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PROVENANCES

Becherus Medicus, homo ingeniösus, sed polypragmon . . .

(Leibniz to Jakob Thomasius, September 1669)

By his pairing of “ingeniösus” and “polypragmon,” Gottfried Wilhelm Leibniz attempted to capture Johann Joachim Becher’s spirit and temper. While Leibniz celebrated Becher’s innate cleverness, he believed that his restlessness brought down odium upon him.¹ In the seventeenth century, polypragmon usually had negative connotations, suggesting that someone was overly busy, restless, and a busybody. It was, however, sometimes used in a positive sense to signify someone curious after knowledge. Its Latin equivalent, curiousus, was also frequently used at the time, and it too possessed both the positive sense of eager inquisitiveness (especially about the material world) and a negative one of weakness of will arising from too great a reliance upon the senses, as well as of overbusyness, ranging even to spying (figure 1).²

Such multivalent restlessness appears typical of Johann Joachim Becher (figure 2). A polymath, he published works on chemistry, politics, commerce, universal language, didactic method, medicine, moral philosophy, and religion. Becher was a man of deeds as well as of words, and, in the service of the most important princes of the German territories, he proposed and carried out many mechanical, chemical, and commercial projects.

A sketch of Becher’s life illustrates well the diversity of activity that was an expression of his restlessness.³ What little we know of Becher’s early life is gleaned from his own published works. His birth in 1635 to Lutheran parents in the free imperial city of Speyer is confirmed in city records, but from that time

¹ In a letter to Lambert van Velthuysen in which he compared Becher to other German scholars, Leibniz remarked that he was “a man of the greatest ingenuity, but not a little restless, which has brought down ill-will upon him everywhere.” 6/16 April 1669, Gottfried Wilhelm Leibniz, Sämtliche Schriften und Briefe, ed. Preussische Akademie der Wissenschaften et al. (Darmstadt: Otto Reichl et al., 1923–), ser. 2, vol. 1, pp. 39–40.


³ I summarize Becher’s life in the following sketch. This summary will be expanded and reference will be made to appropriate sources in the chapters that follow.
until 1655, when he appears again in documents, the portrait of the formative years of his life is his own. He claims to have left Speyer with his mother and brothers in 1648, the year of the signing of the Peace of Westphalia. His father had died in 1643 and his mother had remarried. His stepfather took the boys and their mother into foreign lands in search of a livelihood. Becher does not dwell on these facts, for they only provide the backdrop for the more evocative connections that he establishes in the presentation of his life, in which he emphasizes more than once his travels and autodidacticism. From the time he left the city of his birth in 1648, he claimed never to have attended school or university, learning instead by the light of nature and through conversation with
the learned. In 1654, at the age of nineteen, he published an alchemical work under the pseudonym Solinus Saltzthal.

In 1655, Becher appears in Vienna, where he titled himself mathematician to

4 Becher provides some autobiographical information in his Methodus didactica (Munich: Maria Magdalena Schellin, 1668), and Psychosophia. Das ist! Seelen-Weiszheit (Güstrow: Chris-
Emperor Ferdinand III. He had by this time converted to Catholicism, and was apparently supplying the emperor with advice on alchemical projections and perpetual motion machinery. In 1658, Becher was in Mainz, continuing his search for patronage, and in 1660 he was finally successful, for in that year the elector and archbishop of Mainz, Johann Philipp von Schönborn, appointed him *Hofmedicus und -mathematicus* (court physician and mathematician).

Becher’s status changed significantly in 1661. He moved from mechanical virtuoso to membership in an established profession, for in that year he defended a treatise on epilepsy before the faculty of medicine at the university in Mainz and was awarded the doctorate of medicine. Within the same week he became a member of the faculty of medicine, and in the next year married Maria Veronika von Hörnigk, the daughter of the Mainz professor of medicine, Ludwig von Hörnigk, who in 1663 stepped down from his position as professor in Becher’s favor. For the next three years, Becher published works on medicine conforming to his professional status within the university.

In 1664, Becher moved to the court in Munich, having been named *Hofmedicus und -mathematicus* to Elector Ferdinand Maria of the Wittelsbach House of Bavaria. His wide-ranging activities in this position mainly centered on work in the laboratory and the improvement of commerce. For example, he established a laboratory at the court, began a silk manufactory in Munich, traveled to the Netherlands in 1664 to try to obtain a colony in the New World for the elector and to hire artisans for his manufactory, and created various trade companies. In 1666, while carrying out trade negotiations in Vienna, he became involved in a dispute with the imperial treasurer, Georg Ludwig von Sinzendorf, and he returned to Munich for four years.

During these four busy years, he published the majority of his books. In 1667 he published a verse version of a devotional work, which he called an “Ethics,” and finished in quick succession a work on teaching Latin and didactic theory, the *Methodus didactica*; and a book of political economy, the *Politischer Discurs von den eigentlichen Ursachen deß Auf- und Abnehmens/ der Städt/ Länder und Republicken* (Political discourse about the true causes of the rise and fall of cities, territories, and republics). In 1669 he published his most important chemical work, *Actorum Laboratorii Chymici Monacensis, seu..."
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Physicae Subterraneae libri duo (Two books of the acts of the chemical laboratory of Munich, or subterranean physics), and Moral Discurs von den eigentlichen Ursachen des Glück und Unglücks (Moral discourse about the true causes of fortune and misfortune). In the same year, he spent three months in Holland negotiating for a colony in the New World from the West India Company, not, however, for the elector of Bavaria, but for Friedrich Casimir, count of Hanau. In 1670, his last year in Munich, he perfected a method of extracting iron from clay and linseed oil, that is, of extracting a metal from nonmetallic substances. He performed this process before Elector Johann Philipp in Mainz, and it excited interest as far away as the Royal Society of London. In addition to all these activities, he managed his career so successfully that in 1666 he was appointed commercial advisor to the emperor of the Holy Roman Empire, Leopold I. Although Becher held this position simultaneously with that of medicus and mathematicus to the Bavarian court, from 1666 he always titled himself “Advisor on Commerce to His Majesty, the Emperor of the Holy Roman Empire.”

In 1670, Becher left Munich in order to serve the emperor exclusively. He advised the emperor on pretenders to alchemical knowledge as well as on commercial projects. He also performed a transmutation from lead to silver himself in 1675, and set up a Kunst- und Werckhaus (art and workhouse), which was to be a model manufactory, patent deposit, archive, cabinet of curiosities, and library.

In 1676 Becher set out with his brother-in-law, Philipp Wilhelm von Hörnigk, to enforce a ban on French imports imposed by the emperor on the trading cities of Germany. This trip ended his career at the Habsburg court since it provided his enemies an opportunity to make damaging accusations against him during his long absence from Vienna. Becher was accused (probably with just cause) of taking bribes, and the project ultimately failed.

Becher never returned to Vienna after this trip and spent the remaining years of his life again in the search for patronage, in northern Germany, the Netherlands, and England. In 1677 he entered the service of Duke Gustav Adolph of Mecklenburg-Güstrow in Rostock (where four volumes of Becher’s pre-1678 papers still remain). In Duke Gustav Adolph’s service, Becher attempted to secure the discoverer of phosphorus, Henning Brand, and his process for the icy noctiluca, but Gottfried Wilhelm Leibniz preempted Becher and lured the phosphorus maker away for the duke of Hannover. In 1678–79, Becher raised a flurry of interest among the learned of Europe when he contracted with the States General of Holland to extract gold from the beaches of the Dutch Republic. A small-scale assay of the process succeeded, but Becher left secretly for England before the large-scale probe could be carried out. In England, where he was possibly patronized by the circle around Prince Rupert of the Palatinate, Becher advised on mines in Cornwall and wrote two large works: a collection of
chemical and alchemical processes and a collection of failed and successful projects and inventions. In these works, Becher established for posterity his own and others’ priority to ideas, inventions, and chemical recipes.

Becher died at the age of forty-seven in London far from the main stage of his life’s activities, but he had enjoyed a very successful career in the service of the most important political figures in the Holy Roman Empire, and he had written more than twenty books—many of which were reissued several times. And he ensured his fame after death as skillfully as he had obtained patrons in his lifetime. He left behind a set of words and actions that would be put to use in the following generations. Becher’s life as a practical (active) but learned (contemplative) man became exemplary soon after his death and is expressed perfectly in the title of the first biography of Becher published in 1722: Das Muster eines Nützlich-Gelehrten in der Person Herrn Doctor Johann Joachim Bechers (The model of a useful scholar in the person of Dr. Johann Joachim Becher).

His name and work were also used in other ways in the eighteenth century. In 1703 Georg Ernst Stahl (1660–1734) edited and republished Becher’s major chemical work of 1669, the Physica Subterranea. Stahl claimed to have used Becher’s ideas in his own construction of a theory for the discipline of chemistry. That theoretical construction, which has come to be known as the phlogiston theory, gave way before Antoine Lavoisier’s theory of chemical change based on the theory of oxidation in the last decade of the eighteenth century. Since Stahl wrote him into the history of chemistry, Becher has had an established place in the history of science.

In the history of economic thought, too, Becher’s place endures. His Politischer Discurs was used by the earliest teachers of Kameralwissenschaft (cultural science), a subject instituted at the universities of Frankfurt an der Oder and

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8 Nährische Weisheit und Weise Narrheit: Oder Ein Hundert/ so Politische als Physicalische/ Mechanische und Mercantilische Concepten und Propositionen/ deren etliche gut gethan/ etliche zu nichts worden (Frankfurt: Johann Peter Zubrodt, 1682).
9 Urban Gottfried Bucher (Nuremberg and Altdorf: Johann Daniel Tauber, 1722).
11 Stahl was called to the University at Halle as Professor of Medicine at its founding in 1694, where he lectured on medicine and chemistry. In 1715 he became court physician to Elector Friedrich Wilhelm of Prussia. Stahl has usually been considered a primary opponent of mechanism in medicine and chemistry in the eighteenth century as well as a leading Pietist. See Dictionary of Scientific Biography (New York: Scribner, 1970–), s.v. “Stahl, Georg Ernst.”
Halle in the first decades of the eighteenth century. Georg Heinrich Zincke (1692–1768) edited and republished this major work written by Becher in 1668. Zincke’s own texts, which he claimed were based to a large extent on Becher’s ideas, became part of the discipline of Kameeralistik.

Zincke sought to delineate the boundaries and subject matter for his new faculty in the university, while Stahl attempted to establish his vitalist medical theories and Pietist doctrines. Both scholars wished to create a history for their disciplines and doctrines, and they placed Becher at its center. Later generations of historians have accepted the place in history assigned to Becher by Stahl and Zincke uncritically, and, as a result, the secondary literature on Becher fits clearly into one of two stories: the story of the rise of modern chemistry, or the story of the rise of modern economic thought. But while historians have


13 Zincke, trained in law, became perpetual Commissarius in Policey-sachen to Elector Friedrich Wilhelm of Prussia in the 1720s, then professor of law and cameral sciences in Leipzig in the 1740s.


Christoph Meinel sees the history of chemistry in the eighteenth century not primarily as the history of a change in theory, but in the organization and alliances of chemical practices. Meinel maintains that Becher established a connection between oeconomia and chemistry which was strengthened and bore fruit in the eighteenth century when the first chairs of chemistry were founded in the Kameeralistik faculties of Swedish and German universities. See his articles: “De praestantia et utilize Chemiae. Selbstdarstellung einer jungen Disziplin im Spiegel ihres programmatischen Schrifttums,” Sudhoff’s Archiv 65 (1981): 366–89; “Theory or Practice? The Eighteenth-Century Debate on the Scientific Status of Chemistry,” Ambix 30 (1983): 121–32; and “Reine und angewandte Chemie,” Berichte zur Wissenschaftsgeschichte 8 (1985): 25–45.

