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Die *Planetentheorie*: its uses and meanings for the Saxon mining communities and the culture of the Dresden Court 1553–1719

Sarah Richards

Abstract. This paper seeks to demonstrate, albeit in brief outline, how different strands of knowledge and belief about the planets and their relationship to material matters here on earth, were upheld or rejected in early modern humanist texts. Evidence can be found in sixteenth-century printed books which propound alchemical theories about the influence of the seven planets on the earthbound metals, and those which refute such ideas. In the metal-rich region of Saxony the Dresden court ceremonials appropriated these beliefs, and applied them in a rich iconographical tradition that represented the planets in relation to the mines and metallurgical workshops that brought wealth to the state. The tradition was upheld in the calendar of court ceremonies and festivals that took place in Dresden between 1574 and 1719. These were ephemeral events, in which the appropriation of planetary symbolism, largely for ideological purposes, was recorded in visual and verbal descriptive forms.

In about 1500, a *Bergbüchlein*, or *Little Book of Mining*, was published, and continued in print well into the sixteenth century. It was written by the Saxon physician, Ulrich Rülein von Calw, who for part of his life lived and worked in the rich silver mining region of the Erzgebirge range of hills to the south-west of Dresden, on the border of the present day Czech Republic.¹ Rülein von Calw wrote in the vernacular, and his

¹ On Ulrich Rülein von Calw see W. Pieper, *Ulrich Rülein von Calw und sein Bergbüchlein*, Freiburger Forschungshefte D7 (Berlin: Akademie Verlag, 1955). See also an unpublished dissertation by J. I. M. Mendels, *Das Bergbüchlein: A Text Edition* (Baltimore MD: Johns Hopkins University, 1953), which analyses the linguistic character of the *Bergbüchlein*. For a discussion of Rülein von

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Bergbüchlein is small enough to slip into a pocket. It is illustrated with woodcuts, and an interested reader would have been able to carry the book into the field and learn by comparison with nature (Fig. 1). Through 'Daniel', the patron saint of miners, Calw exhorts his imagined reader – and Daniel addresses a young inexperienced miner called Knappius – to exercise the use of his judgment so 'that he may recognise as artfully as possible, from which material, through which method and in which location the native metals may be produced...' and in so doing profit from them.²

The *Bergbüchlein* focuses in particular on the knowledge and skills required in prospecting for ores. It was written with reference to the Aristotelian concepts of the four elements and a geocentric universe. However, the author explains the presence and condition of metal ores based on the strand of alchemical theory attributed to a group of Arab scholars active in Basra in the tenth century, and later associated with the name of Geber. In the first chapter of the *Bergbüchlein*, 'About the Origin of Ores in General', von Calw writes:

It should be realised that for ores to grow or to be born requires an agent to exert an influence, and a passive thing or matter that is qualified to be influenced. In the words of the naturalists, the common maker of ore and all other things that are born is Heaven with its movement, radiance and influence. The influence of Heaven is diversified by the movement of the firmament and the countermovement of the seven planets. In this way each metallic ore receives an influence from its own particular planet, specifically assigned to it because of the characteristics of the planet and the ore, and also because of their conformity in warmth

Calw's work in a wider context see E. Darmstaedter, *Berg-Probir-und Kunstbüchlein* (Munich: Verlag der Münchner Drucke, 1926). For an English translation of the book see A. G. Sisco and C. S. Smith, *Bergwerck und Probierbüchlein* (New York: The American Institute of Mining and Metallurgical Engineers, 1949).

² The British Library holds the 1533 edition printed by Christian Egenolph of Frankfurt-am-Main, f.1: '...das er künstlich erkennen möchte als vill imm möglich wer / auß welcher materienn / durch welcher mittel / und in welcher stat die metal natürlich gemacht werden....'. On the figure of Daniel Mendels, *Bergbüchlein*, cites Petrus Albinus, p. 43. See also Pieper, *Rülein von Calw*, p. 183.

or frigidity, moisture or dryness (Aristotle). Thus, gold is made by the Sun or his influence, silver by the Moon, tin by Jupiter, copper by Venus, iron by Mars, lead by Saturn, and quicksilver by Mercury. That is why Hermes (Trismegistus) and other learned men often call the metals by these names, that is, they call gold sun, in Latin *sol*, and silver moon, in Latin *luna*.³

