

~~Period of what modern historians call the intermediate technol-~~  
 Especially in the Low Countries, Germany and Italy, thousands of workshops of all kinds emerged, specializing in stone, leather, metal, wood, plaster, chemicals and fabrics, producing a growing variety of luxury goods and machinery. It was chiefly the families of those who worked in these shops that produced the painters and carvers, the sculptors and architects, the writers and decorators, the teachers and scholars responsible for the huge expansion of culture that marked the beginnings of the early modern age.

There was one respect in which the growth of intermediate technology had a direct, explosive effect on this cultural spread. Indeed, it was the most important cultural event by far of the entire period. This was the invention, followed by the extraordinarily rapid diffusion, of printing. The Romans produced a large literature. But in publishing it they were, as in many other fields, markedly conservative. They knew about the codex—that is, a collection of folded and cut sheets, sewn together and enclosed within a binding—but they clung to the old-fashioned scroll as the normative form of book. It was the early Christians who preferred the codex, and the replacement of the scroll by ever more sophisticated codices was the work of the so-called Dark Ages. What the Christians took from the Romans was a version of their screw wine-press to bind the codex.

The material on which the Romans originally wrote was papyrus, the dried leaves of a grass grown along the Nile, and it is from this term that our word "paper" is ultimately derived. But between 200 B.C. and A.D. 300 papyrus was replaced by vellum, calfskin soaked in lime, then smoothed by knife and pumice stone, or parchment, made from the scraped skin of sheep or goats. Vellum was a luxury material, extremely durable, and was used throughout the Middle

Age for the finest manuscripts. Indeed, it continued to be used in the Renaissance, even for printed work, though special care was required to produce satisfactory results. Parchment was cheaper but also durable and continued to be used for certain legal documents until the mid-twentieth century. However, during the Middle Ages both were largely superseded by paper, or cloth parchment as it was originally called. This was produced by an industrial process that turned fibrous material, such as straw, wood, linen or cotton, into pulp, which was then spread in sheets over a wire framework. It came from China via the Moslem world, from which it reached Spain and Sicily. By about 1150 the Spanish had improved on the original process by developing a stamp mill, turned by hand, which used a wheel and tappers to raise and drop pestles in mortars. By the thirteenth century, paper mills were powered by water, and leadership in the industry had shifted to Italy, which by 1285 had developed the practice of sewing a figure of wire into the mold to produce a watermark. Efficiently produced, paper was cheaper than any other writing material by far. Even in England, which was backward in the trade, a sheet of paper (eight octavo pages) cost only one penny by the fifteenth century.

The availability of cheap paper in growing quantities was a key factor in making the invention of printing by movable type the central technological event in the Renaissance. Printing from wooden blocks was an old idea: the Romans used the technique for textiles and the Mongol Empire used it to make paper currency. By about 1400, playing cards and pictures of saints were being printed from blocks in Venice and southern Germany. The key novelty, however, was the invention of movable type for letterpress, which has three advantages: it could be used repeatedly until worn out; it could be easily renewed, being cast from a mold; and it introduced strict uni-

Low Countries = Netherlands + Belgium (under day)

formity of lettering. Movable type was the work of two Mainz goldsmiths, Johannes Gutenberg and Johann Fust, in the years 1446–48. In 1450 Gutenberg began work on a printed Bible, known as the Gutenberg Bible or the Forty-two Line Bible (from the number of lines on a page), which was completed in 1455 and is the world's first printed book. Gutenberg had to solve all the problems of punch cutting, typefounding, composing the type, imposing the paper and ink and the actual printing, for which he used a modification of the screw press. The resulting book, which amazes those who see and handle it for the first time for its clarity and quality, is a triumph of fifteenth-century German craftsmanship at its best.