One author who has explicitly attempted to provide an interdisciplinary approach to Becher’s work is Mikulás Teich, “Interdisciplinarity in J. J. Becher’s Thought,” History of European Ideas 9 (1988): 145–60.

15 In the extensive literature on economic thought in the early modern period, Becher along with his brother-in-law Philipp Wilhelm von Hörnigk (1638–1712) and Wilhelm von Schröder (1640–88) is considered a mercantilist or cameralist. Herbert Hassinger’s biography of Becher is primarily an economic history; however, it was written with the view that mercantilism was both an economic and political practice, with the aim of centralizing all of society around the economic needs of the absolute monarch. This approach, taken first by Gustav Schmoller and his students in the late nineteenth century, is predominant in German historiography of early modern economic thought.
continued to situate Becher ever more firmly as a figure of significance in the history of chemical and economic thought, they have overlooked the context and cultural significance of Becher’s actions. For, as Leibniz aptly noted, Becher was a very active man. And he was active within a certain social setting, namely, the German court society. Historians have not attempted to understand Becher’s work as possessing a connecting thread, or to understand the motivation for his polymathy.\(^ {16}\) Becher’s early champions, Stahl and Zincke, situated Becher so thoroughly within their histories that Becher as a significant figure in his own right disappeared in the retrospective vision of the stories of disciplinary development.

The use of Becher as exemplary figure is particularly clear in the history of technology. Scholars have combed the texts of the past in the search for precursors and inventors, and often they have not needed to look farther than the entertaining and well-organized collection of projects and inventions that Becher published while in England. He has consequently been named the “father” of many inventions, from gas-lighting to the planting of sugar beets in Central Europe.

Becher has also had his uses in the history of Germany. Periods of intensive study on Becher have coincided with periods of economic disaster or rising nationalist feeling. Numerous dissertations on Becher appeared in the 1920s and 1930s, at least two of which ended with a section on the relevance of Becher’s ideas to their own time.\(^ {17}\) Becher’s most recent and thorough of

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\(^ {17}\) Hassinger treated all Becher’s works, but was not seeking a unifying thread through them. Hassinger was himself mainly interested in Becher’s political and economic ideas, and did not attempt to link them to his natural theory.
biographers, Herbert Hassinger, submitted his biography of Becher as a Habilitationsschrift to the university in Vienna in 1944, although the war prevented its publication until 1951.  

**War**

Becher provides an exemplum of history for these modern writers because throughout his life he pursued political and economic reform in a Germany severely damaged by war. Becher’s date of birth, 6/16 May 1635, fell midway through the Thirty Years’ War, which had raged through the Holy Roman Empire since 1618. Shortly before Becher’s birth, the city of Speyer had been taken by the troops of Bernhard of Weimar, and, not long after, a false hope of peace appeared with the treaty between the elector of Saxony and the emperor. This treaty ended the internal war of the Reich, but the battles between foreign powers continued inside the empire for another thirteen years.

The war left the Holy Roman Empire in economic shambles, and the decline and shifts in population it caused were visible and remarked upon at the time. Later historians have calculated that the German Empire lost about a third of its population in the cities and two-fifths of the population on the land. Agriculture and trade were seriously disrupted, and many towns were left deserted through lack of population or means of sustenance. The Thirty Years’ War occasioned not only economic chaos but also social and intellectual crisis. In the 1660s Becher himself said that this ostensibly “theological” conflict made “of belief a comedy,” which in Germany had turned into “a slaughterhouse and tragedy.”

The way Becher conducted his life must be seen against this political, economic, and intellectual backdrop. Much has been written about the crisis of the seventeenth century to which this war ostensibly contributed, and while Becher’s works testify that he saw no general European crisis, he did consider his immediate world, the Holy Roman Empire of the German Nation, to be in social and economic, moral, and intellectual crisis.

Becher’s work must also be seen against the background of the power struggles between territorial princes that led up to the Thirty Years’ War. The treaties

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of Osnabrück and Münster codified the increasing particularization of the German territories by ensuring the sovereignty of the prince within his territory. The resulting political and economic issues that revolved around the sovereign prince’s court provide the framework for Becher’s activities. The court was the center of power and patronage in the seventeenth century, and it attracted many purveyors of schemes and projects similar to Becher’s. His success in obtaining court positions derived from a particular ability to speak in a language comprehensible and persuasive to the court world, and at the same time to deal effectively with the artisans necessary to carry out his projects. He became an intermediary between court and artisan. As intermediary, he proposed practical, material projects that would aid the German courts impoverished by the Thirty Years’ War, but he articulated and carried out these projects in such a way that he bolstered the traditional structure and expression of power within the court society.

Becher was not an atypical figure in early modern Europe in responding to the real economic crisis in his society by projecting a scheme for ordering it. His scheme developed from models already present within political and economic discourse. He advocated reform not by denouncing established social, intellectual, and political structures, but rather by “refurbishing” them with new connecting spaces and arrangements within their walls. Employing the rhetoric and observing the conventions of established power structures, Becher attempted to contruct a new constellation of power and a new discourse that embraced political, moral, and natural philosophy.

In order to provide for the landed ruler’s need of specie, Becher sought to integrate the landed ruler into the commercial exchange economy. In pursuing this goal, Becher used his position of medical doctor and advisor and his knowledge of nature to transform and conflate natural, productive, landed values and mobile, material values of the merchant and exchange. He proposed to the court a new language and vision, at the center of which stood commerce.

### Commerce and the Closed Society

*zwar in dem Sprüchwort heisset/ quae ad omnes pertinent, à singulis negliguntur, und heutiges Tags gar wenig seynd/ welche dem gemeinen Wesen zum Besten nutzliche Conceptionen führen.*

Indeed [as it] says in the proverb, what is everyone’s business is nobody’s concern, and today there are very few men who put forward useful concepts that lead to the best for the community.

*(Becher, Politischer Discurs)*

On 6/16 May 1635, Johann Joachim Becher, the eldest of three sons, was born to a Lutheran pastor, a native of Wittenberg, and his wife, the daughter of an
established citizen and Lutheran pastor of the free imperial city of Speyer. The crisis of war that enveloped much of the lives of Becher’s parents reverberates in his own life and writings. In the social and political realm from which his mother came, the free imperial town of Speyer, the war led to a breakdown of the stable guild society through the cessation of trade, the levying of war taxes, and the resultant loss of power by the guilds. The influx of the soldiers and refugees of war also brought chaos to this closed society. A tension between the commonweal and self-interest, and between universalism and closed community characterized Becher’s mother’s realm.

Anna Margaretha Gauss, Becher’s mother, survived her husband and apparently accompanied Becher and her other two sons through large parts of Europe in search of a livelihood. Becher reports nothing about her except that she remarried after his father died in 1643 and that her second husband was a wastrel who took them away into foreign lands. During this time, Becher claims that he had to give lessons in order to sustain his mother and brothers. When they set off on this journey, his mother had been an established member of the community, born to a family of citizens and council members in Speyer.20

As the daughter of a citizen of a free imperial city, Becher’s mother belonged to a community society that embodied a notion of common purpose and a hostility to the unincorporated individual. The citizenry of Speyer, a town of middle size, was divided into fifteen guilds, ruled over by a patriciate drawn from members of these guilds.21 Because Speyer was a seat of a bishopric and meeting place for the Reichskammergericht, the artisanal citizenry had to assert itself against representatives of the bishop and local nobles for control of the town. The emperor granted various special privileges to the town of Speyer, and the location of the Imperial Court of Appeals in the town allied the emperor with the town citizens against the bishop and the nobility.

A middle-sized guild town of the Holy Roman Empire had a distinctive structure and outlook that was nurtured by the balance of powers in the empire, and that resulted in the town’s ability to assert its independence against the local nobility.22 These towns had formed around the production of goods by artisanal guilds, and town government and politics were dominated by guild members. The corporate guild mentality asserted the communal good over the interest of the individual, and required that all the citizens of a city be united into corporate organizations. The ostensible goal of this community was not to provide for a single family and name but to benefit all in the community, thereby giving the

20 Her father was pastor of the Augustinian church in Speyer and died in 1644, a year after his son-in-law.
town the power of common purpose by which it could assert itself against outside forces.23 The town was not just a society of individuals (Gesellschaft) but a community (Gemeinde), or, as it was sometimes translated, a universitas. Not every person residing in a town belonged, however, to its citizenry, but only those who could be corporately represented and who had been approved by their corporate body. In a small town like Nördlingen, probably no more than half of the adult, working males between 1580 and 1700 were Bürger, citizens who possessed the privileges and duties of citizenship (Bürgerrechte). In a large city, such as Frankfurt, in 1700, about 62 to 67 percent of all inhabitants lived within Bürger households.24 Overwhelmingly, these Bürger were drawn from the guilds and were wealthy enough to meet property requirements for citizenship. Citizenship, however, was more than a measure of economic wealth; it was also a measure of one's political position, social quality, family history, and personal dignity.

The community was organized around a notion of common purpose, which was antithetical to personal ambition and individual prominence (monetary or social), and the corporate structure enforced this. The structure and mentality of the community was hostile to noncollective elements typically residing outside the town walls or passing through the town, such as the rural landholder, the peasant, the learned man, the civil servant, the mercenary, and the merchant. These outsiders were disruptive sources of competition. In particular, merchants were seen by guildsmen as disruptive competitors, for, although some small retailer guilds selling imported goods existed, the guildsman ideally sold his goods directly from his workplace.25 Thus the merchant was seen as an unnecessary middleman who inflated prices and who lived off the sweat of other men's brows. The merchant was not only a competitor in that he brought in outside wares that competed with the manual workers' goods, but he was also outside the collective community. The guildsman entered a tacit contract as a member of the community to supply wares of good quality in return for exclusive control of the market. The merchant took part neither in the community nor in the contract. Therefore he competed on a different level and in accordance with an entirely different set of rules that seemed to the guildsman to give him an incomparable advantage.26 Thus the merchant was not only a competitor, but he belonged to a different world—a world in which property was not defined in terms of one's place in the community, nor in terms of land, but in

25 Walker, Home Towns, p. 78.
26 Ibid., pp. 120–21.
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terms of movable goods and money. Movable goods and money were traditionally associated with risk, instability, vanity, selfishness, and private interest, but most of all, money wealth was considered suspect in the stable town world by reason of its very mobility.

Merchants were not, therefore, normally part of the small-town citizenry. They were looked upon with suspicion and excluded from town government and community life. Moreover, the merchant and his money wealth were considered external to the town economy because they were not productive. The town, like agriculture, was viewed as producing goods, whereas commerce involved only the consumption of others’ work. Where land produced natural fruits and the artisans in the towns produced worked goods, the merchant took from the community and gave nothing in return. The townsman viewed merchants as taking wealth and means of sustenance from the community, for merchants took advantage of deficiencies in town production, as, for example, in their import of luxury goods (also considered evidence of their corrupting influence), or in the inefficient distribution of goods. If the retail merchant was seen as a middleman who drove up prices, the large import merchant was viewed as sucking wealth and money out of the town. This view hinged on the fact that neither sort of merchant could claim to be productive in the way that those engaged in agriculture and craft could. Furthermore, the money wealth that the merchant accumulated was traditionally viewed as unnatural because it was properly a means of exchange, rather than a regenerative resource, for “pecunia non fructificat.”

27 Friedrichs, Urban Society, notes the small number of merchants among the Nördlingen citizenry (5 out of 1541 in 1579), but sees it as coincidental (pp. 80–81).