Von Calw explains the significance of the direction ore rich veins take in relation to the heavens; that a rich vein of silver ore would be expected in high land that falls towards the south, and he describes the most favourable compass points to look for, and where the heavens would work favourably in preparing the fundamental materials for the formation of silver.⁴

It is important to consider who was most likely to read a book of this kind, and given von Calw's place within the humanist intellectual circles of late fifteenth and early sixteenth-century Saxony, the readership was probably comprised of men of learning, and of interested mining entrepreneurs, of which von Calw was himself one.⁵ Within the mining communities, if it was believed at all that metals grew and matured in the earth under the influence of the planets, then it was the work of God, the supreme maker. The earliest figure of significance was not Hermes Trismegistus, but Tubel-cain, the first miner, according to the Saxons, although more accurately described in Genesis as the first metallurgist. Rülein von Calw's *Bergbüchlein* inserted the alchemical/astrological *Planetentheorie* into an empirical knowledge base specific to the miners and smelters that was communicated, for the most part, orally and tacitly.⁶ There is no evidence to suggest that the miners and smelters accepted the concept that all metals were derived from primary

³ The text is from Sisco and Smith, *Bergwerck*, pp. 19–20. Reproduced by kind permission of the American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc. (AIME).

⁴ Sisco and Smith, *Bergwerck*, p. 35.

⁵ On the issue of the readership see Mendels, *Bergbüchlein*, p. xxxi. See also P. Long, *Openness, Secrecy, Authorship: Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance* (Baltimore MD: Johns Hopkins University Press, 2001), pp. 177–78.

⁶ H. Wilsdorf, 'Alchimi und Bergwerck: Zur Entdeckungsgeschichte einiger Elemente aus bergmännischen Produkten', in *Abhandlungen des Staatlichen Museums für Mineralogie und Geologie*, Band 11 (Dresden 1966), pp. 315–76 (p. 327).

substances, the *prima materia*, sulphur, quicksilver and salt, or that they were persuaded by the *Planetentheorie*.⁷

In Book I of Georg Agricola's *De Re Metallica*, first published in Basel in 1556, the author sets down what a sixteenth-century mining entrepreneur should know. Following the requirement to 'discern the origin, cause and nature of subterranean things', and to know sufficient about medicine to 'be able to look after his diggers and other workmen', Agricola comes to astronomy: from knowledge of astronomy the entrepreneur 'may know the divisions of the heavens and from them judge the direction of the veins'.⁸ Here was a practical application of astronomy, one that can be found in Rülein von Calw's *Bergbüchlein* as well, and it is thought that miners had been using the compass to establish the orientation of veins of metal ores since at least the twelfth century. Agricola also accepted the Aristotelian cosmology, but the two authors differed fundamentally in other respects. Agricola published in Latin rather than the vernacular, although his works were translated into German within a few years. In his *Bermannus sive de re metallica dialogus*, published in 1530, he invalidated the claims of those who believed that the sun, moon and five planets exerted an influence on the animate and inanimate here on Earth. The Saxon miners and metallurgists Agricola knew, recognised that bismuth and antimony are metals. In book five of *De Ortu et Causis Subterraneorum*, published in 1564, Agricola wrote: 'it is certain, that there are more metals than the seven commonly known. But as there are only seven planets, which will be designated the generator of bismuth?'⁹ Not only bismuth, but in addition the metals antimony and arsenic were found to be candidates for a planet in Agricola's lifetime.

Alchemical theory and practice was exposed to critical scrutiny, and to ridicule, but it long continued to draw the interest of those in power for

⁷ Wilsdorf, 'Alchimi und Bergwerck', p. 326.

⁸ Georgius Agricola, *De Re Metallica*, Book 1, translated from the Latin edition of 1556 by H. C. Hoover and L. H. Hoover (London: The Mining Magazine, 1912), p. 4.

⁹ Cited in L. Suhling, 'Philosophisches in der frühneuzeitlichen Berg-und Hüttenkunde: Metallogene und Transmutation aus der Sicht montanischen Erfahrungswissens', in *Die Alchimie in der europäischen Kultur und Wissenschaftsgeschichte*, ed. C. Meinel (Wolfenbüttel: Herzog August Bibliothek, 1986) 'Es steht doch fest, daß es mehr Metalle gibt als jene sieben allgemein bekannten. Da es aber nur sieben Planeten gibt, welchen werden da als Erzeuger des Wismuts bezeichnen?', p. 304.

the potential it was still believed to hold, to transmute base metals into gold and silver. During the seventeenth century, with improvements in assaying, it became more difficult to maintain the veracity of such claims, although there were still those who pursued the search, often under the patronage, or coercion, of a head of state.¹⁰ Interest in the Hermetic tradition was pursued in many of the German Courts in different ways, and no less so in Dresden.¹¹ Principally because of the significance of mining and metallurgy for the Saxon economy, the symbolism of alchemical planetary theory was exploited prominently in the court festivals from the late sixteenth until the early eighteenth century.

