return home ‘soon’, it was not possible to visit either country. He travelled as far as the Alps, but was forced to turn back. *“Since Italy, by its earlier disturbances, and France by its latest, is more or less closed to foreigners, we will probably, from the summit of the Alps, again follow the slope of the water and, down the Rhine, move again to the North.”*¹¹⁷

*“In eight days the route of our return journey will be decided, as the world all around us threatens to erupt in confusion again. In the end, the only route we will probably be left with will be the one Wieland took a year ago. Who would have thought that in Switzerland one would once again be in danger of being cut off from Germany! That we have dutifully hammered rocks on our journey, you can easily imagine, and I have packed up almost more than a reasonable amount; but how can one resist when one sits right in the middle of several hundredweight of [orthoclase] feldspars. Among the more common specimens I will also bring some rare and exceptionally beautiful things.”*¹¹⁸

Neither the flooding of the Ilmenau mine, nor the unexpectedly rapid advance of Napoleon in the north of Italy could dampen Goethe’s keen interest in mineralogy, an interest which continued until the end of his life.

There is no document formalising Goethe’s resignation from the Mining Commission, although the documentary record is not complete¹¹⁹. On 31 December 1799 he placed his signature under a newly bought share for the last time. His last signature on a Commission document is dated 18 August 1800. Four years passed before Christian Voigt was mentioned as the chairman of the Commission in 1804. Goethe, who always found it difficult to talk about matters painful to him, avoided the subject of Ilmenau in his correspondence, even with Voigt and Carl August. It is however, unlikely that the high hopes and deep disappointment experienced by all those with an interest in the undertaking were not discussed in conversation - the records only tell us what has been written down.

All the participants came to terms with the calamitous turn of events – each in their own way – and did their best to move on. The ore crushing mill began to be used to pulp sugar beet from which sugar was produced. White lead was produced in the empty smelting works¹²⁰, and the porcelain factory continued to prosper.

But inevitably, it was the miners who experienced the most hardship. Many had lost their jobs, and even for the dozen or so who still had work maintaining the shaft and adit in a safe condition, there was often no money for their wages. From time to time petitions were handed to the authorities detailing their dire situation. Their families were barely kept alive on bread and water, no one was prepared to lend them money to buy grain.

Final Closure

¹¹⁶ Letter to Johann Heinrich Meyer, Frankfurt, 24 August.

¹¹⁷ Letter to Schiller, Stäfa (on Lake Zürich), 25 September 1797.

¹¹⁸ Letter to Christian Voigt, Stäfa, 17 October 1797.

¹¹⁹ Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, p.73.

¹²⁰ Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, p.77. Although poisonous, white lead was one of the oldest colour pigments used by humans.

In July 1812 the decision was finally made to stop all maintenance work on the shaft and the *Martinroda* adit. Although only a small annual investment was needed to keep a few men in employment, but with no hope of a return, even Carl August had realised that the mine would never be profitable, and that the accrued debts would have to be paid off some other way. Since the start of operations in 1776, 76,000 Thaler had been swallowed up. Before the onset of winter the *Neue Johannes* and *Getreuer Friedrich* shafts were vaulted over, the mouth of the *Martinroda* adit walled up, the buildings dismantled, and the spoil site levelled off.

Goethe was relieved, and broke his silence at last. In April 1813 he wrote to his long standing colleague and friend, reminiscing about their shared experiences and thanking him for taking on the difficult task of winding up the business, something he himself had found impossible to do:

*“These moments, which although still painful, but for us wonderfully assuaged, could not be applied better than by expressing my sincere thanks to your honour for the recent communication. It is a difference, whether in reckless youth and carefree days, trusting no [guiding] forces more than necessary, undertaking great ventures with inadequate means, and misleading oneself and others with vain hopes; or whether in later years, in hard-pressed times, after harsh reality has been imposed, one rings one’s will and half fulfilled accomplishments to the grave. The debt I owe your honour remains unforgettable. Most congenial is the memory of our working and striving together, mutual encouragement and instruction. Even though the venture has not borne fruit outwardly, inwardly the gain has been the greater. I also acknowledge with deepest gratitude that you are willing to take on all the unpleasant matters necessarily accompanying the termination of the business. If only I were able to do something kind and in return.”*¹²¹