28 Trade was not regenerative like agriculture, in which the fruits of the earth were multiplied and replenished, for it simply involved the taking of wealth from one group to enrich another. This view had its source in Aristotle, Politics, 1.8.1–11.35. See Steinhäusler, Johann Joachim Becher und die Einzelwirtschaft, pp. 49–50, who traces the antimerchant rhetoric through scholasticism, humanism, and Reformation literature. He quotes “pecunia non fructificat” on p. 113. Steinhäusler provides an excellent analysis of Becher’s model of human society and its sources in earlier economic structures. More recently, Wolfgang Zorn, “Humanismus und Wirtschaftsleben nördlich der Alpen,” in Humanismus und Ökonomie, ed. Heinrich Lutz (Weinheim: Acta humaniora, 1983), pp. 31–60, goes over the same material, but points up some of the problems for the historian in drawing out a consistent thread of thought on economic questions (as they are defined since Adam Smith). Part of this problem stems from the effort to impose a theory of coherent economic system on writers of earlier periods. These authors were usually writing in response to immediate and single issues within an established discourse, rather than elaborating their views within a comprehensive system. Jonathan Parry, “On the Moral Perils of Exchange” and “Introduction: Money and the Morality of Exchange,” in Money and the Morality of Exchange, ed. J. Parry and M. Block (Cambridge: Cambridge University Press, 1989), pp. 1–32, provides a useful overview of literature and approaches to the subject of exchange. See also Niels Steensgaard, “The Seventeenth-century Crisis,” in The General Crisis of the Seventeenth Century, ed. Geoffrey Parker and Lesley M. Smith (London: Routledge & Kegan Paul, 1979), pp. 26–56; and Stuart B. Schwartz, “The Voyage of the Vassals: Royal Power, Noble Obligations, and Merchant Capital before the Portuguese Restoration of Independence, 1624–1640,” American Historical Review 96 (1991): 735–62.
By 1635 the power of the guilds that had initially enabled the cities to free themselves from territorial rule had dwindled. The movement of trade away from the empire to Antwerp and finally Amsterdam and the other maritime nations reduced trade in the empire as a whole. The Thirty Years’ War destroyed the cities’ productivity and their markets, while war tax levies put fatal financial strain on their treasuries. The war also greatly increased mobility in the society. The increasing power of the territorial rulers and their courts resulted in a greater number of hofbefreite artisans, who operated outside the guilds under direct license from a member of the nobility. The artisan at the noble court was freed from guild constrictions and rules, and, as the residential seats of noble courts moved increasingly off the land and into the towns, these free artisans competed fiercely with the often already struggling incorporated guild artisans of the towns. The corporate guild structure of the towns was also eroded in the first half of the seventeenth century by the system of Verlag, a putting-out system in which a merchant supplied artisans with raw material, which they made into goods and sold back to him.

The town society was just one of three separate worlds that coexisted in the Holy Roman Empire of the German Nation in the seventeenth century. Outside the town walls of the community-centered society of the towns lay a hierarchical world of the landed territorial prince, and a mobile and individualistic world of commerce and money. Each of these worlds had its own economy, structure of power, and set of values, and each saw in the others a threat to its own stability. The community world was structured around a guild economy in which members of a reciprocally defined status worked according to a careful division of labor for a common good. Wealth resided in the ability of the community to sustain itself, and the status of an individual corresponded to his place in the community. The hierarchical world of the landed ruler, on the other

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30 Friedichs, Urban Society, chronicles the decline of corporatism in Nördlingen. In the late seventeenth and early eighteenth centuries, the status of artisans declined because their urban monopoly was broken down by new forms of production. This happened because the citizens’ (i.e., the guilds’) economic position was eroded in the Thirty Years’ War and did not return to its former state before enormous war taxes were levied by the empire against the towns for the Turkish and French wars.

31 Again, I follow Walker’s analysis in Home Towns, esp. pp. 26–27, for this section. His label for the third mobile group is “movers and doers.” I have set out the three worlds here in schematic form; I do not claim that the situation in the seventeenth-century German Empire corresponded neatly to these divisions. These divisions, however, reflected the common perception of society as separated into the Lehr-, Nähr-, und Wehrstände. The estate of teaching (Lehrstand) included individuals such as priests and scholars, who were not tied to a single locale. The Nährstand of sustenance-providers such as peasants and artisans was normally perceived to be tied to a particular location on the land or in the cities. The Wehrstand, composed of the nobility, was understood to defend the other two estates, and resided on the land.
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hand, was organized around the lord, who, as father of his household, looked after the welfare of the rest of his dependents. The economy of the landed household was based on the agricultural production of the land, and, in this economy, wealth was measured by land and power, and status by honor. Lastly, the world of the large-scale merchant existed outside these societies of land and town, and in this world of exchange for monetary profit, wealth was measured in money, and status by credit.

The values of the town and of the land were both based on production for self-sustenance, and these societies were careful to conserve a balance of power by the observation of traditional rights and privileges. In contrast, the third world of commerce, which was based on taking advantage of lapses in self-sustenance in the other two worlds, depended on a suspension of the traditional rights in the court and town worlds. In Germany, the commercial world was an accepted part neither of the community world nor of the hierarchical landed society. By the seventeenth century, however, the two stable societies of town and landed wealth began to break down in the face of increased demands for money, competition in international commerce, and war, and the court began to seek additional means of hard cash.

In his political writings, Becher took over the rhetoric and self-sustaining structure of the community world, exemplified by his notion of common good as a model for territorial government, and his cyclical model of sustenance and provision in society. Although he drew his model of civil society from the community world, he transformed the model in significant ways. He made the commercial activity of merchants the “soul” of his self-sustaining community, and the prince, although a “servant” of the community, came, by means of Polizey (government ordinances), to control the community world. By drawing the community world under the control of the prince, Becher sought to make the town cycle of sustenance the basis of princely wealth. Becher thus sought to extract the goal of common purpose and the cycle of economic sustenance (which he made dependent, however, upon commercial activity) from the community world and place them under the control of the territorial ruler. He desired to retain corporate forms, such as the guilds, but to police them by requiring them to be privileged by the prince. The corporate forms and the common purpose of his mother’s community world thus resounded in Becher’s thought. But by drawing it into the court and commercial worlds, he ultimately helped to destroy this corporate world.

Becher left the town walls of Speyer with his mother in 1648 and became a wanderer. The citizen of no city, he joined the mobile group of individuals who threatened town stability. Becher recounted that while on his travels with his mother, he learned from merchants, and records indicate that during this time

32 Walker, Home Towns, notes Becher’s use of community rhetoric and structure on pp. 148–50, and uses Becher as a “spokesman” for the town world.
he may have resided in the large trading cities of northern Europe.\textsuperscript{33} He drew from his experience of the world of the \textit{Bürger}, as well as from the mobile world of commerce, in formulating a comprehensive view of society.

**Commerce and the Open World**

Becher’s view of commerce as a productive and meliorative force in society did not come from within the town world. To understand the central place of commerce in his model of society, we must turn to the world of his father, Joachim Becher. The advent of war in the seventeenth century brought forth projects of intellectual and spiritual reform. Commerce was a significant component in these reform projects, but it was a very different notion of commerce than Becher had learned in his mother’s town world.

Joachim Becher was a Lutheran pastor, perhaps educated in Strasbourg, called to Speyer as deacon in 1633 and made pastor of the church of Saint George in October 1635. Becher claimed that his father could understand ten languages by the age of twenty-eight: Hebrew, Chaldean, Samaritan, Syrian, Arabic, Greek, Latin, German, Dutch, and Italian.\textsuperscript{34} Becher’s father died at the age of thirty-seven in 1643 when Becher was eight years old, but by this time he had perhaps begun to teach his son the rudiments of Latin, and had passed on to him a glimpse of the vision that lay behind his attempt to master these languages. His learning of the ancient languages was rooted in the philological analysis of the Scriptures, a legacy of the conjunction of humanist philology and Lutheran reform, while his knowledge of the vernacular tongues, Dutch and Italian, indicates the increasing use of the vernaculars as Europe divided into separate political units. The ideal of a unified European Christendom had not quite faded, however, and the interest in language at this particular time was part of a scholarly effort to unify the different European languages as a first step toward the unity of peoples and the peace that was to follow on it. For Becher’s father, the Lutheran pastor, who had been twelve years of age when the war began and who died before it ended, the search for a universalism that would lead to reform and to universal peace was particularly immediate.

We have no other indication of the elder Becher’s educational and theological views than Becher’s statement that his father had mastered ten languages; however, Becher possessed several lists of books, one of which set out a course of study with a distinctly Lutheran cast. Perhaps this was a Lutheran pastor’s course for his son. In this course, lectures were to be heard and disputations undertaken in philology, history, Greek, and Hebrew. The student was then to proceed to a \textit{studium sacrum}, which drew upon authors in rhetoric, oratory,

\textsuperscript{33} Mss. var. 2, fol. 674r–v. See n. 106.

\textsuperscript{34} Becher, \textit{Methodus didactica}, p. 33.
epistolary writings, poetics, history, chronology, logic, mnemonics, and the rudiments of philosophy. Mastering the corpus of ancient Latin, Greek, and Hebrew authorities and their modern commentators was the aim of this studium, but the reform of knowledge and of humankind’s relationship with God was also a strong component. The authors included Lutheran theological reformers such as Luther, Melanchthon, Johann Heinrich Alsted, Jan Amos Comenius, as well as other reforming moderns, such as Erasmus, Vives, and Scaliger.

Becher’s father belonged to the generation of reformers of learning such as Johann Heinrich Alsted and Jan Amos Comenius, from whom Becher himself would draw vocabulary and ideas while completely transforming their goals. In the early decades of the seventeenth century, Alsted published a seemingly endless number of polymathic encyclopedias. In the thousands upon thousands of folio pages contained in these weighty tomes and at the Reformed University of Herborn where he taught, Alsted instituted and extended the school reforms of Petrus Ramus. Later scholars ridiculed the dusty folio volumes that represented his life’s effort, but in the lands of German tongue in the first half of the seventeenth century Alsted’s reform of learning was very serious business indeed. It drew from Hermetic and Neoplatonic doctrines as well as from reformed religious thinkers to establish a new place for humankind in the cosmos and a new relationship between humans and God.

Jan Amos Comenius, Alsted’s student at Herborn, best exemplifies the climate of intellectual and religious reform into which Becher was born and to which he would return for ideas. Comenius would imitate Alsted in formulating a course of study to reform philosophy so as to accommodate the new understanding of humankind’s relationship with God. Such reform was necessary as the end of history approached. Comenius had also come under the influence of another chiliastic Protestant thinker, Johann Valentin Andreae (1586–1654), a Lutheran pastor publishing just at the outbreak of the Thirty Years’ War. Andreae’s Societas Christiana promoted an individual piety akin to 

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35 Mss. var. 2, fols. 17r–20v.
38 For the following portrayal of Comenius, I have drawn heavily on Hans Aarsleff’s outstanding article in the Dictionary of Scientific Biography, 3:359–63. See also the substantial bibliography that he cites there.
 Pietism and the acquisition of pansophic knowledge based in part on the study of nature and of the crafts. Andreæ’s ideas for the reform of learning show a marked similarity to those of his slightly older contemporary Francis Bacon in *The New Atlantis* and *Sylva sylvarum*, but it was probably from Andreæ’s writings, filtered through the works of Comenius, Samuel Hartlib, and other Protestant reformers, that the ideal of natural knowledge as an integral part of religious and material reform emerged.

