



Metallurgy. An iron-smelting furnace and forge. From *De re metallica* by Georgius Agricola.

“fossils” at the time) based on their external characters. In 1553 Agricola sent to Hieronymus Froben the manuscript of his masterpiece, *De re metallica* (On metals), the preparation of which had been announced since 1530. *De re metallica* was published in 1556, just a few months after the death of its author. With its 292 woodcuts and twelve books it was the longest work on mining ever printed, and it was the first book on mining to be printed in a folio format.

In this work Agricola presented a systematic and thorough survey of metallurgical knowledge, the techniques employed to work metals, the laboratories and workshops used by miners, and the machines and tools used to excavate and maintain the shafts and the veins. *De re metallica* was a huge suc-

cess because it provided comprehensive information and clarified the nomenclature in metallurgy. It was translated into German (1557) and Italian (1563) and quickly became one of the most successful scientific works printed in the sixteenth century.

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AGRICOLA, RUDOLF (Roelof Huisman; 1444–1485), Frisian scholar, humanist. Agricola was the pioneer of humanistic learning in the Low Countries and Germany, as well as an educational reformer and theoretician of dialectic and rhetoric.

Life and Career. Born in the countryside around Groningen, Agricola was the illegitimate son of a church official, and he grew up in the house of his mother and stepfather. He was not only intellectually talented but also musically gifted (both as a composer and a performer), and he enjoyed painting and drawing. He received his primary education at St. Martin’s school in Groningen. Having gained financial independence in 1454 thanks to a prebend, or stipend, granted to his father by the bishop of Münster, Agricola studied arts from 1456 onward, first in Erfurt (B.A., 1458), then in Cologne and Louvain (M.A., 1465). In Louvain he also began to study law. Possibly encouraged by the circle of humanistic scholars gathered around the canonist Raimundus de Marliano, who taught in Louvain, he had crossed the Alps to Pavia by 1469, where he first continued his law studies but soon turned to the new *studia humanitatis*. From 1475 to 1479 he lived in Ferrara, where he was in the service of Duke Ercole I d’Este (1433–1505) as an organist and learned Greek with Giovanni Battista Guarini (1538–1612). During his Italian years Agricola not only attained a thorough knowledge of ancient Greco-Roman literature, history, and moral philosophy, he also acquired great competence as a Latinist and orator.

He returned to the north in 1479, spending that summer in Dillingen, where he completed his main work, *De inventione dialectica libri tres* (Three books on dialectical invention; printed 1515). In

1480 he was appointed secretary to the city of Groningen, then an important regional power. Although Agricola lived among a number of men who favored humanism, and though his office allowed him to visit libraries and meet like-minded people during business trips, he was not satisfied either with his function or with the intellectual climate in Groningen. In 1482, after having declined two offers of appointment elsewhere, he decided to take up the invitation to join his friend Johann von Dalberg in Heidelberg. Dalberg was bishop of Worms and chancellor of Heidelberg University. After his delayed arrival in 1484, Agricola was an active member of the intellectual community in Heidelberg, lecturing, delivering speeches, and participating in academic disputations. He also began to learn Hebrew. In 1485, Agricola and Dalberg went to Rome to attend the consecration of Pope Innocent VIII (1484–1492); Agricola wrote the speech that Dalberg delivered before the new pope. On the journey home Agricola fell sick. Although he interrupted his trip to recuperate, he arrived sick again in Heidelberg and died shortly afterward.

Agricola's Works. Agricola worked for the restoration of pure Latin, promoted educational reforms, and aspired to unite pagan learning with Christian piety. His works include eight orations (one containing an idealized biography of Petrarch), six Latin translations of short ancient Greek texts and one of a French letter by a contemporary, twenty-six poems, a correspondence of fifty-four letters (fifty by Agricola), the treatise *De inventione dialectica libri tres*, a brief monograph on the universals (transmitted in two versions, one still unpublished), and brief commentaries on a part of the late ancient excerpts from Seneca the Elder's rhetorical works and on Cicero's *De lege Manilia*. Finally, there exist two manuscripts written by Agricola, one containing works by Tacitus, one containing Pliny's letters, and also a manuscript of Pliny and three editions—Tacitus, Pliny, and Boethius—containing printed notes by Agricola or annotations in his hand. There are also some spurious and lost writings.

Agricola's greatest achievement is his *De inventione dialectica libri tres*. Starting from his discontent with contemporary scholastic dialectic, Agricola combined Aristotelian dialectic and rhetoric and thus provided a comprehensive theory of methodical thinking and reasoning. Book 1 contains a detailed account of twenty-four *loci argumentorum*, combining the traditional dialectical and rhetorical *loci*, or topics. Book 2 focuses on the different parts of dia-



Rudolf Agricola. CULVER PICTURES

lectic. These include the substance of dialectic (the *quaestio* and its subdivisions), and the instrument of dialectic (the *oratio* or ratiocination)—two basic forms of reasoning are discerned, namely *argumentatio*, addressed to an audience that resists or must be persuaded into assent, and *expositio*, setting matters out for an audience that follows willingly. Book 2 also discusses the treatment of the *loci*, that is, the method of recognizing *loci* in a given literary text, and of using the *loci* to find arguments.

In book 3, Agricola discusses the techniques of moving and pleasing the audience; he adds a section on *dispositio* and stresses in the concluding chapter the importance of constant training in writing. *De inventione dialectica* is a specialized but readable manual, mainly because the rules are frequently illustrated by means of detailed examples from classical authors. Despite its title, *De inventione* was a treatise on humanistic rhetoric, not logic, and it was enormously influential. During the sixteenth century it was evidently much read by advanced students, professors, and theoreticians, and thus influenced both teaching practices and scholarly research concerning rhetoric and dialectic.

Most of Agricola's works did not appear before the sixteenth century. Several went through numerous printings, especially in centers of humanistic cul-

ture and learning such as Louvain, Cologne, and Paris, and thus show the importance of Agricola's legacy for the development of humanism in northern Europe. These works include *De inventione dialectica*, the translations of Isocrates's *Praecepta ad demonicum* (Exhortation to Demonicus, on practical ethics) and of Aphthonius's *Progymnasmata* (Preliminary exercises), and letter 38 to Jacob Barbireau, *De formando studio* (On the organization of the program of studies). This letter provides a standard description of the humanistic arts curriculum and of its methodology. It owes its popularity especially to the fact that it includes a brief description of the method of collecting writing materials by means of commonplaces (*loci communes*).

Agricola was not only a guide for many of his friends (such as the Deventer schoolmaster Alexander Hegius [c. 1433–1498], whose Latin he corrected and to whom he taught Greek), but he also inspired Erasmus (c. 1466–1536)—who, as a schoolboy in Deventer, saw him once—and many other humanists of Erasmus's generation. Between 1492 and 1539 as many as six biographies of Agricola were written, bearing witness to the importance attached in that period to Agricola and his intellectual legacy.

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AGRICULTURE. The concept of "Renaissance agriculture" may be understood as the process by which the plants and the methods of cultivation that became the basis of the "agricultural revolution" of the eighteenth century were studied in books, gardens, and fields. The fact that modern European agronomy was first developed in the course of the deliberate retrieval of classical agronomy makes this a characteristically Renaissance endeavor. At the same time, the genetic plasticity of southern European cultivars ensured that Mediterranean gardens and farms became a laboratory for northern European agriculture. Therefore the agricultural revolution was the end result of the transfer of Mediterranean agricultural styles and experience to northern Europe.