Leone Battista Alberti | Encyclopedia.com

(*b*. Genoa, Italy, 18 February 1404; *d*. Rome, Italy, April 1472)

mathematics, physics, natural history, technology.

In the twelfth century Alberti's ancestors were feudal lords of Valdarno who settled in Florence, where they became judges and notaries and were members of the wealthy bourgeoisie. In the fourteenth century they engaged in commercial and banking enterprises, organizing a firm with branches scattered all over Europe; their wealth enriched Florence. At the same time, the Albertis became involved in politics. Toward the end of the fourteenth and the beginning of the fifteenth centuries, this led to the family's exile; they sought refuge in the foreign branches of their firm. Thus Leone Battista Alberti, the son of Lorenzo Alberti, came to be born in Genoa. It is possible that he was illegitimate.

From his early childhood Alberti is said to have been precocious; little else is known about his youth. Fleeing the plague, his father went to Venice, the site of perhaps the most important branch of the house of Alberti. The father died suddenly, leaving his children in the care of their uncle, who disappeared soon thereafter. It is possible that unscrupulous relatives liquidated the Venice branch in order to make themselves rich at the orphans' expense.

Alberti seems to have started his advanced education at Padua. At any rate, after 1421 he continued it at Bologna, where he began the study of law. Overwork caused him to fall ill, and he had to interrupt his studies; nevertheless, he received a doctorate in canon law. For relaxation he took up the study of mathematics, natural sciences, and physics, subjects that he pursued to a rather advanced level. Subsequently, the decrees of exile against his family having been revoked, Alberti undoubtedly returned to Florence, or at least to Tuscany. In Florence he met Brunelleschi, who became a good friend. Between 1430 and 1432 he was in the service of a cardinal, who took him with his entourage to France, Belgium, and Germany.

In 1432 Alberti arrived in Rome, where he became a functionary at the papal court. In Rome he discovered antiquity and became the artist we know today—painter, sculptor, and then architect. His paintings and sculptures, however, have never been found or identified. As part of the papal court, he necessarily shared all its tribulations. In 1437 he was in Bologna and Ferrara with Pope Eugene IV, who was roaming all over northern Italy. He was often in Rome, yet he also served those humanistic families who ruled small, more or less independent principalities. Thus he certainly spent some time at the court of Rimini, with the Malatesta family. Here Alberti conceived and partially executed his most important architectural work, the Malatesta Temple, a chapel designed to shelter their tombs.

Alberti was, we are told, amiable, very handsome, and witty. He was adept at directing discussions and took pleasure in organizing small conversational groups. Alberti represented, perhaps even better than Brunelleschi, the first scholar-artists of the Renaissance, more inquisitive than given to realization, more collectors of facts and ideas than imaginative and creative. Still close to the expiring Middle Ages, Alberti had trouble freeing himself of its shackles on the scientific level. He was possessed of a perpetual need to know—and a perpetual need to expound his ideas—as well as a desire to mingle with intellectual equals. It is certain that from these encounters at the courts of rulers like the Malatestas, a new scientific spirit arose. In this sense Alberti occupies a place of particular importance in the history of thought. At the end of his life, aside from architectural works or such engineering projects as the attempt to refloat the Roman galleys in Lake Nemi in 1447 (on which he wrote a short treatise, now lost), he was occupied with these meetings and with the editing of his written works, which were numerous.

Unfortunately, a large part of Alberti's scientific work has been lost. It is not impossible, however, that some of his works may be submerged in the scientific literature of the age without being known. Like all of his contemporaries, Alberti inherited a fragmentary science. He seems to have been interested in isolated problems which furnished subjects for discussion but which individually could not result in anything important. It was difficult to give them a personal emphasis, for these questions had already been debated, discussed, and restated many times.

Alberti's mathematics is exactly that of his times. He wrote at least on an advanced level only small treatise the *Ludi matematici*, dedicated to his friend Melidus d'Este, himself an accomplished mathematician. Only twenty problems were involved, some of which had to do on an with mathematics only remotely. Only one of them touched on an abstract question—lunules in "De lunularum quadratura", in which he furnished an elegant solution to the problem but lost his way in the squaring of the circle. On all other points he shared the preoccupation of a great number of fifteenth-century scholars, considering mathematics as a tool rather an independent science. Often he merely applied formulas. Thus, geometry was used to calculate the height of a tower, the depth of a well, the area of a filed. In this work we find notions of the hygrometer which simply the

hygrometer of Nicholas of Cusa. Albert Wrote a book of mathe matical commentaries that may have contained more precise ideas but unfortunately the manuscript has never been found.