Christian’s brother Johann Voigt took a more relaxed approach to the failure: *‘Doctors, moles and miners have much in common with each other. They all grope in the dark, and the end of their labours are piles of earth.’*¹²²

Goethe’s relief at the final closure of the mine is so great that, not having set foot in Ilmenau for 17 years, he decided to celebrate his 64th birthday there in August 1813. Carl August paid a surprise visit with his retinue; the town councillors serenaded him; there was a barn dance. He visited the porcelain works on 31 August, and encouraged the establishment of small industries. There is not a word about the mine in his diary, but he was again very interested in Johann Voigt’s mineral collection (which he later bought for the University of Jena after Voigt’s death in 1821).

Three years later, 27 September 1816, Christian Voigt celebrated his 50th anniversary of public service in Weimar. Goethe wrote a poem dedicated to his longstanding colleague. Using the same metaphor he had used 43 years earlier in his letter to Professor Höpfner, he remembers their mining and geognostic work together.

*“Uplifted by a mountain breeze, aware of the ethereal skies,
on summit rock of high-forested ravines,
In narrow tunnels as in deepest shafts
Seeking a light that will ignite the spirit,
Was a delightful, partnered contemplation
Whether nature will at last be fathomed.*

¹²¹ Letter to Christian Voigt, 11 April 1813.

¹²² Quoted in: Manfred Wenzel (1987) *Der Ilmenauer Bergbau und sein Einfluß auf Goethe als Dichter und Naturforscher*, *Medizinhistorisches Journal* 22,1 pp 3-27

*And many years of quiet earthly life
 Bore witness to the noblest striving.
 In garden also, where poetic flowers sprouted,
 Refreshing outer sense, and inner contemplation,
 Safe not from airy arrows,
 Sent by Cupids back and forth,
 There we spent the hours in deep enjoyment
 Serenely contemplating early worlds,
 Joining us to eternal cherished spirits,
 The ever eloquent, unmatched masters.”*

To Minister of State von Voigt, to mark the 27th of September 1816

*Von Berges Luft, dem Äther gleich zu achten,
 Umweht, auf Gipfelfels hochwaldiger Schlünde,
 Im engsten Stollen wie in tiefsten Schachten
 Ein Licht zu suchen, das den Geist entzündet,
 War ein gemeinsam köstliches Betrachten,
 Ob nicht Natur zuletzt sich doch ergründe.
 Und manches Jahr des stillsten Erdelebens
 Ward so zum Zeugen edelsten Bestrebens.*

*Im Garten auch, wo Dichterblumen sprossen,
 Den äußern Sinn, den innern Sinn erquicken,
 Gefahrlos nicht vor luftigen Geschossen,
 Wie sie Erosen hin und wider schicken,
 Da haben wir der Stunden viel genossen
 An frisch belebter Vorwelt heitern Blicken,
 Gesellend uns den ewig teuren Geistern,
 Den stets bereden, unerreichten Meistern.*

*Dahin bewegten wir von dornigen Pfaden
 Verwornen Lebens gern die müden Schritte,
 Dort fanden sich, zu gleicher Lust geladen,
 Der Männer Tiefsinn, Frauengeist und – sitte
 Und Wissenschaft und Kunst und alle Gnaden
 Des Musengottes reich in unsrer Mitte,
 Bis endlich, längst umwölkt, der Himmel wettetert,
 Das Paradies und seinen Hain zerschmettert.*

*Nun aber Friede tröstend wiederkehret,
 Kehrt unser Sinn sich treulich nach dem Alten,
 Zu bauen auf, was Kampf und Zug zerstörtet,
 Zu sichern, wie's ein guter Geist erhalten.
 Verwirrend ist's, wenn man die Menge höret;
 Denn jeder will nach eignem Willen schalten;
 Beharren wir zusamt in gleichem Sinne,
 Das rechn' ich uns zum köstlichsten Gewinne.*