Printing from movable type, therefore, was a German invention, which rather undermines the label "the Italian Renaissance." Germans were quick to exploit the new possibilities for religious books, especially Bibles, and works of reference, but also for scarce classic texts. The first printed encyclopedia, the *Caribolicon*, appeared in 1460, and the following year a Strasbourg printer, Johan Mentelin, produced a Bible for laymen. He followed this with a Bible in German, the first printed book in the vernacular. Cologne had its own press by 1464, Basle two years later. Basle quickly became famous for scholarly editions of the classics, later with Desiderius Erasmus, the Dutch humanist, as their literary adviser. Nuremberg got its first press in 1470 and soon became the earliest center of the international printing trade, where Anton Koberger worked twenty-four presses and had a network of connections with traders and scholars all over Europe. In Augsburg the new presses were built alongside the Abbey of St. Ulrich, which had one of the most famous scriptoria in Europe. There seems to have been little commercial conflict between the scriptoria and the new presses, the scriptoria concentrating on luxury books of ever-increasing com-

plexity and beauty, often illustrated by leading artists, the printers on quantity and cheapness. Thus the first best-seller in the new world of print was Thomas à Kempis's *De imitatione Christi*, which went through ninety-nine editions in the thirty years from 1471 to 1500.

Though the Italians were not the first into printing, with their large papermaking industry, their experience in block printing and their strong scriptorium tradition they soon took the leadership in the new technology. Near Rome, the Benedictine monastery of Subiaco had links with Germany, and in 1464–65 it commissioned two German printers, Sweynheym and Pannartz, to set up presses alongside its scriptorium. Presses in Germany had one important disadvantage in international trade. Gutenberg and other German printers based their type on imitations of the calligraphic strokes of official writing, using German Gothic hands of the mid-fifteenth century as their model (known later in England as "black letter" type). Outside Germany, readers found these typefaces repellent and difficult to understand. The German printers of the Subiaco press were ordered to cut type based on the standard style of handwriting used by Italian humanists in the fifteenth century, itself based on the admirably clear Carolingian minuscule. This became known as Roman, and was the true Renaissance type.

Nicolas Jenson, the master of the Royal Mint at Tours, was sent by King Charles VII of France to Mainz in 1458 to learn the new art of printing. But instead of returning to France, Jenson spent the rest of his life in Venice, where he set up the most famous printing press in the world. He cut superb examples of Roman types, which were imitated all over Europe. From 1490 his presses were rivaled in Venice by those of Aldus Manutius, who not only designed a serviceable Greek type for printing ancient texts in the original, but also de-

signed and popularized a type based on the cursive handwriting used in the fifteenth-century papal chancery. This is characterized by a sharp inclination to the right and exaggerated serifs, and the type based on it became known as italic. Aldus used it first in 1501, uppercase only. Lowercase followed around 1520, and some books were produced entirely in italic. Later it slipped comfortably into its modern role of use for emphasis, contrast and quotation.