Forced into exile as the Catholic forces entered his native Bohemia and destroyed the community of the Bohemian Brethren among whom he was a pastor, Comenius struggled throughout his life with the first stage of a thoroughgoing reform of humankind in preparation for the Last Days. This reform centered on the school curriculum and began with the teaching of language, both because learning Latin was propaedeutic to any course of study, and because he believed that only a proper understanding of the relationship between words and things could bring about an understanding of God’s revelation in the words of Scripture and the things of Creation. Learning began with the senses, especially the sense of sight; thus a study of things through vision and observation was primary. For this reason, Comenius formulated his celebrated method of teaching language by pictures, which finally resulted in the publication of his famous picture book, *Orbis sensualium pictus* (1658).

Drawing on Hermetic and Paracelsian ideas, especially as formulated by Jacob Boehme, Comenius believed that God had left his signature in all the things of nature as well as in the mind of man himself. Man must therefore come to know himself as well as study the things of nature in order to read these signatures. For, as Paracelsus (1493–1541) had set forth, the seeds or signatures of the things resonated with the Platonic ideas in the mind of man to bring about true understanding and knowledge of God. The natural philosopher or physician must “overhear” and unite with the thing under study in order to gain true, natural knowledge of the object.

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Like the reformers of the curriculum and of philosophy before him, Comenius sought a universal method that would enable the student to see the order of things and to understand their causes, moving the mind toward wisdom and insight. This had been the aim of Alsted’s encyclopedia, but Comenius’s method added millenarian components. A universal method would lead to universal knowledge—panSophia—which would overcome the fallen state of humankind and lead to the final reform.

In the face of the proliferation of vernacular books and the increasing separation of nations, a prominent feature of this universalist reform was the search for a universal language. Such a language would overcome the state of mutual ignorance and misunderstanding that had been the fate of humankind since the attempted construction of the Tower of Babel. The new universal language would make feasible a universal method of learning, and this in turn would lead to order, peace, and harmony among people. The universal language of things that Comenius set forth with his book of pictures was to initiate this reform. He believed universalism had been furthered in the modern era by the invention of printing, the advances in navigation, and the increase in long-distance trade and exchange. Commerce, the exchange of things, held out a strong promise of universality.

This notion of universalism and its associated concepts continued to resonate in Becher’s thinking, and, significantly, one of Becher’s first works was a scheme for a universal language. But he had a quite different vision of universalism and reform than that of his father’s generation. For Becher, the immediacy of spiritual reform in a world ravaged by war had been replaced by the urgency for material and financial reform of the temporal world at the court of princes. The focus had shifted from the eternal sphere of God to that of his representative on earth, the prince. As a convert to Catholicism and a créature of the Habsburg/Catholic world, Becher manipulated the ideas of his father’s world to create a new vision of the order of society. Becher remained fascinated by commerce, by ships, by travel, and by universalist undertakings, but in his hands the spiritual and cosmic meaning was muted, and the material content emphasized. The religious and millenarian significance with which these activities had been invested by Comenius and also, perhaps, by his own father continued, however, to reverberate in Becher’s thought.

His father’s world of the universal exchange of words and things stood in


contrast to the values of the closed town society that had been his mother’s world. When Becher left the town walls of Speyer, he carried with him a legacy composed of these contrasting values, and he would draw from this legacy for understanding and ideas in the course of his life.

The Mechanical Arts

Becher states he was just thirteen years of age when his stepfather took him and his family to seek their livelihood in foreign lands in the year of the Peace of Westphalia, 1648. Perhaps his stepfather died or deserted them, for Becher said he had to become his family’s sole support in foreign countries, giving lessons by day and studying at night. After they left Speyer it is unlikely that Becher had any formal course of education. Becher had any formal course of education.\textsuperscript{45} When he became established he recalled his course of study:

By night I had to study and with great effort seek from books what one [feeds] to others in schools already chewed up and laid out in the best way. Often I could not understand and from a lack of books, I had to search de novo and by the light of nature for many theses and axioms myself, which took much time, although afterward I had learned it with greater solidity. I had to learn in a different manner: start from the fundament and go from things to words. In contrast, the schools remain only in words and do not know anything about real things. When I had to study at night, during the day I had to teach others so that I could keep not only myself but also my mother and two brothers who were abroad with me. . . . While I taught, I learned . . . for I was not over thirteen years of age.\textsuperscript{46}

Becher claimed to have begun with the things themselves, and from this basis to have risen “by the light of nature” to understand theses and axioms. He sought a “kurze[n] Methodum,” or a “newes expediens” by which he could teach languages to his pupils. When he had mastered this reform of language teaching (by the light of nature and by studying other Methodisten), he turned to other subjects:

I wanted to move to other studies; I set aside didactics and studied theology. When I finished that I moved to mathematics, from there to medicine, from there to chemistry, and after this, by means of mathematics, I learned various manual trades. In these I observed the artisanal practices and privileges so that I finally arrived at political and juridical study.\textsuperscript{47}

\textsuperscript{45} Becher does mention that he had private lessons with a teacher named Debus in the Latin school in Speyer (\textit{Methodus didactica}, p. 69). Hassinger noted that Debus was Konrektor of the school in 1644 (Hassinger, \textit{Becher}, p. 12). Becher’s name does not appear on the rolls of matriculation of any universities he would have been likely to visit (Hassinger, p. 16).

\textsuperscript{46} Becher, \textit{Methodus didactica}, Vorrede, unpaginated.

\textsuperscript{47} Ibid.
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Becher claims to have passed from language learning, the basis of all boys’ schooling, directly to theology, as the Lutheran plan in his Nachlaß advised. He did not tarry long, however, with his theological studies, as he moved quickly to practical concerns, and from there to politics and law. Mathematics also led him to commerce, for, from the mechanical arts, he claimed to have learned artisanal vocabulary and instruments and to have speculated about how he might produce the objects of manufacture. He learned about selling and the market, and thus came to a scientz of commerce:

Because I studied mathematics and especially took pleasure in mechanical subjects, I had to do with many types of artisans, and so had to learn to understand their work, vocabulary, and instruments. I even invented various artisanal compendia, and I speculated how manufactured goods might be more easily made. After this, I went further and examined how they might be sold, and, because of this, I learned about putting-out companies. In a nutshell, I had to learn the entire art, nature, and character of merchant activity. Thus I entered into this science slowly; not suddenly without understanding, cause, or calling. Then, in addition, I did many other things, for example, I undertook long travels, I saw numerous trading cities and their government and customs, and I was employed in different commissions dealing with this material.48

Becher emphasized again and again the importance of mathematics and experience in his education and life:

I cultivated the ingenuity, judgment, and memory such as God had given me in mathematics and learned thereby order. After that I studied the axiomatic methods, and besides that I have read much, listened much, experienced much, made many trials, labored much, speculated much, and I have associated with many learned people.49

In emphasizing mathematics, his contact with artisans, and his own experience, Becher was drawing on a Ramist tradition as mediated by Alsted and Comenius. Petrus Ramus (1515–72) believed that “natural” or “practical” reason should be allowed to guide humankind in the acquisition of knowledge, for this was the method used by the ancients, but distorted by modern scholars. Natural reasoning resided in the daily life of humankind and in its trades, such as navigation, medicine, agriculture, and bookkeeping.50 In his search for ancient sources, Ramus found the practice of these arts more ancient than the theories

48 Becher, Politischer Discours (Frankfurt: Johann David Zunner, 1668), dedication, b recto.
49 “Das ingenium, judicium und memorie, so mir Gott verliehen/ habe ich in der Mathesi excolirt/ und durddurch die Ordnung geltert/ darauf habe ich mich auf die Methodos axiomata aufgemerckt/ über dieses habe ich viel gelesen/ viel gehörct/ viel erfahren/ viel probirt/ viel laborirt/ viel speculirt/ bin auch mit viel gelehrten Leute umgangen.” Becher, Psychosophia (the second printing [Hamburg, 1705] of the second edition of 1683 was used here, p. 316).
of scholars. Thus his reform advocated attentiveness not only to practice itself but also to the practices of the mechanical arts.\textsuperscript{51}

Mathematics was particularly important, not only for Ramus, but for other reformers of the trivium and quadrivium, such as Melanchthon and Rudolph Agricola, because it was the heart of the quadrivium and was seen as corresponding to the place of logic in the trivium. For Ramus, however, it became central in his intellectual and pedagogical reform, for it represented to him a way of unifying the practices of the liberal and mechanical arts, and of theory and practice.\textsuperscript{52} Mathematics was most important for Ramus in its connection to the practices of the mechanical arts, and their utility for society. He visited the workshops of artisans in Paris and Nuremberg, and claimed to be confirmed in his opinion that mathematics was important for civil life.\textsuperscript{53} Ramus considered Nuremberg, and Germany in general, to be a model of the practice of the mechanical arts, and the related study of mathematics. For Ramus, Germany possessed so much wealth and honor because both its cities and princes cultivated the mathematical and mechanical arts in their mining, machine making, fortification, and weapon manufacture.\textsuperscript{54} Many other writers of the sixteenth and seventeenth centuries believed that the advancement of mathematics and the mechanical arts proved the possibility of intellectual and material progress, as well as the superiority of the moderns over the ancients.\textsuperscript{55}

During Becher’s lifetime, mathematics was very much associated with the mechanical arts and trades. John Wallis’s 1690 memory of mathematics as it had existed in the 1630s in English universities illustrates this attitude in the time of Becher’s youth: “For Mathematicks, (at that time, with us) were scarce looked upon as Accademical studies, but rather Mechanical; as the business of Traders, Merchants, Seamen, Carpenters, Surveyors of Lands, or the like; and perhaps some Almanak-makers in London.”\textsuperscript{56} In the sixteenth and seventeenth centuries mathematics came to signify both the exact science and certain

\textsuperscript{51} Hooykaas makes the point that practice was both the source and the goal for Ramus (ibid., p. 30).

\textsuperscript{52} Ibid., pp. 30–31, and chap. 10, “Apologie des mathémátiques,” pp. 75–90.

\textsuperscript{53} Ibid., p. 84.


\textsuperscript{56} This example is drawn from Christoph J. Scriba, “The Autobiography of John Wallis, F.R.S.,” Notes and Records of the Royal Society 25 (1970): 27. Mordechai Feingold, The Mathematicians' Apprenticeship (Cambridge: Cambridge University Press, 1984), attempts to refute this description of mathematics in 1630 by examining the teaching of mathematics at English universities at this time. His conclusion that mathematics was indeed taught does not preclude the possibility that mathematics was viewed as mechanical.
knowledge of geometrical demonstration and the practical, mechanical activity of the workshop. Mathematics was an established part of the scholar’s training that would have been learned from the subjects of the quadrivium—arithmetic, geometry, music, and astronomy—but mathematics was also firmly associated with the machines and workshops of artisans.57

Ramus believed the union of scholarly mathematics and the practice of the mechanical arts by artisans would bring about great civic prosperity. Writing in 1730 about Nuremberg mathematicians and Künstler of the town’s more prosperous and glorious days, Johann Gabriel Doppelmayr saw Nuremberg as exemplifying the fruitful relation existing particularly in Germany between exact mathematics and the mechanical arts. He believed Nuremberg’s fame as a center of mathematical astronomy (the chosen home of the astronomer Regiomontanus), its reputation for artisanal virtuosity, and its affluence as a center of artisanal manufacture were not coincidental. Exact mathematics, the practice of the mechanical arts, and artisanal ingenuity had driven each other on to raise Nuremberg to heights of material abundance. While the studium mathematicum had been cultivated in Italy, it had flourished especially in Germany, and particularly in Nuremberg.58 Because of its relationship to material progress and plenty, mathematics was invoked by artisans to establish their learned status and by scholars to demonstrate their ability to carry out in practice what they proposed in theory.