Looking Back

In 1823 Goethe expressed the opinion “*the Ilmenau mine would probably have held up if it had not existed in isolation; if it could have been affiliated with a Harz or Freiberg mining company.*”¹²³

Could he have done anything differently? He went as far as it was possible to go with the state of knowledge at the time. In 1781 he even sought confirmation of the already unanimous opinions of Friedrich Trebra, Johann Voigt, mining inspector Schreiber, and others, by meeting with Johann Otto Mühlberg, who had worked in the old Ilmenau shaft between 1728 and 1740 while in his teens and twenties, and so a genuine ‘*miner in leather*’. He prepared 12 questions for the 72 year old pensioner. The answers he received confirmed the opinion of the professionals, the ‘*miners with feather*’.¹²⁴

But he was aware of at least one ominous sign from the beginning. Already in February 1784, Mining Inspector August Schreiber had drawn attention to the ‘*extremely poor condition of a stretch of the adit*’. Goethe investigated immediately,

¹²³ In a conversation with Chancellor Friedrich von Müller on 31 March 1823.
<http://www.zeno.org/Literatur/M/Goethe,+Johann+Wolfgang/Gespr%C3%A4che/%5BZu+den+Gespr%C3%A4chen%5D/1823>.

¹²⁴ Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, p.83.

and was convinced of the need to repair the section. The costs were estimated at 1,440 Thaler and three years of work.¹²⁵

Was it the considerable amount of money, or the enormous time delay, especially at this early moment of euphoria - Goethe had just given his speech at the opening ceremony of the mine - that led to the decision not to undertake the necessary maintenance? When on 18 October 1784 he had inspected the adit “*from the 10th light hole*”, he had made no mention of repair work needing to be carried out in his letter to the Duke. Others knew about it; for Johann Voigt it was a ‘*constantly gnawing worm in his heart*’.¹²⁶

And so a decision to reduce costs made in 1784, led directly to a rockfall with disastrous consequences twelve years later. But even if the money had been found to repair the adit between 1786 and 1791, while the miners were waiting for the shaft to be pumped dry, the chance of finally reaching a rich ore-bearing section of the copper schist would have remained negligible. This was an unalterable fact of the local geology.

Goethe did not complete his autobiography “*Poetry and Truth*”. He continued his life story in the “*Daily and Annual Journals*” (“*Tag- und Jahreshefte*”), which he wrote between 1817 and 1830. In his entry for 1794, written between 1819 and 1823, after a silence of more than 20 years, Goethe referred as follows to the struggling venture: “*We had been struggling with the mine in Ilmenau for several years; to risk such an important undertaking in isolation could only be excused by a youthful, blithe exuberance. Within a large, well-established mining industry, it could have developed into a productive undertaking. But with only limited means, and in spite of summoning from time to time external, although very capable, advisors, with whom it was possible to reach an understanding, the execution was neither cautious nor energetic enough, and the project, especially regarding the completely unexpected formation of nature, was more than once on the point of collapsing.*”¹²⁷

His entries for 1795 included the following:

*“I had scarcely returned from Karlsbad, when the news arrived from Ilmenau that a significant adit collapse had put an end to the mining there. I hurried to get there, and did not see without apprehension and distress an undertaking on which so much time, energy and money had been spent, suffocated in itself, and buried. On the other hand, I was cheered up by the company of my five-year-old son, who seized upon the region, which I had seen and thought about to the point of weariness for twenty years, with a fresh childlike spirit, grasping all objects, conditions, and activities with a new zest for life. He expressed much more decisively than could have been achieved with words: that something which has withered away is always followed by something alive, and that the participation of humankind in [the life of] this earth could never be extinguished.”*¹²⁸

Goethe was never one to dwell on the past unpleasantness.

He celebrated his final birthday in Ilmenau in 1831, together with his two grandsons. He was honoured with a torchlight procession, and met with his friend Johann Heinrich Christian Mahr (1787-1868) to whom Carl August had given the task of ordering the mine’s archives. Together they took a *chaise* to the Kickelhahn. Goethe

¹²⁵ Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, p.81.