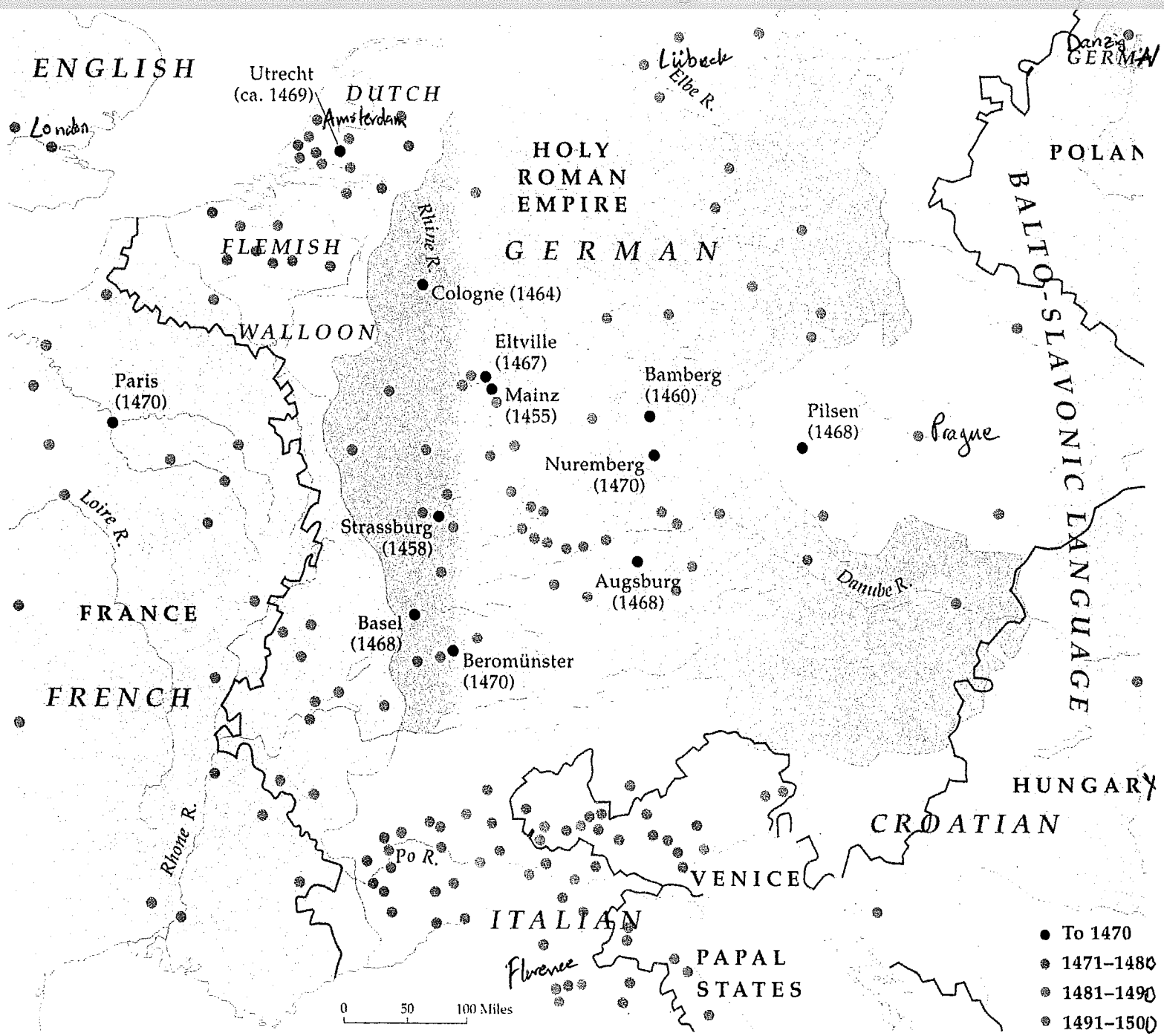
The speed at which printing spread, the quality and quantity of the production, and the extraordinary mechanical ingenuity displayed together constituted a kind of industrial revolution. By 1500, less than half a century after the first printed book, there were printing firms in sixty German towns, and Venice alone had 150 presses. German workmen took printing to Utrecht in the Netherlands in 1470, Budapest in Hungary in 1473 and Krakow in Poland in 1474. Printing reached Valencia in Spain in 1473, and a quarter century later, under the patronage of Cardinal Francisco Jimenez de Cisneros, Spain began to produce what remains to this day one of the most remarkable books ever devised, the Complutensian Polyglot Bible, in five languages of antiquity, Hebrew, Syriac, Latin, Greek and Chaldee, the texts running in parallel columns. At the other end of the market, Manutius was producing cheap Latin texts for the use of poor scholars. The spread of printing in the vernacular was one way in which the market expanded. Thus William Caxton, who learned printing in Cologne and ran his first press at Bruges in 1474, brought printing to England in 1476 with an eye to the vernacular readership. Of the ninety or so books he published, seventy-four were in English, of which twenty-two were his own translations.

The printed book trade, then, might be described as the first really efficient and innovative pan-European industry.

Advertisements for books began to appear in 1466, and publishers' catalogs soon afterward. The quantitative impact was overwhelming. Before printing, only the very largest libraries contained as many as six hundred books, and the total number of books in Europe was well under one hundred thousand. By 1500, after forty-five years of the printed book, the total has been calculated at nine million.

Hence, the background to what we call the Renaissance was a cumulative growth and spread of wealth never before experienced in world history and the rise of a society in which intermediate technology was becoming the norm, producing in due course a startling revolution in the way words were published and distributed. But this does not mean the Renaissance was an economic, let alone a technological event. Without economic and technological developments it could not have taken the form it did, and so it has been necessary to describe the material background first. But it must be grasped that the Renaissance was primarily a human event propelled forward by a number of individuals of outstanding talent, which in some cases amounted to genius. We turn now to the human foreground, and in the first place to the writers

# Spread of Printing



from  
The Western Experience