The personification of miners in the Saxon court festivals was modelled initially on the mining mummery introduced by Emperor Maximilian I in the early sixteenth century.¹² It was during the electoral rule of August I from 1553 to 1586, that the representation of mining and metallurgy began to feature more prominently in the Dresden court festivals, and to develop a symbolic tradition that alluded to alchemical planetary theory as well as the classical pantheon of the gods found in sixteenth-century iconography. In the carnival procession of 1574, held in the courtyard of the Dresden palace, August appeared as 'the God or Planet Mercurius', followed by men dressed in the working attire of miners and smelters, who represented the key stages in the winning of silver from mineshaft and ore. August I introduced the idea of Mercury as a protector of miners, a symbolic role that continued to be reproduced in festival iconography until Saturn took ascendancy in the late seventeenth and eighteenth centuries. It made sense in that Mercury was emblematic of prosperity in trade, and the Saxon state sought to benefit from the mineral wealth within its territorial domains. The court festivals synthesized in the spectacles themes that resonated with the beliefs and folk superstitions of the people, as well as the allegorical and mythological figures of classical antiquity, which underpinned many of

¹⁰ See R. Halleaux, 'L'alchimiste et l'essayeur', in C. Meinel, *Alchimie*.

¹¹ See for example, B. T. Moran, *The Alchemical World of the German Court: Occult Philosophy and Chemical Medicine in the Circle of Moritz von Hessen (1562-1632)* (Stuttgart: Franz Steiner Verlag, 1991); R. Evans, *Rudolf II and his World* (Oxford: Oxford University Press, 1973); P. Smith, *The Business of Alchemy: Science and Culture in the Holy Roman Empire* (Princeton NJ: Princeton University Press, 1994); P. Long, *Openness*.

¹² F. Sieber, *Volk und volkstümliche Motive im Festwerk des Barocks* (Berlin: Akademie-Verlag, 1960), p. 47.

the iconographical sources for the visual and literary culture of the court. The ingenuity of the devices employed to represent mining and smelting reminded spectators of the power of Saxon technology, and at the same time alluded to the mysteries of alchemy.¹³

The theme of the seven planets represented by the gods of classical mythology became an established tradition in the European court festivals and ceremonies during the seventeenth century. However, the staging of parades, of opera, drama and ballet performances, as well as firework and water spectacles, was not bound by rules. The personifications of the seven planets were drawn into stagings that were inflected by local concerns, often of a political and dynastic nature. For example, the Dresden carnival celebration of 1678 was one occasion, preceded by several earlier events, framed around the planetary gods and the Old Testament figure of Nimrod, founder of his Babylonian dynasty. In the carnival procession the Elector Johann Georg II took the role of Nimrod, and in Gabriel Tzschimmer's account of the roles and positions allotted to Johann's son and brothers in the processional order, it is possible to interpret the underlying dynastic tensions which were of long standing.¹⁴ In the same exhaustive description of the 1698 festivities, Tzschimmer devotes a small section to the planetary system. He explains the planets in terms of the zodiac, and in which house each of the heavenly bodies is placed, but he also includes contemporary calculations as to the distance of the sun, moon and planets from the Earth, and their relative sizes.¹⁵ New knowledge about the solar system coexisted alongside the older astrological model.

That these extravagant and complex events were devices to distract and entertain the bored and troublesome nobility is too simplistic an interpretation of their purpose. It is now generally accepted that there were wider political and economic interests at work through court displays, which had the effect of asserting political and economic strength

¹³ Sieber, *Volk und volkstümliche Motive*, p. 53.

¹⁴ G. Tzschimmer, *Die Durchlauchtigste Zusammenkunft* (Nuremberg: J. Hoffmanns, 1680). H. Watanabe O'Kelly, 'Joseph und seine Brüder: Johann Georg II. Und seine Feste zwischen 1660 und 1679', *Dresdner Hefte: Beiträge zur Kulturgeschichte* 21 8/1 (1990): pp. 29–38. See also H. Watanabe O'Kelly, *Court Culture in Dresden: From Renaissance to Baroque* (London: Palgrave Macmillan, 2002).