Mathematics was thus associated with the arts and with the artisanal cities seen as centers of production and prosperity. Becher’s background in the guild city may well have prepared him to regard the artisanal city as a place where mathematics and the mechanical arts brought about great productivity; however, his papers and publications give no clue as to where he might have honed his mathematical and mechanical skills. His interest in the arts was in any case fully in tune with the increasing attention paid to artisanal labor since the sixteenth century. In England, John Wilkins had published Mathematical magick in 1648, which was concerned with practical mathematics and machines. He wrote this book for learned men, traditionally prejudiced against the mechanical arts and their


practitioners. For this audience, he relates the story of Heraclitus in the tradesman’s workshop:

It is related of Heraclitus, that when his scholars had found him in a tradesman’s shop, whither they were ashamed to enter, he told them . . . that the gods were as well conversant in such places, as in others: intimating, that a divine power and wisdom might be discerned, even in those common arts which are so much despised.\textsuperscript{59}

Artisanal knowledge was separated from the realm of school knowledge by the fact that the mechanical arts were neither taught in the schools nor written down, and a certain unclean odor clung to them as the illiberal arts, for in antiquity they had been the work of slaves and the vulgus. The knowledge of artisans was transmitted by doing and imitation, rather than by the study of books, and artisanal guilds and guild towns constituted the means by which their knowledge and techniques were reproduced. As the power of the guilds and guild cities grew, and the arts came to be seen as the foundation of the wealth of cities and republics, scholars began to look to artisans and artisanal knowledge as productive and valuable. Juan Luis Vives, for example, encouraged scholars not to “be ashamed to enter into shops and factories, and to ask questions from craftsmen, and to get to know about the details of their work.”\textsuperscript{60}

Johann Valentin Andreae and Francis Bacon both believed that a study of the mechanical arts would yield knowledge of nature as well as knowledge useful to the state,\textsuperscript{61} and their thought was particularly influential in plans for the

\textsuperscript{59} Quoted in J. A. Bennett, "The Mechanics' Philosophy and the Mechanical Philosophy," \textit{History of Science} 24 (1986): 22. Wilkins here paraphrased Aristotle, \textit{De partibus animalium}, 1.5.15–25, in which Aristotle used the example of Heraclitus in comparing the study of the eternal, unchanging divine with the study of the perishable things of the observable world. While Aristotle conceded that study of the divine was more pleasing, he maintained that because the things of nature were closer to human nature and experience, their study had its own compensations. He therefore advocated the study of all the objects of nature, no matter how small and unattractive. Aristotle wrote: “For even in the study of animals unattractive to the senses, the nature that fashioned them offers immeasurable pleasures in the same way to those who can learn the causes and are naturally lovers of wisdom. It would be unreasonable, indeed absurd, to enjoy studying their representations on the grounds that we thereby study the art that fashioned them (painting or sculpture), but not to welcome still more the study of the actual things composed by nature, at least when we can survey their causes. Therefore we must avoid a childish distaste for examining the less valued animals. For in all natural things there is something wonderful. And just as Heraclitus is said to have spoken to the visitors, who were wanting to meet him but stopped as they were approaching when they saw him warming himself at the oven—he kept telling them to come in and not worry, ‘for there are gods here too’—so we should approach the inquiry without aversion, knowing that in all of them there is something natural and beautiful.” Trans. D. M. Balme (Oxford: Clarendon Press, 1972).

\textsuperscript{60} \textit{De tradendis disciplinis} (1531), bk. 4, chap. 6, trans. Foster Watson (Totowa, N.J.: Rowman and Littlefield, 1971), p. 209. On this subject, see also Rossi, \textit{Philosophy, Technology, and the Arts}.

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"Histories of Trades" pursued by English scholars of Becher’s generation. Comenius’s émigré associate in England, Samuel Hartlib, and his circle of like-minded Protestant reformers, were particularly active in promoting these plans. When John Dury traveled to Germany in the 1630s in pursuit of a Protestant union, he wanted not only to promote his overarching cause, but also to observe “all Inventions, and Feats of Practise in all Sciences.”

For Inventions and Industries, I will seake for such chiefly as may advance learning and good manners in the Universities, Schooles, and Commonweales; next for such as may bee profitable to the health of the body, to the Preservation and Encrease of wealth by trades and mechanick Industries, either by sea or Land; either in Peace or Warre.

In Dury’s view, the reformation of learning and of the world was to come from things: the materials out of which the artisan crafted his objects, the techniques that tried and transformed things, and the inventions that brought profit and wealth to commonwealths and republics. Samuel Hartlib brought Comenius to England in 1641/42, where his history of trades projects aroused attention among other English notables in contact with Hartlib such as Robert Boyle, William Petty, and John Evelyn. Henry Oldenburg, a fellow German émigré, fell in with Samuel Hartlib’s plans, and on his travels on the Continent in the 1650s would meet with Becher in his search for mechanical knowledge. Becher would begin his career constructing perpetual motion machines, and, just as Hartlib had been eager for news of Comenius’s perpetual motion schemes in the 1640s, so two decades later Henry Oldenburg and Samuel Hartlib would be anxious to bring Becher to England also. By that time, however, the German war was over, the English civil war was drawing to a disappointing close for reformers like Hartlib, and a new political order was falling into place.

“Viel Erfahren”

Experience was the second important component in Becher’s education: "habe ich viel gelesen/ viel gehört/ viel erfahren/ viel probiert/ viel laborirt/ viel


speculirt/ bin auch mit viel gelehrten Leute umgangen." He claimed to have learned “by the light of Nature,” from the things themselves. Here again he echoed, especially in the way he chose to recount his education, the reformers of knowledge such as Jacob Boehme, Paracelsus, Francis Bacon, Ramus, and, closer to his own life, Comenius. His own vivid observations and experience fill his works, as for example, when discussing the efficacy of cold in halting putrefaction, he recalls the body he saw hanging from the gallows with no signs of putrefaction for an entire long winter in Sweden.

In the seventeenth century, observation, experience, and the practical trials and labors of art constituted a novus methodus philosophandi, a new method of philosophizing. This new method, which was based upon active practice and was seen to yield new knowledge, would eventually transform completely the older system of education directed toward the mastery of a corpus of authorities. The mottoes of the academies that formed around the “new method of philosophizing” in the seventeenth century distilled the essence of this method. To pick only three examples, the “Nullius in verba” of the Royal Society of London expressed the members’ loyalty to things, rather than words; the Academia del Cimento’s “Provando e riprovando” declared an adherence to active trial and practice; and the adoption of pseudonyms from the story of Jason and the Argonauts by the members of the Academia naturae curiosorum emphasized the active search for knowledge.

65 “I have read much, listened much, experienced much, made many trials, labored much, speculated much, and I have associated with many learned people.” Psychosophia (1705), p. 316.

66 Becher, Chymisches Laboratorium oder Unter-erdische Naturkündigungen (Frankfurt: Johann Haaß, 1680), p. 362. This work is Becher’s translation of Actarum Laboratorii Chymici Monacensis, seu Physicae Subterraneae libri duo (Frankfurt: Johann David Zunner, 1669).

67 One of the clearest statements of the nature of this new method and the changes it had wrought was expressed by Johann Christoph Sturm, a professor of mathematics and physics at Aldorf, in Collegium Experimentale, sive Curiosorum in quo Primaria hujus seculi inventa & experimenta Physico-Mathematica . . . Phaenomena & effecta . . . (Nuremberg: Wolfgang Maurice Endter & Johannes Andrea Endter, 1676), pp. xxx2 r–v. He states that the “new method of philosophizing . . . called experimental” is practiced in various societies and colleges throughout Europe.

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This new method had its origins in the importance placed on the things of nature and on knowledge of God’s Creation by authors influenced by Hermetic philosophy such as Paracelsus and Jacob Boehme.69 These authors elevated the work of the hands and the manual worker (Handwerker) above the learning of books because the artisan worked with the objects and materials of nature. The Handwerker was more closely attuned to nature, because by his art, he imitated nature (ars imitatur naturam), which yielded knowledge of nature and ultimately formed a path to the understanding of God’s Creation. The art of the craftsman also “reformed” nature by creating valuable objects out of the raw materials of nature. The manual labor of refining nature for human needs, common to all Handwerck and thought by Paracelsus to be exemplified in the refining processes of alchemy, brought about the reformation and ultimately the redemption of the world and humankind. Medicine and alchemy, above all other arts, carried out in microcosm the macrocosmic process of human redemption after the Fall.70

Becher notes that he too “did many trials, and labored much,” and his first published work was one of alchemical medicine. In 1654, at the age of nineteen


Becher often cited Paracelsus, although he distanced himself from the religious enthusiasm (and social radicalism) of Paracelsus. Becher used his references to Paracelsus, rather, to connect himself with a figure who personified the method of philosophizing practiced outside the schools and based in the experience of natural things. This method could be learned by studying the techniques and the mentality of artisans, for they had particular access to the knowledge of nature in the practice of their arts.

**Respublica litterae**

In describing his education, Becher was careful to balance the experience, assaying and laboring of his early life with reading, speculation, and conversation with scholars (“bin auch mit viel gelehrten Leute umgangen”). Becher was always eager to be regarded as a member of the scholarly world, even when others saw him as a “mechanick” or noted his poor Latin. He claimed to have been acquainted with many of the most famous members of the republic of scholars of his day, but the facts of his claim are less important than investigating the group of scholars with whom he chose to ally himself. In 1678, when he claimed to be retiring from court life, he counted up his famous acquaintances and found they included a small number of Jesuits, several professors at the university at Leiden, and all the most stellar names of Queen Christina’s erudite court, most of whom had also spent time at Leiden. Like great numbers of his countrymen, Becher may have studied at Leiden, although he did not formally matriculate. While there, he probably came in contact with Cartesian ideas, which he seems to have rejected, as well as with the late humanist Stoicism of Justus Lipsius and the wave of practical, political literature Lipsius left in his wake in the Netherlands and throughout Europe.

The republic of letters, like the rest of the European society of orders in the

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71 Discourse about the powerful philosophical universal medicine, called Trismegistus, stone of the philosophers, no place of publishing and no pagination, only known copy in the British Library. A manuscript of the title and foreword for this work, dated 1654, is in Mss. var. 2, fols. 266r–275v. A Latin translation was included in the sixth volume of the *Theatrum Chemicum*, ed. Johann Joachim Heßmann (Strasbourg: Eberhard Zetzner, 1661), pp. 675–94.

72 In *Psychosophia* (1705), p. 316, Becher lists Marin Mersenne, René Descartes, Claude de Saumaise (Salmus), Gabriel Naudé, Samuel Boschart, Nicolas Heinsius, Johann Freinsheim, Johann Heinrich Boeckler, Heinric Meibom, and Johann Scheffer.


74 Becher viewed Descartes as a materialist—one who investigated spiritual matters by a method meant only for corporeal things (*Psychosophia* [1705], pp. 80–81).
seventeenth century, was changing, and this transformation is reflected in Becher’s list of his scholar-*amici*. Almost all the scholars on it were in the service of a noble patron. In contrast to the previous century in central Europe, a scholar in the seventeenth century might never hold a position at a university. At the beginning of the seventeenth century, many scholars believed that they no longer belonged to what had previously been an elite social order—the guild of scholars. Instead they sought prestige and legitimation at the new center of active life, the noble court. This became the arena for the translation of their words and texts into practice, and provided the place where they could quite literally make their fortune. Their ideas echoed this new focal point of their lives, and, in their works, the territorial prince and his state became a necessity for social order. Thinkers as diverse as Thomas Hobbes and Justus Lipsius claimed that the body politic was dead without a prince to hold it together.

