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[Geometry]. Excerpts from FRA LUCA PACIOLI DI BORGO SAN SEPOLCRO, *Summa de arithmetica, geometria, proportioni et proportionalità* [Cose di geometria]; [Architecture]. Excerpts from LEON BATTISTA ALBERTI, *De re aedificatoria* [Mesure de colonne e capitelli] In Italian and Latin, illustrated manuscript on paper
Italy, Venice, c. 1495-1505

18 ff., complete, following repair the leaves were remounted on tissue paper and re sewn thus rendering collation impracticable, on paper (watermark of a crowned eagle close to Briquet no. 87, Florence, 1495 and Venice or no. 88, Florence, 1498; Pisa, 1497-1502; Venice, 1498), written in a cursive Italic hand, in a fast but legible script, on 18 to 28 lines per page, rubrics and captions in pale red ink, many geometrical diagrams in the first part with captions in red ink (inner margins repaired with tissue, with loss of a letter or two on a few pages). Bound in modern reddish-brown polished calf, smooth spine, covers decorated with double frame traced in blind, lozenge fitted in inner rectangle. Dimensions 200 x 150 mm.

Interesting compilation, a sort of *vademecum*, of works that provided the reader (a student of architecture?) with, on the one hand, notions of geometry and, on the other hand, the basic notions of the classical orders of Greek and Roman architecture. The present work offers a good example of the bridges between Mathematics and the Liberal Arts, with cross-overs dear to such Cinquecento theoreticians as Alberti, Pacioli, and Da Vinci, who all applied mathematical and geometrical theorems to the study of art and architecture.

PROVENANCE

1. Language and watermarks in paper all confirm an Italian origin for this manuscript. The text is copied in Venetian dialect, and Venice is confirmed as a probable place of origin given the watermarks, with paper found in Venice at the end of the fifteenth and beginning of the sixteenth centuries. The manuscript appears to have been compiled during a period contemporary or closely following the publications of the major works of Vitruvius, Alberti, and Pacioli, all discussed below.

2. Private Collection, Europe.

TEXT

ff. 1-8, Excerpts from Luca Pacioli, *Summa de arithmetica, geometria, proportioni et proportionalità*; rubric, *Cose di geometria estratte dal frate dal Borgo*; incipit, "Cinque cose sono necessarie a saper chi vole essere

perfectamente pratico nell'arte di geometria..."; another rubric, *De dimensione omnium triangulorum* (f. 4v);

This is a work containing basic geometrical notions derived from the *Summa de arithmetica, geometria, proportioni et proportionalità* by Luca Pacioli, first printed in Venice, Paganini, 1494 (no copies of this rare imprint recorded in North American collections). Given the watermarks and style of script, it seems probable that the present compilation was copied during Pacioli's lifetime, and is closely contemporary with the first edition of Venice, published in 1494. A Franciscan friar, Luca Pacioli (1445?-1509?) is represented in the famous painting by Jacopo da Barbari, in front of a table filled with geometrical tools: there, the learned mathematician is demonstrating a theorem of Euclid (Naples, Museo di Capodimonte). Luca Pacioli studied in Venice and Rome and was a traveling tutor in mathematics until 1497, when he accepted an invitation from Lodovico Sforza to work in Milan. There he collaborated with and taught mathematics to Leonardo da Vinci.

In the *Summa*, Pacioli sought to provide in a single work a synthesis of the mathematical knowledge of his time. The *Summa* is also notable for including the first published description of the method of keeping accounts that Venetian merchants used during the Italian Renaissance, known as the double-entry accounting system. Although Pacioli codified rather than invented this system, he is widely regarded as the "father of accounting." Geometry forms the second part of the *Summa* and is divided into eight sections in honor of the Eight Beatitudes of the Sermon on the Mount (On Pacioli's Geometry, see in particular Ciocci, 2003, esp. "La geometria della Summa," pp. 239-272).

ff. 8v-16, Excerpts from Leon Battista Alberti, *De re aedificatoria*, rubric, *Mesure de colonne e capitelli estracte da Vitruvio et Leone Batista Alberti*; incipit, "La colonna la longhezza del fuso deve essere..." [see *De re aedificatoria*, Book VI, chapter 13]; rubric, *Bassa corinthia* (f. 10v); *Bassa yonica* (ff. 11-11v); rubric, *Capitello dorico* (ff. 12-13); rubric, *Capitello yonico* (ff. 13v-14v); rubric, *Capitello italico* (ff. 14v-15); rubric, *Capitello corinthio* (ff. 15v-16) [see *De re aedificatoria*, Book VII, chapter 8];

This is a compendium describing the different orders that apply to building columns and capitals in architecture. These orders are Corinthian, Doric, Ionic and Italic, as described by Leon Battista Alberti (1404-1472) in his seminal treatise on architecture *De re aedificatoria* (c. 1450) first printed in Latin in 1485 [*Leonis Baptistae Alberti florentini viri clarissimi De re aedificatoria: opus elegantissimu et maxime utile*, Florentiae, N. Laurentus, 1485; see Goff, A-215]. Capitals and columns are treated by Vitruvius in the chapters of his *De architectura* dedicated to the different Orders, Book III and IV. The *De architectura* was rediscovered in 1414 by the Florentine humanist Poggio Bracciolini. To Alberti falls the honor of making this work widely known in *De re aedificatoria*. The first known edition of Vitruvius was published in Rome by Fra Giovanni Sulpitius in 1486.

f. 16v, blank;

ff. 17-18, Three recipies for making ink (in a different hand, slightly later), heading, *Modus faciendi atramentum*; two recipies against stomach aches.

The small portable format of the volume, the nature of the script, and the contents of the extracts, as well as the utilitarian texts on making ink and curing stomach aches added slightly later, make

this volume a likely candidate to be a student's manual in the late fifteenth-century Veneto. The fact that it is written in dialect, rather than the "pure" Italian employed in humanist circles, underscores the utilitarian purpose this interesting manuscript must have served.

LITERATURE

Alberti, Leon Battista. *On the Art of Building in Ten Books*, Cambridge, MA, 1997.

Alberti, Leon Battista. *De re aedificatoria*, edizione e traduzione a cura di G. Orlandi, Milan, 1966.

Antinori, C., ed. *Il Trattato della "summa" di Paciolo*, Rome, 1990.

Caye P. and F. Choay. *L'art d'édifier, Leon Battista Alberti*, Paris, 2004.

Ciocci A. *Luca Pacioli e la matematizzazione del sapere nel Rinascimento*, Bari, 2003.

Emmer, Michele. "Art and mathematics: the Platonic solids," in *The Visual Mind*, pp. 215-220, Leonardo Book Series, MIT Press, Cambridge, MA, 1993.

Haulotte, R. and E. Stevelinck, eds. *Summa de arithmetica, geometria, proportioni e proportionalità*, Brussels, 1994.

Pacioli, L. *Summa de arithmetica, geometria, proportioni e proportionalità*, Parma, 1970 [facsimile of the Venice, 1494 edition].

ONLINE RESOURCES

Biography of Luca Pacioli

<http://www-history.mcs.st-andrews.ac.uk/Biographies/Pacioli.html>

Digital Edition of L. Battista Alberti, *De re aedificatoria*, Florence, N. Laurentus, 1485

<http://gallica.bnf.fr/ark:/12148/bpt6k58667v>