¹⁵ G. Tzschimmer, *Zusammenkunft*, pp. 184–85.

through the ingenuity of the spectacle.¹⁶ This was particularly apparent in the dazzling Saturnfest, held in Dresden in September 1719 to celebrate the marriage of the Electoral Prince Friedrich August to the Archduchess Maria Josepha, the niece of the Emperor Karl VI and daughter of the late Emperor Joseph I.

The Elector and King of Poland Friedrich August I chose Saturn as the leitmotiv for the extensive period of wedding festivities organised for the prince and his bride. Monika Schlechte, who has analysed the iconography worked into the festival, has pointed out that given the somewhat dark aspects associated with the mythological figure of Saturn, this was a strange choice for such an occasion.¹⁷ However, the festival iconography emphasized the righteous and wise characteristics of Saturn, the protector of wealth and health, rather than the melancholy and malign being associated with mortality. Reminders of life's frailty were set against the Saturnalia, the life affirming midwinter orgies of the ancient world, and of Saturn as presiding over the Golden Age in antiquity. Of course, such a representation was intended to reflect favourably upon the Elector Friedrich August. The central event of the festivities was the mining parade. Here, 1500 miners and smelters assembled in front of the festival building on the site designed by court architects and engineers on fields at Plauen outside Dresden. This position, away from the city and the court, was chosen in order to present a spectacle that recreated the context of Saxon mining in the nearby Erzgebirge range of hills, as well as the dark and rocky abyss into which Jupiter hurled Saturn when he expelled him from Olympus (Fig. 2). The god, finding himself among the simple folk of the nether regions, set about directing operations to build a material world that represented his magnificence, achieved through the sweat and labour of skilled peoples to the glory of their master and the prosperity of the land. The ideological parallel drawn in the spectacle was that of the 'wise' governance of the Elector Friedrich August bringing to Saxony a robust economy through the skilled and industrious exploitation by the subject peoples, of the natural riches found within the state.¹⁸

¹⁶ H. Bächler and M. Schlechte, 'Die Hofische Festkultur-Funktion und Wirkung', *Dresdner Hefte: Beiträge zur Kulturgeschichte* 21, 8 /1 (1990): pp. 3–11.

¹⁷ M. Schlechte, 'Saturnalia Saxoniae-Das Saturnfest 1719, eine ikonographische Untersuchung', *Dresdner Hefte: Beiträge zur Kulturgeschichte* 21, 8 /1 (1990): pp. 39–52.

¹⁸ Schlechte, 'Saturnalia Saxoniae-Das Saturnfest 1719', p. 48.

The climax of the festival was in the illuminations, and it is here that the symbolism of the seven planets was put to spectacular effect (Fig. 2). The alchemical symbols for the metals attributed to each planet were illuminated in the form of a low pyramid near the summit of a hill above the royal signature of Friedrich August. The sun forms the apex of the pyramid with the moon and Venus on each side below, then comes Mars and Jupiter, with Saturn and Mercury at the base. The pyramid is closed by the words CONSTELLATIO FELIX, signifying the propitious order of the planets for the state of Saxony. The authority of the claim was underscored by the fact that all the metals attributed to six of the planets were found in Saxon mines, and in the case of gold, in Saxon rivers.

Friedrich August was strongly persuaded by alchemy, largely for the potential he hoped it held for the making of gold and silver. In the year 1719 the alchemist Johann Friedrich Böttger died of natural causes, but not without having spent long years living with the fear of execution should he fail to satisfy August's demands. In the same year Hector von Klettenberg was imprisoned in the Königstein fortress for just such a failure, and a year later he was beheaded.¹⁹ Friedrich August's harshness in the pursuit of power represented by precious metals has to be seen in the context of absolutist rulership. Saxon deposits of silver were more or less exhausted, and August's attempts to raise revenue from the state were compromised earlier in his electoral rule by opposition from the landed nobility and representatives of the citizenry.²⁰ In these circumstances, how much must he have desired independence in badly needed wealth creation?²¹ Saxony still had one of the most developed mining and metallurgical industries in Europe, and 150 years earlier Agricola had made sound arguments against the claims of alchemists that they could transmute base metals into gold. For whatever reason, Friedrich August clearly took little heed of the knowledge and experience of those who served in mines and metallurgy in his own domains. However, the fact that he was so persistent in his pursuit of an alchemical solution to his need for bullion, reminds us of the central importance of

¹⁹ K. Hoffman, 'Böttger als Alchemist', exhibition catalogue *Johann Friedrich Böttger zum 300 Geburtstag* (Dresden: Staatliche Kunstsammlungen Dresden, 1982), p.68.