In the scholars’ new environment of the noble court, the Ur-question of their predecessors, the civic humanists—“how should one live one’s life”—became their central concern. They sought to answer it not only for themselves in their courtiers’ and Höflichkeit manuals, but also for the whole of their society in an explosion of literature on politics, civil prudence, and arcana imperii. They did not proceed by a single method. Some—Bodin, Althusius, Conring—began from Aristotle’s Politics and discussed the structure of the state, while others made their starting point the Bible, or began from the huge number of polizei-ordnungen that had accumulated in every town and territory by the mid-seventeenth century. Another route is exemplified by Lipsius, who developed a set of practical axioms of political behavior based on Roman Late Republican and Imperial writers such as Cicero, Tacitus, and Seneca (and tacitly on Machiavelli).

Becher almost never referred to the Aristotelians and their theories of state structure. He placed himself instead in the tradition of Lipsius’s practical poli-

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77 Kühmann, *Gelehrtenrepublik*, p. 72.

78 Nancy S. Struver, *Theory as Practice: Ethical Inquiry in the Renaissance* (Chicago: University of Chicago Press, 1992), sees this as the overriding concern of Petrarch and the practical inquiry that he initiated.

tics, as he signaled when he named among his “acquaintances” Claudius
Salmasius, Johann Freinsheim, Johann Boeckler, and Johann Scheffer. The
political writings of these men focused on the development of self-knowledge
and Stoic self-control. Their goal was the worldly and urbane experience of
the courtier (or Stoic) that brought with it an ability to act prudently, to distin-
guish between reality and appearance, and, most important, to develop the
virtue that would permit personal triumph over fortuna. 80 Their writings
sought to keep not only the individual but the whole of society, within
the bounds of order. The seventeenth-century commentators of Aristotle, the neo-
Stoics, Jesuits, the authors of novels, 81 and even playwrights 82 and poets were
all caught up in the struggle for order with the political expressed. They found opportunities for practical comment and political ax-
ions at every turn. As one poet apostrophized in 1667: “Diogenes Laertius
said that many useful things concerning ruling and running a house can be
taught through poetry. In the poems of Amphion and Orpheus is hidden noth-
ing other than the possibility of learned and decent people bringing an un-
washed folk to obedience and good laws.” 83

Order was, however, acquired at a cost. The scholars of the seventeenth
century, displaced and held by the golden chain of servitude, seeing their value
at court calculated upon a different scale than that current in the republic of
letters, clung to the freedom of will and mind that Stoicism offered. They often
lamented their position at court, and the tension they felt between court privi-
leges and the life of the mind was palpable in their work. 84 Becher would
lament that at court a person was regarded for his born worth and name, rather
than for his capabilities. 85 He reflected that the final cause of all civil society
was to protect and serve the individual, but the less one needed this protection

80 The basic text on early modern neo-Stoicism remains Gerhard Oestreich’s collected essays in
Geist und Gestalt des frühmodernen Staates (Berlin: Duncker & Humblot, 1969). Other useful
works in this relation are Günter Abel, Stoizismus und Frühe Neuzeit (Berlin: Walter de Gruyter,
1978); Frühserbige, Der politische Körper; and some of the essays in Neumeister and Wiedemann,
Res Publica Litteraria.
81 Such as Christian Weise (see Frühserbige, Der politische Körper) and Duke Heinrich Julius of
Brunswick. On the political novels of this period, see Arnold Hirsch, “‘Politischer’ Roman und
82 On these political dramas, see Günther Müller, “Höfische Kultur,” in Alewyn, Deutsche
Barockforschung, pp. 182–204.
83 “Viél nützliche Sachen von dem Regier- und Hauß-Stande können durch Poetische Lieder
beggebacht werden/ saget Diogenes Laertius. Unter den Gedichten von Amphion und Orpheus,
stecket nichts anders verborgen/ als daß verständige und beredte Leute ein ungeschlachtetes Volck
leichtlich zum Gehorsam bringen und zu guten Gesätzen gewähren können.” G. Neumark, Poet-
tische Tafeln, quoted in Kühmann, Gelehrtenrepublik, p. 324.
84 See Helmuth Kiesel, “Bei Hof, bei Höll.” Untersuchungen zur literarischen Hofkritik von
Sebastian Brant bis Friedrich Schiller (Tübingen: Max Niemeyer Verlag, 1979), and Kühmann,
Gelehrtenrepublik.
85 Becher, Psychosophia (1705), p. 342.
the freer one would be. To prove his point, he cited both Seneca, “neminem
timet, quem nemo timet” (he fears no one, whom no one fears), and Paracelsus,
“Qui omnia secum portat, non indiget alieno auxilio” (he who carries all things
with him needs not the aid of others).\footnote{Ibid., pp. 89–90.}

The explosion of literature on politicis in the seventeenth century, like the
earlier humanist concern with the public, active life from which it derived, was
above all a practical movement. Political action and the new philosophy were
both grounded in this practice, dependent on curiosity (with all its voluptuous
sensory and sensual connotations), and undertaken by a new group of men who
needed to acquire knowledge quickly and put it to immediate use. These men
agreed on the human ability to control fortuna by ingenuity, invention, and
virtue, and possessed a vision of the future that comprehended the idea of
human progress. They evinced, above all, an overriding belief that the visible,
material world was the real world in which a material salvation would be
attained. The skills necessary to the new philosopher, the scholar-courtier, and
the territorial ruler would turn out to be very similar: good observation of people
pp. 105, 113, sees this emphasis on observation as the basis of a new rationality formed not by
bourgeois capitalism but by the dynamics of the court. Frühsorge, Der politische Körper, pp. 108–
9, discusses the identification of prudence (“politische Klugheit”) with careful observation.}
collection of experience, ability to distinguish reality from appearance, and an ability to play on the unforeseen circumstances of the moment.

Consummate courtier Gabriel Harvey (1545–1630) would note that “Euerie
pragmatician castes about for life, and scoures the coast to the purpose. Jt
importes euerie negotiatour, discouerer, intelligencer, practitioner, and euerie
wittie man continually to cast abowt, & scowre the coast. Still & still more &
more.”\footnote{Gabriel Harvey, quoted by Frank Whigham, Ambition and Privilege: The Social Tropes of
Elizabethan Courtesy Theory (Berkeley: University of California Press, 1984), p. xiv.} In Rome, scholars interested in natural philosophy formed an Ac-
cademia dei lincei (Academy of the lynx-eyed), while a German author of
political axioms quoted an Italian proverb that “the assistants of princes must
have the eyes of the lynx.”\footnote{Christian Georg Bessel, Faber Fortunae Politicae, Monitis ad vitam politicam admodum
necessariis & saluberrimis (Hamburg: Johannes Naumann & Georgius Wolff, 1673), p. 252.}
The telescope became an emblem both of natural philosophy and political prudence in the seventeenth century.\footnote{Frühsorge, Der politische Körper, pp. 108–9.}
Duke Heinrich Julius of Brunswick stated that he would not speculate like a philosopher, but
“like a Politicus or old Aulicus about such things as I have seen and experienced
myself,”\footnote{Kühlmann, Gelehrtenrepublik, p. 342 n. 80.} and Louis XIV would write that “the entire art of politics consists in
playing upon circumstances.”

Becher would hazard and improvise to effect a conjunction of his own
mechanical inclinations and practical education, the manual practice and collection of experiences in the new philosophy, the political focus of the scholars with whom he associated himself, the need for prudence in his daily life at the noble court, and the overriding need to make his work relevant to his own princely patrons.

Theoria and Ars

Practice, the active gathering of experience by trial, by assay, by observation, and by collection, was the work of politics and history, but also of artisans. For them it constituted an unwritten knowledge that was productive and provided for the necessary wants of humankind. The significance and potential of this sort of knowledge was exemplified for Becher, as it had been for Paracelsus, in alchemy, and was epitomized in the alchemical anecdote evoked by the tag (often quoted by Becher), “Solve mihi hunc syllogismum” (solve for me this syllogism). This anecdote recounted how a professor of philosophy had lectured to his students about the impossibility of alchemical transmutation. He brought long logical demonstrations, as well as the words of authorities, to bear on his argument. A stranger in the audience stood up, and, without entering into the disputation, called for some lead, charcoal, and a crucible, and transmuted it into gold on the spot. He handed the still-warm gold to the professor and pronounced, “Solve mihi hunc syllogismum,” and left the lecture hall. 92 This anecdote (or emblem) indicates the distance between practice and theory and between their methods in the seventeenth century. The professor is stranded without a method, without principles and proofs, without even the possibility of continuing speech when confronted by the creative, productive action of raw ars.

Becher carried with him on his travels a book that makes clear the tension between theory and art at this time. Advices from Parnassus, by Trajano Boccalini, was first published after Boccalini died in 1613, and went through numerous editions and translations from the Italian over the next two centuries. 93 In the satiric text, Boccalini conjured up a court of Apollo on Parnassus, in which Apollo played beneficent patron to the respublica litterae, including the most famous scholars and teachers of the ancient world and of humanist


93 Originally published as De’ ragguagli di Parnaso, this work was printed in German in 1644, and in 1655 edited by Jesuit law professor and political writer, Christoph Besold, to whom Becher made reference in Politischer Discours and Methodus didactica. Becher cited Boccalini’s work in Appendix Practica, über seinen Methodum Didacticam (Frankfurt: Johann David Zunner, Munich: Sebastian Rauch, 1669), p. 39. A list of his effects entitled “Joachim Becher’s things that belong on the trip” indicates that he carried Boccalini’s book with him. This list is in Mss. var. 2, fols. 678r–681v, and Boccalini is mentioned on fol. 680r.
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Europe. In Boccacinisi’s missivelike series of tidings from this court, these scholars and literati, the gods of Roman mythology, and the political figures of the sixteenth and early seventeenth centuries argue, found academies, duel, make proclamations, hold court, and gossip. Boccacini’s work forms a witty synopsis of the debates and concerns of the literati in the sixteenth and early seventeenth centuries. Becher probably obtained his education from precisely such works as Boccacini’s, and out of them, he formed an understanding of the issues of his world and of the sphere and scope of knowledge, as well as an image of himself as an actor in the republic of letters. He would carry this understanding into his positions at the noble courts of the German Empire and use it to establish himself there.

One of the many issues Boccacini addressed in Advices was the relation of contemplation and action, and of theory and practice. In Advice 76 several princes have besieged Aristotle in his country house in order to force him to revoke his definition of the tyrant:

Aristotle, Prince of the Peripateticks, that he might philosophize without interruption, retir’d t’other day to his pleasant Country-seat, where he was unexpectedly besiegd in the night by a great number of Horse and Foot under the Command of several Princes. The Enemy having with great diligence cast up their Trenches, and rais’d their Batterys, were preparing to play upon the House, and beat it about his ears. But Apollo, who had speedy advice of this great News, dispatch’d two famous Italian Satyristys, Lodovico Ariosto, and Francisco Berni, with a Detachment of Satyrick Poets to raise the Siege. They attempted it with their utmost skill, but to no purpose; for tho the Poets ply’d the Besiegers very warmly with their Vollys of Lampoon and Defamation, yet the Princes Armor was of proof against their smartest fire. Apollo therefore, seeing Force cou’d not prevail, in a tender care to the honor of the Peripatetic Philosophy in the person of its great Master, sent into the field the magnanimous and ever-glorious lover of the Learned, Frederick Feltrio Duke of Urbin, who upon a parley with those Princes, obtain’d a Truce.