¹²⁶ Sigrid Damm (2009) *Geheimnißvoll Offenbar*, Insel Verlag, p.81.

¹²⁷ <http://www.zeno.org/Literatur/M/Goethe,+Johann+Wolfgang/Autobiographisches/Tag-und+Jahreshefte>.

¹²⁸ Ibid.

insisted on walking the last few hundred meters to the hut where he had carved his famous verse. On the way down he pointed to a rocky outcrop (quartz porphyry, of which Mahr had sent him a sample the previous year), and commented: *“This is an unusual phenomenon worthy of note, and may possibly lead to conclusions in geognosy in the future. We are only there to observe nature, we cannot invent anything about her.”*¹²⁹

On his return to Weimar he wrote to his friend Zelter in Berlin:¹³⁰

“For six days, the sunniest of the whole summer, I took leave from Weimar and made my way to Ilmenau, where in previous years I had done a great deal of work, but have since then had a long absence before the present reunion. I saw again the inscription I made on the wall of the lonely cabin on the highest summit of the fir forests on 7 September 1783 [Goethe got the year wrong.] of the song that you have carried so delightfully into the world on the wings of music: ‘Über allen Gipfeln ist Ruh’ etc.

“After so many years, it was possible to have an overview: that which remained, that which had disappeared. The successes stood out and gave cheer, the failures were dissolved in pain (verschmerzt) and forgotten. The people lived according to their nature, from the charcoal burner to the porcelain manufacturer. Iron was smelted, brownstone extracted from the crevices, although at present not as actively sought as in earlier days. Pitch was boiled, the soot collected, the soot pads artificially and miserably made. Coal brought to light with incredible labor; huge, fossilized tree trunks discovered in the pit (I had forgotten to show you one of them, it’s kept in the garden house); and so it went on, from ancient granite, through the subsequent epochs, where new problems always arise, and which the most recent world-creators let rise from the earth with the greatest ease¹³¹.

On the whole, wonderful use is being made of the diverse soils, and the land is worked above ground and in the depths.

When I imagined myself from there to you, I wished for nothing more than to let you experience the big contrast between your circumstances and these.”

Life went on. Goethe was at peace.

¹²⁹ Sigrid Damm (2009) *Goethe’s letzte Reise*, Insel Verlag, p.154.

¹³⁰ Letter to Carl Friedrich Zelter, Weimar, 4 September 1831. Zelter (1758-1832) was a composer, conductor, and director of the *Sing-Akademie* in Berlin. He set several of Goethe’s poems to music. Musically self-taught, he initially worked in his father’s engineering business to earn a living. He was a great admirer of the music of J S Bach, a love which he passed on to his pupil Felix Mendelssohn. Mendelssohn’s 1829 revival of Bach’s St Matthew Passion was sponsored by Zelter and the *Sing-Akademie*, and was a milestone in the history of music.

¹³¹ A reference recently developed ideas of tectonic uplift by Leopold von Buch and other geologists. See my essay ‘Goethe’s Conundrum, Integrating Basalt into the Harmony of Nature.

Addendum

“Ilmenau”

Goethe opens the poem by reminiscing about his past explorations of the forest. He hears the sighing of the evening breeze in the spruce trees, and the splashing of the waterfall. He feels uplifted by the beauties of Nature, but although he prefers not to think about it, he does not forget the harsh lives of the peasants.

*Let me forget that here too the world
Holds many creatures in her earthly shackles;
The yeoman trusting seeds to sodden soil,
Cultivating cabbages to benefit the brazen
boar;
The miner his meager bread in fissures seeks,
The charcoal burner trembles when the hunter
curses.
Rejuvenate me, as you often do,
As if I were starting life anew.*

Then “*the clouds sink down, and fog presses into the valley.*” He enters a dream world where “*it is night and twilight all at once*”, and sees as in a vision a scene from the early years of his friendship with Carl August.