²⁰ K. Czok, 'Zur Absolutismuspolitik Augusts des Starken-am Beispiel der Revisionskommission', in *Saxonia: Schriftenreihe des Vereins für sächsische Landesgeschichte, August der Starke und seine Zeit*, Band 1 (1995), pp. 41–47.

²¹ Following the death of Jan Sobieski, King of Poland, August was elected to be his successor, but the Polish crown proved to be a heavy financial burden.

precious metals to the early modern state. In addition, notwithstanding the work of Agricola and his followers, how could anyone be so sure that it was not possible to transform an inferior metal into a precious one? The debate was still open in the early eighteenth century.²²

In the context of a public display of international proportions the use of planetary symbolism in the 1719 Saturn Festival still had a relevant purpose. Many participants and spectators no longer held the view that the planets exercised any influence on the metals mined from the nearby Erzgebirge, not least the miners and metallurgists themselves, but symbolically there was still a potent ideological connection to be made between the material assets of the Saxon State and the political image the Elector wanted to project to the world.²³ However impressive the visual representation of Saxon mining and metallurgy may have been at this event, the actual state of knowledge about these technologies had not advanced radically since Georg Agricola's standard work was published in 1556, and Lazarus Ercker's treatise on assaying in 1580.²⁴ At the beginning of the eighteenth century Saxon mining was still heavily dependent on localised empirical experience, under which incremental improvements were made. Until a more sophisticated knowledge of mathematics and mechanics was applied in the design and construction of machinery, and until lacunae in the knowledge of Saxon geology and mineralogy were addressed, progress that would propel the industry forward could not be made.²⁵ There were men of outstanding ability in Saxony, for example Ehrenfried Walther von Tschirnhaus, who with the

²² For example, B. J. Teeter Dobbs, *The Foundations of Newton's Alchemy*, (Cambridge: Cambridge University Press, 1975); L. M. Principe, *The Aspiring Adept: Robert Boyle and his Alchemical Quest* (Princeton NJ: Princeton University Press, 2000); G. Scheel, 'Leibniz, die Alchemie und der Absolut Staat', *Akten des Internationaler Leibnizkongresses*, *Studia Leibnitiana Supplementa*, T.9 (1980): pp. 267–83.

²³ Blaschke, 'Kritische Beiträge zu einer Biographie des Kurfürsten Friedrich Augusts I. Von Sachsen', in *Saxonia: Schriftenreihe des Vereins für sächsische Landesgeschichte, August der Starke und seine Zeit*, Band 1/8 (1995), pp.7–13.

²⁴ L. Ercker, *Beschreibung der allervornehmsten mineralischen Erz und Bergwerksarten vom Jahre 1580*, eds P. R. Beierlein and A. Lange (Berlin: Akademie-Verlag, 1960).

²⁵ H. Baumgärtel, *Vom Bergbüchlein zur Bergakademie: Zur Entstehung der Bergbauwissenschaften zwischen 1500 und 1765/1770*, *Freiberger Forschungshefte D 50* (Leipzig: VEB Deutscher Verlag für Grundstoffindustrie, 1965), pp. 74–78.

Electors' patronage, could have made a difference to the state of knowledge through the creation of an academy of sciences. However, August's inclination was to build and refurbish lavish palaces in Dresden and Warsaw, to augment the collections through the purchase of artworks and luxury goods, many of which were commissioned from court painters, sculptors and jewellers, and to place more faith in alchemy than the new sciences. For the Saxon state to function as a major presence in international affairs, it was to a great extent dependent on the wealth creating skills and experience of miners and metallurgists, but their empirical knowledge base could not transform the industry without the intervention of new knowledge from outside. The reasons why this failed to take place in early eighteenth-century Saxony is an issue that merits further study. In 1719, the Elector Friedrich August I commissioned a planetary spectacle that aimed to convince Europe that the wealth and power of the Saxon state was greater than it was.