When they first began to treat, the Princes complain’d grievously of Aristotle for having in his Politicks given so malicious a Definition of a Tyrant, that it included every good Prince: for if, as he had dar’d to assert, those who regard their own profit more than that of their Subjects, ought to be call’d Tyrants, in their opinion no Prince cou’d clear himself from the imputation; since no Shepherd was so fond of his Sheep as to be afraid to milk and shear ’em, and to be willing to starve himself to keep them fat. That the Stagyrite was grossly ignorant; if he did not know that Profit is the sole end of all dealing, and the whole World is but one publick Warehouse. And if the Law of Nature it self allow’d Parents to love themselves better than their own Children, with what color wou’d that Beast Aristotle oblige Princes to be fonder of others profit than their own? They added that the Literati were grown so malapert and conceited, that they took upon ’em to meddle with the deepest concerns of the State, and even prescribe Rules for Princes to govern by;
not perceiving (poor Pedants!) that Politicks are quite out of their sphere, and that none shou’d pretend to ’em but such as have been practis’d in the Government of Kingdoms, which is not to be learn’d from Philosophy, Rhetorick, and the mouldy Records of Learning. For since the Theory of Politicks can’t be form’d into a System, those who have not study’d it in the Closets of great Princes, and in their Administration of State-affairs, ought never to argue upon it, unless they have a mind to make themselves ridiculous to all the world, by writing and telling things for which they deserve to be scourg’d.

These words convinc’d Duke Frederick that the Princes had good reason to be angry; wherefore he told his Friend Aristotle, he must needs revoke his antient Definition of a Tyrant, and give ’em another more to their satisfaction. The Philosopher comply’d with all his heart, and said, That Tyrants were a certain sort of strange Creatures in very antient Times, whose Race is now wholly extinct.

The Princes having obtain’d their desire, instantly rais’d the Siege and march’d home; and poor Aristotle, half dead with the Fright, return’d to Parnassus, where he confess’d to all the Virtuosi, that his Philosophical Precepts avail’d him but little against the fear of Death; and, Gentlemen, says he, if you’ll be advis’d by me, mind your Books and let State Affairs alone, for ’tis impossible for you to treat upon that Subject without evident danger of incurring the Displeasure of the Great.\footnote{Advises from Parnassus in Two Centuries (London, 1706), pp. 128–29.}

In this inventive bit of news from Parnassus, Boccacini alluded to the hazards for the scholar at the noble court but, more significantly, to the idea that the knowledge and books of scholars were useless to the man of politics. The man of affairs needed knowledge born of the experience of practice. The pedantic rule making and system building of the scholars was wholly irrelevant to political practice, for philosophical precepts did not provide knowledge that could assist the person engaged in the active life of the forum.\footnote{In Advice 76, as in every one of Boccacini’s “advises,” there are several issues being addressed at once. Here, one in particular should be indicated: Boccacini’s princes claim that Aristotle is ignorant of the fact that “Profit is the sole end of all dealing, and the whole World is but one publick Warehouse,” which illustrates well the moral concerns raised by the nobility’s need of surplus wealth, or commercial profit, in the early modern period, and the problem of finding an ancient source that could reconcile this.}

To understand the significance of this satiric piece for Becher, let us return to Aristotle. In the \textit{Nicomachean Ethics}, Aristotle discusses the organization of knowledge and distinguishes among the life of enjoyment, the contemplative life and the active life. He leaves aside a lengthy discussion of the life of enjoyment as too vulgar and treats in detail the active and contemplative lives.\footnote{Nicomachean Ethics, 2d ed., trans. H. Rackham (Cambridge, Mass.: Harvard University Press, 1982), 1.5.1–7. My reading of Aristotle’s \textit{Nicomachean Ethics} owes much to discussion with Owen Hannaway about the relation of theory and practice in the early modern period and the importance of locating the categories of this debate in the classical corpus.}
48 CHAPTER ONE

Each sphere of life had its own end, type of knowledge, and degree of certainty. The life of contemplation concerned itself with the pursuit of the unchanging and eternal good. The result of contemplation was epistemic or theoretical knowledge about the immutable objects of nature; things that existed by necessity and contained within themselves the source of their change. Theoretical knowledge was proved by demonstration in the form of syllogisms and based on certain, demonstrable principles. 97

Practical knowledge, or praxis, on the other hand, concerned mutable affairs that could be directed and intervened in by humans. This knowledge was based in action and derived from either “things done” or “things made.” The sphere of practical knowledge pertaining to things done resulted in “prudence,” and was the knowledge required by rulers and men of public life. Aristotle dealt with this knowledge particularly in his practical writings on ethics, economics, and politics. Prudence could not be called a science, and was not of absolute certainty, for it could not be proved by demonstration based on certain principles, or, as Boccalini’s bellicose princes said, it could not be “form’d into a System.” Prudence might never be certain, but it could be used as the basis for action if it were based on experiences, or particular facts. 98 Prudence apprehended only the particular, not the general (which was the basis of theoretical knowledge), and achieved this apprehension by (often fallible) sensory perception. 99

The practical knowledge concerning “things made” was technē, or art. Art did not deal with things that already existed or had come into existence of necessity; rather, art itself brought its objects into existence. Art was the only one of the three types of knowledge that was productive, for the efficient cause of its objects lay in the maker and not in the objects themselves. 100

Science, prudence, and art were different types of knowledge for Aristotle, and his distinctions continued to be observed in the course of European thought. The Roman concern with political life in the forum focused the sphere of practical knowledge on “things done,” and praxis came to refer to the type of knowledge necessary for a life in the service of the respublica. The development in the medieval universities of a course of education that focused on the systematization of the liberal arts and excluded the mechanical arts as incapable of similar ordering widened the gap between theoretical and practical knowl-

97 Aristotle, Nicomachean, 6.3.2–4.
99 Aristotle, Nicomachean, 6.4.
100 Ibid., 6.4.4–5.
edge. At the same time, however, the practitioners of the mechanical arts, organized in guilds, took on increasing economic importance and political power in public life.\textsuperscript{101} The humanist reform of knowledge, reacting against the life of contemplation as exemplified for the humanists in the medieval universities, renewed the Roman perception of the value of the active life and, as Boccalini has shown us, developed a rhetorical strategy that set the life of contemplation and theory against the life of political activity and practice. Concurrently, the practical knowledge of “things made” had become a source of power and a subject of great interest to the scholars, literati, and princes in the sixteenth and seventeenth centuries.

By the seventeenth century, \textit{praxis} still referred to the type of knowledge needed by the man of affairs, but frequently it was used to mean the \textit{activity} of the maker of things. Practice as experience and trial began to take over from the more specific view of \textit{praxis} as relevant to the sphere of public life. Becher and his contemporaries still recognized the basis of their division between theory and practice as resting in the separate spheres of political life and scholarly contemplation, but for Becher, “practice” increasingly denoted experience, especially the experience of artisanal manual labor that was carried out without the schooled or written learning of theory and system. Thus, he referred to the \textit{Handwerk} of the smelter and assayer at their furnaces, or the \textit{Proben} and trials of the chymist in his laboratory, as practice. In his lifetime, Becher would rise from the status of a practicing mechanical virtuoso to a scholar and member of the noble court and, in his rise, he would refer always to his distinctive abilities to unify theory and practice. As a practitioner claiming access to theory, Becher had a stake in this union, as did the inspector of mines, who in 1690 proclaimed that the moderns were superior to the ancients because for the ancients there “was no theory to go along with the \textit{praxis}” (“keine Theoria nechst der Praxin vorhanden gewesen”).\textsuperscript{102}

Boccalini’s princes, who called for the strict separation of \textit{theoria} and \textit{praxis}, claiming that \textit{praxis} could be learned only from experience, indicate the con-


tested nature of the division of knowledge in this period. In his rise from mechanic to scholar, Becher would take advantage of the changing relationship between theory and practice, and he would answer the anonymous stranger’s syllogism by asserting that the union between theory and practice would make knowledge productive. Such productive knowledge would prove indispensable to the political considerations of the territorial ruler.

The alchemist’s “Solve mihi hunc syllogismum” pointed up not only the active nature of art, but also the productive potential of art. Art was productive knowledge, and alchemy, as art, exemplified the possibility of material production and indicated the value of productive knowledge. Alchemy, however, also involved theoretical contemplation of immutable nature, for, as one alchemical writer expressed it, Hermes, the discoverer of alchemy, was also the inventor of all the arts and sciences:

Und er ist der Hermes gewesen/ der nach der Sündflut aller Künsten und Disciplinen/ beydes der freyen und so die Handwerks Leut treiben/ der erst Erfinder und Beschreiber gewesen.103

And it was Hermes, who, after the Flood, was the first inventor and articulator of all the arts and disciplines, both of the liberal arts, as well as of those which the artisans practice.

Alchemy involved art and theory and thus gave access to the worlds both of the scholar (through books) and of the artisan (through the laboratory). Becher would find it perfectly suited to his needs, for he could use it to talk to the court about the processes of artisanal creation and production.

Wanderjahre

Travel was an essential part of the artisan’s indoctrination in a craft, for after his apprenticeship, he worked for different masters as a journeyman. It was also part of the university student’s education before he became a master of the liberal arts. Paracelsus advocated travel as the basis of experience for the student of nature: “He who wishes to explore nature must tread her books with his feet. Writing is learnt from letters, Nature, however, [by traveling] from land to land: One land one page. Thus is the Codex of Nature, thus must its leaves be turned.”104 For Paracelsus, Erfahrung (experience) in fact meant “the result of traveling with open eyes.”105 Travel continued to be part of the rhetoric

104 Quoted by Pagel, Paracelsus, pp. 56–57.
105 Ibid., p. 57.
of the new method of philosophizing as a source of experience. Becher traveled much, especially between 1648 and 1655. It appears that Becher and his family stopped in Bremen, Hamburg, Danzig, Stockholm, and Lübeck, before finally coming to rest in Breslau, for on a list of what seem to be his mother’s effects at her death are included attestata honoris from these cities—testimonials to her upright standing as part of a Bürger family. It is perhaps not surprising that Becher attempted to construct a model of human society on the example of the guild town, when one realizes that even after his mother had left the closed community, she continued to carry the town world with her, as part of her baggage, in the form of letters of bürgerlich credit.\footnote{106}

Becher seems to have spent time in Stockholm where he claims to have met many of the learned philologues and philosophers at the court of Queen Christina.\footnote{107} He specifically mentions Mersenne, who died on his way back from Sweden in 1648, and Descartes, who died in Stockholm in 1650, as well as many other scholars who were in the queen’s service between 1648 and 1652. Perhaps his stepfather or his mother’s family had connections to the court, but even as a studious sixteen-year-old who perhaps tutored younger pupils, he could well have taken part, if only at a distance, in the scholarly debates of Christina’s learned court. His trotting up of these most famous members of the republic of scholars in a list at a much later date betrays his desire to show that he was part of this world from early on, although it does not prove any real converse with these scholars. Rather, a mention of his “very good acquaintance,” a certain Andreas Reußner, is more in keeping with Becher’s mechanical inclinations at that time. By a constant stream of correspondence, this enterprising man kept his patron, Magnus Gabriel de la Gardie—one of the most powerful men at Queen Christina’s court—informed about war machines, mines, mills, medicines, silk making, and the progress of legal proceedings (all the favorite projects).\footnote{108} Becher remembered Reußner later as someone who had lost a bet and been ridiculed when he failed to draw water up through a lead syphon over the Brückenberg in Stockholm.\footnote{109}

Becher states he was in Danzig in 1650/51,\footnote{110} and a list of baggage he carried

\footnote{106} The list, entitled “der f. Mutters Sachen,” was presumably a list of her possessions drawn up on her death. It is in Mss. var. 2, fol. 674r–v, and includes, besides the testimonials, a legal document from Speyer, a bill, a letter from her [?] guardians, kitchen utensils, medicaments, housewares, writing instruments, paper, a ruler, compass, dividers, bedclothes, a straw mattress, and some foodstuffs (butter, cheese, salt, ginger, vinegar, and oil).