*Where am I? is it a magic fairy land?
What nocturnal celebrations at the foot of yon
rock wall?
By small huts, covered tight with brash,
I see them happily stretched out around the
fire.
The gleaming embers flickering high through
the spruce canopy,
A simple meal cooks on the humble hearth.
They loudly joke; meanwhile, the bottle
drained,
returns refilled in jovial circles.*

... ..

*Is it the Egyptian’s suspicious sojourn?
Is it a fleeting prince like in the Arden forest?
Shall I, already lost in pathways of my mind,
Find here the ghosts of Shakespeare manifest?*

Then he recognizes the figures round the campfire, among them Karl Ludwig von Knebel.

*Relaxing calmly by the fire,
A lanky figure from an ancient hero’s tribe.
He eagerly sucks on his beloved pipe,
The smoke curls up about his forehead.*

He realises that there is someone missing from the merry company

when they start whispering so as not to disturb a sleeping figure beside the glowing embers of a small fire, in a roughly timbered lean-to off to one side.

*“Greetings to one who rests here late at night
Pensively keeping watch here at this threshold!
Why do you sit away from those enjoyments?
You seem to me to be concerned about
something important.
What is it that keeps you lost in contemplation
Not even tending to your glowing embers?”*

We expect Karl August to respond, but instead it is Goethe himself, or rather the spirit of his early days in Weimar.

*“Oh, ask me not, for I am not prepared
To satisfy a stranger’s idle curiosity;
I cannot even countenance your good will;
Here is the time for silence and endurance.
I am not able to tell you of myself,
From where I came, who sent me here;
From foreign regions I am banished here
Held captive by a bond of friendship.*

*“Who knows himself? Who knows what he can
do?
Even the brave do things reckless and strange.
And only the next day determines whether,
What’s been done was detrimental or of benefit.
Did not Prometheus himself let flow
The pure embers of heaven through fresh clay?
And could he do more than pour
earthly blood through invigorated veins?
I brought pure fire from the altar;
But what I ignited is not pure flame.
Storm winds increase the embers, fan the
flames;
I condemn myself, but do not waver.”*

With brutal honesty his younger self describes not only the young Duke’s turbulent confusion, in which he had been happy to acquiesce, but also his own introversion and uncertainties, his uneasy status as an outsider, and his inability to understand how a universally famous poet like himself could meet with such strong resistance from the court.

*“And when I sang, unwisely, about courage
and liberty,
Integrity, and freedom from coercion,
Proud of myself and heartfelt comfort,
I earned myself goodwill and recognition;
But alas! a God denied me the art,
That poor art of being artificial.
Now I sit here, uplifted and depressed,
Innocent and punished, and blessed and
condemned.”*

The poem provides no answers to his dilemma. Instead his younger self refuses to even consider the question; he is unable to tell from where he came, and why he is held captive by a bond of friendship. Yet it was plain for all in Weimar to see that his birth and social background were the cause of his tragic situation. Instead of searching for an answer, Goethe now turns to the sleeping Duke.

*But speak quietly, for under this roof
Rests all my peace of mind, and all adversity:
A noble heart, misdirected from the path of
nature*

*By narrow fate; now sensing the correct way
forward,
At times he struggles with himself, at times
with his imagination,
And what his destiny has given him through
birth,
He thinks to achieve with effort and with
perspiration.*

.

*Certainly, the years will give
The right direction to his energies.
Yet, with a strong inclination for the truth
Error still remains his passion.
A stubborn recklessness draws him on,
No cliff too steep, no path too narrow
Accidents lurk on every side,
And throw him in the arms of torment.
Then painfully o'erstretched impulses and
emotions
Drive him now here, now there
And from ill-humoured agitation,
He takes ill-humoured rest.
And grimly unrestrained on sanguine days,
Unruly without good cheer,
Wounded in soul and body battered,
He falls asleep on a hard camp bed.*

Goethe feels weighed down by the severity of his dream vision, and struggles to return to his senses.

Vanish dream!

.