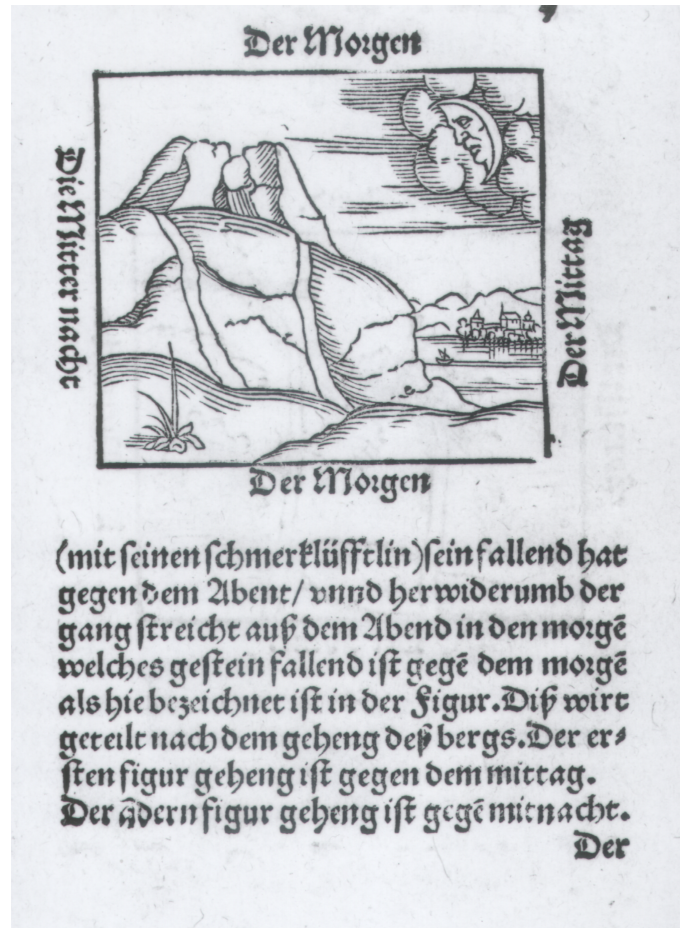


Figure 1. *Bergbüchlein* (Ulrich Rülein von Calw), woodcut. Frankfurt-am-Main, Christian Egenolph, 1533 (670 1506); by permission of the British Library.

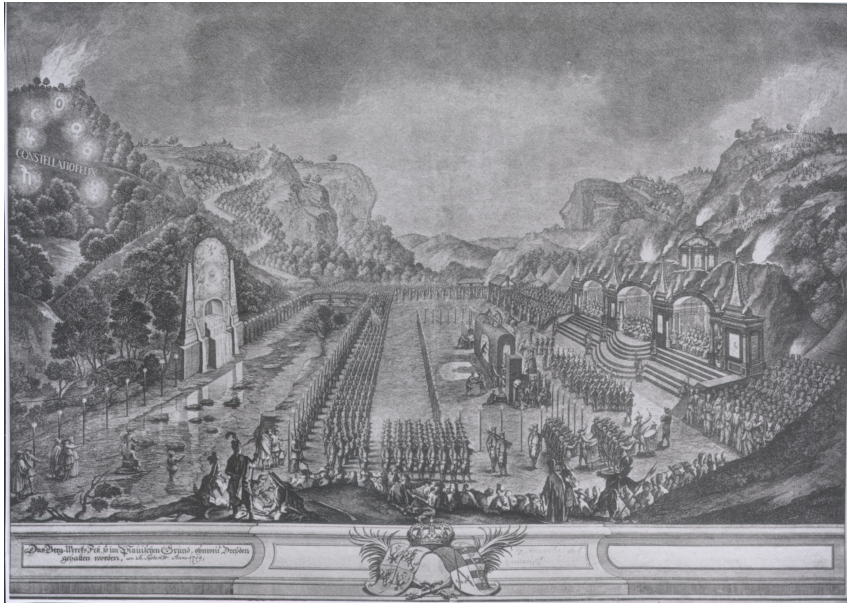


Figure 2. *The Mining Parade, Saturn Festival, 26 September, 1719, Dresden.* Etching and engraving by an unknown master after C. H. J. Fehling, 59.5 x 82.5 cm.. J. L. Sponsel, *Der Zwinger, die Hoffeste und die Schloßbaupläne...*Dresden, 1924; reproduced by permission of the Warburg Institute, London.