\footnote{107} Becher, Psychosophia (1705), p. 316. See also Hassinger, Becher, pp. 13–14.

\footnote{108} Reußner was apparently in the service of both Jakob and Magnus Gabriel de la Gardie. His correspondence with them and others dated between 1648 and 1654 is extant in the Riksarkivet in Stockholm: Eriksbergarvhet, Autografsamlingen, vol. 53, Jakob de la Gardie; Biographica, Andreas Reußner, vol. 9; Correspondence to M. G. de la Gardie E1534.

\footnote{109} Becher, Närrische Weißheit, p. 203. Becher also mentions Reußner in the British Library, Sloane Mss. 2867, fol. 259r.

\footnote{110} In Methodus didactica, p. 45, Becher claims to have been in Danzig when Johannes Buno published his Neue lateinische Grammatica in Fabeln und Bildern in 1651.
with him in his travels indicates he may have moved from there to the cosmopolitan trading city of Breslau, for he had several good correspondents and "comrades" in Breslau.\textsuperscript{111} His mother wrote letters to him from Breslau, and it is likely that she died there.\textsuperscript{112} Perhaps Becher received his introduction to the manual art of the laboratory in Breslau, possibly with the help of a certain Dr. Gottfried Stocklöw.\textsuperscript{113} He claims to have met learned men on his travels not only in Sweden, but also in Germany, Holland, and Italy.

Travel and mobility were essential to the alchemist’s education as well, and Becher often quoted Paracelsus’s celebrated maxim, “Qui omnia secum portat, non indiget alieno auxilio” (he who carries all things with him needs not the aid of others).\textsuperscript{114} This adage referred to the philosophers’ stone, by which base metals were transmuted into gold, but it had additional significance in Becher’s thought, derived from another book that accompanied him on his travels, and probably formed another essential link in his autodidactic education. This book, \textit{Zodiacus vitae} by Marcellus Palingenius, was a long encyclopedic poem


\textsuperscript{112} I base these conclusions on the list of “der f. Mutters Sachen,” Mss. var. 2, fol. 674r–v, and the list of Becher’s effects, Mss. var. 2, fols. 678v–681v, entitled “Sachen die auf die Reise gehören, d.i. Herrn Joachim Bechers Sachen.” This contains a list of clothes and linens in one white trunk and a list of books, letters, personal papers, and manuscripts that filled two other trunks. Many of the letters are listed as having been sent by correspondents in Breslau. Among other correspondence are listed six letters from his mother in Breslau, thirty-three letters from his “Cammerraten Johann Lorentz” from Breslau and other places, and five letters from Dr. Gottfried Stocklöw in Breslau. The list of Becher’s effects should probably be dated sometime in the early 1660s, as he lists letters from Dr. Jobst in Munich (fol. 681r) and an “Instruction” for the \textit{Kurfürst} of Mainz.

\textsuperscript{113} Becher lists five letters from Stocklöw (also Stocklowe) in Mss. var. 2, fol. 681r, and Stocklöw appears in Becher’s \textit{Natur-Kündigung der Metallen} (Frankfurt: Joh. Wilh. Ammon & Wilh. Serlin, 1661), \textit{Parnassus Medicinalis Illustratus} (Ulm: Joh. Görtlin, 1662–63), and \textit{Institutiones Chimicae Prodromae, i.e. Ædipus Chimicus. Obscuriorum Terminorum & Principiorum Chimiorum, Mysteria Aperiens & resolvens} (Frankfurt: Herman a Sande, 1664), where Becher quoted poems of congratulation and praise that Stocklöw sent to him. Zedler, \textit{Grosses vollständiges Universal-Lexikon}, vol. 40, s.v. “Stocklev, Gottfried,” states that Gottfried von Stocklev was a “Kayserlicher Titular-Leib-Medicus” in Breslau, who had converted to Catholicism, and wrote religious tracts with a natural philosophical content under the name of Leo a Stipite. Stocklev died a very old man in 1713. I assume that Zedler’s Stocklev and Becher’s Stocklöw are the same man.

\textsuperscript{114} The source of this maxim was Morienus, although Becher ascribes it to Paracelsus. The writings of Morienus, first translated from Arabic into Latin in 1182, recounted Morienus’s departure from Rome to lead a hermit’s life, and his subsequent call to the court of King Kalid. The king sought Morienus out because he was reputed to know the secret of the alchemical tincture. When the king finally succeeded in bringing him to the court, Morienus did indeed produce the tincture but, having accomplished this, he left the powder standing in a vessel, on the outside of which he had inscribed the words, “Omnes qui secum omnia habent, alieno auxilio nullatenus indigent,” and departed the court again for his desert retreat. See Ferguson, \textit{Bibliotheca Chemica}, 2:108–9.
encapsulating universal knowledge in a string of commonplaces and was used as a school book for generations of students from its first publication in 1560. Becher used Palingenius's words and authority constantly. Book 10 of the Zodiacus, entitled Capricorn, had become a locus classicus of sorts for alchemical writers, for it was here that Palingenius discussed the philosophers' stone and mercury. In this section, Palingenius conflated the philosophers' stone with virtue, so that he who carried all things with him could be either an alchemist or a virtuous man.

Palingenius defined a rich man not as one who has real property or a hoard of gold—the popular definition of wealth—but one who is learned in both wisdom and art, and is upstanding and virtuous. This man could carry his wealth with him wherever he went, unlike the man concerned only with his material possessions. The philosophers' stone, made from changeable mercury, was similar to learning and virtue for it brought and sustained happiness, whereever the storms of fortuna might toss a man:

Him truly and in proper kind A rich man call we may,
That flowes with wit and eloquence, with wisdom and with Art,
And wheresoever he becomes, can gaine an honest part,
To divers places farre from home, his substance with him takes,
And portion for himself to live. And though he journey makes
And never wanteth needfull thinges a joyfull life to leade,
Nor feares the theeves, nor doth the sword, or cruell robbers dread,
And quickly doth him selfe repairie thoughge he be spoyled quite:
For Vertue true gives neuer place to Fortunes frowning spite.\(^{115}\)

Wealth of learning and virtue was more valuable than property because it allowed mobility:

For every dwelling in the worlde doth natie soile appeare
Unto the vertuous man, and well he liveth euerie where.
But he that vertue lackes, althoughte he great possessions hould,
And purses stuffed full with coine and Coffers full of golde,
Yet can he not go where he list, nor trauell every place,
To see the countrie strange abrode, and men of sundry grace,
And euerie where to live: for house and ground, and Castles strong,
He can not beare about with him, in all his iornyes long,
Least that perchance with theeves he meete, or perish on the shore,
And then for gods sake aske his meate at every other dore.
At home therefore he alwaies dwels, and in his countrye lives,

\(^{115}\) Marcellus Palingenius, *The Zodiake of Life*, trans. Barnabie Googe (London: Rause Newberie, 1576; facs. repr. New York: Scholars' Facsimiles & Reprints, 1947), pp. 186–88, for this and the following passages. The list of Becher's possessions, Mss. var. 2, fol. 680r, contains Marcellus Palingenius as one of the authors in the two trunks of books.
54  CHAPTER ONE

Where as his ground a great increase of Corne and wine him gives,
And as a banisht man he feares beyonde the boundes to go,
That slouthfulness of minde, and chaunce to him assigned so:
Wherby the goodly sightes abroade he can not viewe nor marke,
While stil at home he hidden lies, as pent in d雍gon darke.

Palingenius used the regenerative and mobile qualities of the philosophers' stone to represent the movable forms of wealth:

Therefore the olde Philosophers by fine inuention found,
A certaine stone, that where they went or traueled any grounde,
Provided them of needfull thinges, and never would decay.
By aie wherof, full many landes and countries farre away,
They might behould, and alwayes learne of many sundry arts.

The effective agent of the philosophers' stone was Mercury, the master of movement and artifice:

And thus of olde the Gods above, besought with humble hearts,
The sacrifice on altar slaine before he was the trade
To Mercurie, the Sonne, and Moone, Lo thus their praiers made.
O Titan, beauty of the worlde, O fairest God in sight,
O thou Latona driving hence the shadowes of the night,
O swiftly fleeing restlesse Impe of Ioue and Maia borne.
That able arte to change thy selfe, to shapes of sundry forme.

Because it was a mobile and virtuous form of wealth, the philosophers' stone gave freedom from the tyranny of fortune's wheel:

Then whiche no art more worthy is, the Heavenly Stone to frame,
Which wicked people never knowe, nor can obtaine the same.
And this whossoever doth enjoy may dwell in any land,
Bothe free from feare of fortunes wheele, and force of robbers hand:
But unto fewe the Gods vouchesafe so great a gift to give.

In his work, Becher would draw upon the connection that Palingenius made between alchemy and virtue. He would exploit as well the full range of meanings alchemy could evoke; he used it to exemplify practice and theory, as embodying the promise of material productivity, and as a symbol of mobility. He would, in the end, conflate it with commerce.

Becher was himself much tossed about by Fortune, and mobility (perhaps restlessness), as Leibniz noted, was an essential mark of his life. The exigencies of war and the death of his father meant that he was not educated into a traditional profession, and so he fit into no established position in his society. Becher would, however, use his own peculiar education, experience, and mobility to define a place for himself at the centers of power in the Holy Roman
Empire. For like other new men at the noble court in the early modern period, Becher was part of a slow but profound transition in the creation and formation of a sense of self:

The received sense of personal identity, seen as founded on God-given attributes such as birth, was slowly giving way to the more modern notion that the individual creates himself by his own actions. This new view was enticing to those on the rise, but it threatened those who resisted sharing their positions or who feared they would be displaced. The latter proposed the distinctions... the former read the courtesy books... The effect of this... was to articulate a sophisticated rhetoric, indeed an epistemology, of personal social identity—a new understanding of how people tell who they are. The texts that articulated this struggle combined practical action and creative intellectual exploration. They were both tools and the kinds of activity we now describe as literature, history, and philosophy.\footnote{Whigham, \textit{Ambition and Privilege}, p. x. Stephen Greenblatt, \textit{Renaissance Self-Fashioning from More to Shakespeare} (Chicago: University of Chicago Press, 1980), also discusses the creation of identity in the early modern period.}

Becher grasped opportunities and ideas as they came to him—from the books of authorities, from newspapers,\footnote{Newspapers, developing out of the tidings, printed ships’ manifests, and intelligence gathering of the commercial world, were the texts par excellence of Becher’s world, and his \textit{Nachlaß} contains several numbers of different newspapers—for example, Mss. var. 1(2), fols. 648ff., and 1(3), fols. 201ff. Jürgen Habermas, \textit{Strukturwandel der Öffentlichkeit. Untersuchungen zu einer Kategorie der bürgerlichen Gesellschaft}, 6th ed. (Ulm: Luchterhand, 1974), pp. 28ff., associates the rise of commerce and newspapers.} from the evidence of his own senses, and from the concepts and structures of the world of his mother and father—and created out of them both an identity for himself and a vision of society and reform. That vision, which he carried with him to the noble territorial court and there converted into published works and projects, showed the mark of his wanderings, the contents of his baggage, and the fluctuations of his \textit{fortuna} in the two decades between 1635 and 1655.