*The cloud lifts, the fogs disperse,
The shadows are all gone. Praise and joy, ye
gods!
The true sun shines again,
There lives in me a truer, fairer world;
The fearful vision has dissolved into the air,*

*A new life beckons, indeed, it has long since
begun.*

Goethe gains control, and is again the master of his inner world; the one who lost his path in the forest has found it again, and a new vision arises – a vision of prosperity for the peasants earning a living from the land. The vision of an idyllic nature which the friends had enjoyed these past eight years has become a vision of nature from which the hard-working peasants are able to earn a living, but much depends on strong and capable leadership. Ilmenau's and the Duchy's future depend on the right choice between personal indulgence and poverty, or diligence and prosperity.

*I now see here how after a long journey
One finds oneself back home again.
A peaceful nation's quiet application
Makes use of gifts which nature grants to
them.*

*The unspun thread speeds quickly
From the distaff to the loom;
And rope and bucket after lengthy idleness
No longer idle at abandoned shaft;
Deception is discovered, an ordered system has
returned,*

And people prosper in a stable earthly joy.

*So may, O Prince, the corner of your land
Be an expression of your life!*

*You long have known the duties of your class,
And gradually constrained the freedom of your
soul.*

*He can grant himself desires,
Who lives coldly in himself and in his will;
Those who strive to lead with competence and
conscience,*

Must yet be able to forego all personal desires.

*And now proceed, the reward will not be slight,
Without faltering, not as that sower went,
Whose grain fell in a game of chance,
Here on the road, and there between the thorns
No! scatter wisely and wholeheartedly, with
strong and constant hand,*

*Your blessings on a cultivated land;
Then let them rest: the harvest will appear
And make you happy, and those whom you
hold dear.*

Ilmenau

am 3. September 1783

Anmutig Tal! du immergrüner Hain!
Mein Herz begrüßt euch wieder auf das beste;
Entfaltet mir die schwerbehangnen Äste,
Nehmt freundlich mich in eure Schatten ein,
Erquickt von euren Höh'n, am Tag der Lieb und
Lust,
Mit frischer Luft und Balsam meine Brust!

Wie kehrt ich oft mit wechselndem Geschicke,
Erhabner Berg! an deinen Fuß zurücke.
O laß mich heut an deinen sachten Höh'n
Ein jugendlich, ein neues Eden sehn!
Ich hab' es wohl auch mit um euch verdient:
Ich Sorge still, indes ihr ruhig grünet.

Laßt mich vergessen, daß auch hier die Welt
So manch Geschöpf in Erdefesseln hält,
Der Landmann leichtem Sand den Samen
anvertraut
Und seinen Kohl dem frechen Wilde baut,
Der Knappe karges Brot in Klüften sucht,
Der Köhler zittert, wenn der Jäger flucht.
Verjüngt euch mir, wie ihr es oft getan,
Als fing' ich heut ein neues Leben an.

Ihr seid mir hold, ihr gönnt mir diese Träume,
Sie schmeicheln mir und locken alte Reime.
Mir wieder selbst, von allen Menschen fern,
Wie bad ich mich in euren Düften gern!
Melodisch rauscht die hohe Tanne wieder,
Melodisch eilt der Wasserfall hernieder;
Die Wolke sinkt, der Nebel drückt ins Tal,
Und es ist Nacht und Dämmerung auf einmal.

Im finstern Wald, beim Liebesblick der Sterne,
Wo ist mein Pfad, den sorglos ich verlor?
Welch seltne Stimmen hör ich in der Ferne?
Sie schallen wechselnd an dem Fels empor.
Ich eile sacht, zu sehn, was es bedeutet,
Wie von des Hirsches Ruf der Jäger still geleitet.

Wo bin ich? ists ein Zaubermärchen-Land?
Welch nächtliches Gelag am Fuß der
Felsenwand?
Bei kleinen Hütten, dicht mit Reis bedeckt,
Seh ich sie froh ans Feuer hingestreckt.
Es dringt der Glanz hoch durch den Fichtensaal,
Am niedern Herde kocht ein rohes Mahl;
Sie scherzen laut, indessen, bald geleeret,
Die Flasche frisch im Kreise wiederkehret.