Not much is known about Alberti's physics. He wrote *De motibus Ponderis* which been lost also. In some of his works we can find some references to physics, but they are rather elusive ones. Some years ago the *Trattati dei pondi, here e tirari*, long attributed to Leonardo da Vinci, was reattributed to Alberti. In concerns gravity, density (harking back to the works of Archimedes), hydrostatics, and heat. There are only vague, undoubtedly traditional ideas on the preservation of labor. His optics is more theory of vision. In his opinion bodies, even dark ones, emit in all directions rays that move in a straight line. They converge toward the eye and together form a visual pyramid. This theory is also completely traditional. The camera obscure, which way be his greatest discovery, deeply impressed his contemnporaries, although he perhaps borrowed the device from Brunelleschi to whom he was greatly indebted from his studies on perspective. In his *Element picture* however he contributed nothing more than applied geometry. He worked from the idea that the construction of similar figures was the basis for all figure representation.

Alberti displayed the same attitude in his writings on the natural sciences, in which he speculated on nature rather than on scientific data. Like many others, he admitted the roundness of the earth, and also wrote briefly on the development of its crust. He seemingly spoke knowledgeably of earthquakes, atmospheric erosion, water circulation, the action of plants on soil, plant decomposition and formation of humus, sedimentary layers and the formation of deltas. He considered fossils merely a freak of nature.

Alberti best-known work, containing many of his scientific ideas, is *De re aedificatoria*, which was presented to Pope Nicholas V about 1452. The work was printed in 1485 and exerted a certain influence. It was to be a treatise on the art of engineering, but this aim was not completely achieved. Alberti dealt with lifting devices, grain bins and "other conveniences that albeit of little esteem nevertheless bring profit," water supply, ways a quarrying of the and cutting through mountains, the damming of the sea or of rivers, the drying up of swamps, machines of war, and fortresses. In this work he easy concerned less with architecture per se and architectural tech niques than with an actual attempt at town planning. His ideas of city were still largely inspired by the Middle Ages, but they also contained elements clearly belonging to the Renaissance, such as the respect for urban aesthetics, perspective, and orderly arrangemeant. something that certainly seems new—but we hardly know his predecessors—is the application of the entire range of scientific knowledge to town planning and architectural practice. Alberti applied this knowledge of the natural sciences to building materials his knowledge of physics was applied to equilibrium of buildings the flexibility of beams, and the construction of engines and that mathematics (still very simply mathematics)was shown in the very Pythagorean layout of cities and the arrangement of forstresses.

As was typical of his time, Alberti was preoccupied with various machines and apparatuses some in current used and some the subject of scattered and almost confused observation which made it impossible to draw the parallels and comparisons necessary to develop a technology. He spoke of balances, clocks, sundials, pulleys, water mills and windmills, and canal locks. He developed topographical instruments and envisaged the odometer and "sulcometer," which measured distances traveled by ships he studied the methods of sounding in deep waters. In all of this work he manifested more interest in manual crafts than in true science.

Alberti is difficult to place in both the history of science and the history of technology. Contemporary works in these fields almost invariably cite him in their lists of scholars, but he is not credited with anything really new. He contributed no new principles, but he seems to have had a very profound knowledge. In short, he seems to have regarded science as a means for action rather than as a system of organized knowledge. On many occasions he ad mitted his interest in knowledge, but more for reasons of efficiency than as an abstract science, as power rather than as intellectuality. He knew only the perspective and natural science that serve the artist or the architect, and only the mathematics and physics of use to the engineer and the technician. Nevertheless, he perceived certain directions for research. He was well aware of the difference between sensation (common observation) and scientific ideas: "Points and lines are not the same for the painter as for the mathematician." Observation was a point of departure for scientific hypothesis, which must be verified by systematic observation. In the last analysis, al though Alberti contributed nothing but a supplementary collection of special cases to scientific progress, he nevertheless outlined some promising avenues for future work.

BIBLIOGRAPHY

I. Original Works. In most cases only very old editions of Alberti's works are extant. *De re aedificatoria* was first published in Florence in 1485; there were many subsequent editions in Italian, and a French version appeared in Paris in 1553. *Opere volgari dei L.B. Alberti*, IV (Florence, 1847), contains *Ludi matematici*. *Opera inedita et pauca separatim impressa* (Florence, 1890) includes *Elementa picturae;* it also contains a treatise on perspective incorrectly attributed to Alberti. *Trattati dei pondi, lieve e tirari* was published as an appendix to Vasari (Florence, 1917).

II. Secondary Literature. There are few works on Alberti. The essential work is P.H. Michel, *La pensée de L.B. Alberti* (Paris 1930). with an exhaustive bibliography of works published until then. There is a good chapter on Alberti in L. Olschki, *Geschichte der neuspralichen Literatur* (Leipzig, 1919). The technological aspects of Alberti's work are discussed by B. Gille in *Les ingénieurs de la Renaissance* (Paris, 1967), pp. 80–84.