Sagt, wem vergleich ich diese muntre Schar?
Von wannen kommt sie, um wohin zu ziehen?
Wie ist an ihr doch alles wunderbar!
Soll ich sie grüßen? Soll ich von ihr fliehen?
Ist es der Jäger wildes Geisterheer?
Sinds Gnomen, die hier Zauberkünste treiben?

Ich seh' im Busch der kleinen Feuer mehr;
Es schaudert mich, ich wage kaum, zu bleiben.
Ists der Ägyptier verdächtger Aufenthalt?
Ist es ein flüchtiger Fürst wie im Ardenner-Wald?
Soll ich Verirrter hier in den verschlungnen
Gründen
Die Geister Shakespeares gar verkörpert finden?

Ja, der Gedanke führt mich eben recht:
Sie sind es selbst, wo nicht ein gleich
Geschlecht!

Unbändig schwelgt ein Geist in ihrer Mitten,
Und durch die Roheit fühl ich edle Sitten.

Wie nennt ihr ihn? Wer ists, der dort gebückt
Nachlässig stark die breiten Schultern drückt?
Er sitzt zunächst gelassen an der Flamme,
Die markige Gestalt aus altem Heldenstamme.
Er saugt begierig am geliebten Rohr,
Es steigt der Dampf an seiner Stirn empor.
Gutmütig trocken weiß er Freud und Lachen
Im ganzen Zirkel laut zu machen,
Wenn er mit ernstlichem Gesicht
Barbarisch bunt in fremder Mundart spricht.

Wer ist der andre, der sich nieder
An einen Sturz des alten Baumes lehnt
Und seine langen, feingestalten Glieder
Ekstatisch faul nach allen Seiten dehnt?
Und, ohne daß die Zecher auf ihn hören,
Mit Geistesflug sich in die Höhe schwingt
Und von dem Tanz der himmelhohen Sphären
Ein monotones Lied mit großer Inbrunst singt?

Doch scheint allen etwas zu gebrechen;
Ich höre sie auf einmal leise sprechen,
Des Jünglings Ruhe nicht zu unterbrechen,
Der dort am Ende, wo das Tal sich schließt,
In einer Hütte, leicht gezimmert,
Vor der ein letzter Blick des kleinen Feuers
schimmert
Vom Wasserfall umtauscht, des milden Schlafs
genießt.
Mich treibt das Herz, nach jener Kluft zu
wandern,
Ich schleiche still und scheide von den andern.

Sei mir gegrüßt, der hier in später Nacht
Gedankenvoll an dieser Schwelle wacht!
Was sitzest du entfernt von jenen Freuden?
Du scheinst mir auf was Wichtiges bedacht.
Was ists, daß du in Sinnen dich verlierest,
Und nicht einmal dein kleines Feuer schürest?

"O frage nicht! denn ich bin nicht bereit,
Des Fremden Neugier leicht zu stillen;
Sogar verbitt ich deinen guten Willen:
Hier ist zu schweigen und zu leiden Zeit.
Ich bin dir nicht imstande selbst zu sagen,
Woher ich sei, wer mich hierher gesandt;
Von fremden Zonen bin ich her verschlagen
Und durch die Freundschaft festgebannt.

"Wer kennt sich selbst? Wer weiß, was er
vermag?
Hat nie der Mutige Verwegnes unternommen?
Und was du tust, sagt erst der andre Tag,
War es zum Schaden oder Frommen.
Ließ nicht Prometheus selbst die reine
Himmelsglut
Auf frischen Ton vergötternd niederfließen?
Und konnt er mehr als irdisch Blut
Durch die belebten Adern gießen?
Ich brachte reines Feuer vom Altar;
Was ich entzündet, ist nicht reine Flamme.
Der Sturm vermehrt die Glut und die Gefahr,
Ich schwanke nicht, indem ich mich verdamme.

"Und wenn ich unklug Mut und Freiheit sang
Und Redlichkeit und Freiheit sonder Zwang,
Stolz auf sich selbst und herzliches Behagen,
Erwarb ich mir der Menschen schöne Gunst;
Doch ach! ein Gott versagte mir die Kunst,
Die arme Kunst, mich künstlich zu betragen.
Nun sitz ich hier, zugleich erhoben und gedrückt,
Unschuldig und gestraft, und schuldig und
beglückt.

"Doch rede sacht! denn unter diesem Dach
Ruht all mein Wohl und all mein Ungemach:
Ein edles Herz, vom Wege der Natur
Durch enges Schicksal abgeleitet,
Das, ahnungsvoll, nun auf der rechten Spur
Bald mit sich selbst und bald mit Zauberschatten
streitet,
Und, was ihm das Geschick durch die Geburt
geschenkt,
Mit Müh und Schweiß erst zu erringen denkt.
Kein liebevolles Wort kann seinen Geist
enthüllen
Und kein Gesang die hohen Wogen stillen.

"Wer kann der Raupe, die am Zweige kriecht,
Von ihrem künftigen Futter sprechen?
Und wer der Puppe, die am Boden liegt,
Die zarte Schale helfen durchzubrechen?
Es kommt die Zeit, sie drängt sich selber los
Und eilt auf Fittichen der Rose in den Schoß.

"Gewiß, ihm geben auch die Jahre
Die rechte Richtung seiner Kraft.
Noch ist, bei tiefer Neigung für das Wahre,
Ihm Irrtum eine Leidenschaft.
Der Vorwitz lockt ihn in die Weite,
Kein Fels ist ihm zu schroff, kein Steg zu
schmal;
Der Unfall lauert an der Seite
Und stürzt ihn in den Arm der Qual.

"Dann treibt die schmerzlich überspannte
Regung
Gewaltsam ihn bald da, bald dort hinaus,
Und von unmutiger Bewegung
Ruht er unmutig wieder aus.
Und düster wild an heitern Tagen,
Unbändig, ohne froh zu sein,
Schläft er, an Seel und Leib verwundet und
zerschlagen,
Auf einem harten Lager ein:
Indessen ich hier, still und atmend kaum,
Die Augen zu den freien Sternen kehre
Und halb erwacht und halb im schweren Traum,
Mich kaum des schweren Traums erwehre."

Verschwinde Traum!

Wie dank' ich, Musen, euch!
Daß ihr mich heut auf einen Pfad gestellet,
Wo auf ein einzig Wort die ganze Gegend gleich
Zum schönsten Tage sich erhellet;
Die Wolke flieht, der Nebel fällt,
Die Schatten sind hinweg. Ihr Götter, Preis und
Wonne!
Es leuchtet mir die wahre Sonne,
Es lebt mir eine schönre Welt;
Das ängstliche Gesicht ist in die Luft zerronnen,
Ein neues Leben ists, es ist schon lang
begonnen.

Ich sehe hier, wie man nach langer Reise
Im Vaterland sich wiederkennt,
Ein ruhig Volk in stillem Fleiße
Benutzen, was Natur an Gaben ihm gegönnt.
Der Faden eilet von dem Rocken
Des Webers raschem Stuhle zu,
Und Seil und Kübel wird in längerer Ruh
Nicht am verbrochnen Schachte stocken;
Es wird der Trug entdeckt, die Ordnung kehrt
zurück,
Es folgt Gedeihn und festes irdsches Glück.

So mög, o Fürst, der Winkel deines Landes
Ein Vorbild deiner Tage sein!
Du kennest lang die Pflichten deines Standes
Und schränktest nach und nach die freie Seele
ein.
Der kann sich manchen Wunsch gewähren,
Der kalt sich selbst und seinem Willen lebt;
Allein wer andre wohl zu leiten strebt,
Muß fähig sein, viel zu entbehren.

So wandle du – der Lohn ist nicht gering –
Nicht schwankend hin, wie jener Sämann ging,
Daß bald ein Korn, des Zufalls leichtes Spiel,
Hier auf den Weg, dort zwischen Dornen fiel;
Nein! streue klug wie reich, mit männlich steter
Hand,
Den Segen aus auf ein geackert Land;
Dann laß es ruhn: die Ernte wird erscheinen
Und dich beglücken und die Deinen.