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VITALE GIORDANO (1633-1711), *Studio di Matematica* [Unpublished mathematical treatise transcribed by Giacomo Spinola]

In Italian, illustrated manuscript on paper

Italy (Rome), 1675

3 volumes, volume 1: i (later paper) + 7 (unnumbered) + 47 + 3 (unnumbered) + 160 + 10 (unnumbered) + i (later paper) folios on paper, volume 2: ii (contemporary paper) + 3 (unnumbered) + 264 + 15 (unnumbered) + i (later paper) folios on paper, volume 3: ii (contemporary paper) + 3 (unnumbered) + 245 + 6 (unnumbered) + i (contemporary paper) folios on paper, watermark: a shield with a kneeling haloed man holding a cross (unidentified), original pagination in brown ink, vol. 1: 3-98, 99-418, vol. 2: 3-528, vol. 3: 3-490, complete, quires mainly of 10 leaves, horizontal catchwords on every page, frame ruled only (justification 360 x 223 mm.), written in brown ink in a very clear cursive script in a single column on c. 34 well-spaced lines, 759 VERY FINE PEN AND INK ILLUSTRATIONS, MAINLY GEOMETRY DIAGRAMS AND MILITARY ARCHITECTURAL DESIGNS, vol. 1 with water stains and worm holes on most leaves, first leaf of index torn along the inner ruling c. 14 cm., vol. 2 with water stains, vol. 3 in overall excellent condition. Three volumes in contemporary bindings of brown calf over wooden boards, gold-tooled with fine foliage frames and corner fleurons, spine with six raised bands gold-tooled with fleurons and delicate stems, entitled in gilt "Studio di Matematica", "Tom. I.", "Tom. II.", "Tom. III.", minor losses of leather especially in the corners and spine, well restored, minor stains, overall in excellent condition. Dimensions 435 x 307 mm.

This vast three-volume work by one of the best-known Italian mathematicians, Vitale Giordano, is unpublished and immensely important for the history of mathematics in Early Modern Europe. Beautifully illustrated with more than seven hundred very fine pen and ink drawings, especially in the sections on geometry and military architecture, it provides rich information about the academic world in Rome when Giordano was a professor of mathematics at the prestigious Academy of France.

## PROVENANCE

1. These mathematical lectures were delivered by the famous mathematician Vitale Giordano (1633-1711) in 1675 in Rome, probably at the College Clementino (see below). They were transcribed into our manuscript by one of his pupils, Giacomo Spinola, as stated on the titlepages to each of the three volumes. The work is unpublished.

## TEXT

Volume 1:

[preliminary unnumbered p. 1], [Titlepage], "Studio di Matematica"; [preliminary unnumbered p. 2 blank];

[preliminary unnumbered p. 3], [Titlepage], "Studio di Matematica fatto da Giacomo Spinola con la direzione del Sig.r Vitale Giordano Ingegniero di Castel S. Angelo e Lettore di Matematica nell'Accademia Reale della Maestà Cristianissima in Roma. Tomo primo continente

L'Aritmetica, La Geometria prattica, La Gniomonica. L'Anno del Giubileo, MDCLXXV [1675]"; [preliminary unnumbered p. 4 blank];

[preliminary unnumbered p. 5], "A chi legge"; [preliminary unnumbered, p. 6 blank];

[preliminary unnumbered pp. 7-10], "Proemio. Che cosa sia Matematica";

p. [1], [Titlepage], "Aritmetica in chiaro compendio ridotta dal' Signor Vitale Giordano Ingegniero di Castel S. Angelo e Lettore di Matematica nell' Academia Reale della Maestà Cristianissima in Roma"; [p. [2] blank];

pp. 3-98 [+ four unnumbered pages], "Aritmetica", with 3 multiplication tables;

[unnumbered page], [Titlepage], "Geometria Prattica con nuove demonstrationi accresciuta dal' Sig.r Vitale Giordano Ingegniero di Castel S. Angelo e Lettore di Matematica nell' Academia Reale della Maestà Cristianissima in Roma"; [unnumbered verso blank];

pp. 99-339, "Geometria Prattica Libro I°", with 253 geometry diagrams;

p. 340, [Titlepage], "Gniomonica con facili regole descritta dal' Sig.r Vitale Giordano Ingegniero di Castel S. Angelo e Lettore di Matematica nell' Academia Reale della Maestà Cristianissima in Roma"; [unnumbered verso blank];

pp. 341-418, "Gniomonica", with 50 geometry diagrams;

[19 unnumbered pages], Index; [final unnumbered page; frame ruled, otherwise blank].

Volume 2:

[preliminary unnumbered p. 1], [Titlepage], "Studio di Matematica"; [preliminary unnumbered p. 2 blank];

[preliminary unnumbered p. 3], [Titlepage], "Trigonometria Piana illustrata con demonstrationi dal' Sig.r Vitale Giordano Ingegniero di Castel S. Angelo e Lettore di Matematica nell' Academia Reale della Maesta Cristianissima in Roma"; [unnumbered p. 4 blank];

p. [1], [Titlepage], "Studio di Matematica fatto da Giacomo Spinola con la direttione del Sig.r Vitale Giordano Ingegniero di Castel S. Angelo e Lettore di Matematica nell'Accademia Reale della Maestà Cristianissima in Roma. Tomo Secondo continente la Trigonometria piana il misurare in lontananza l'Architettura militare il moto eqabile naturalmente accelerato, e de proietti, le Speculationi d'Apollonio sopra le tattioni, l'inclinationi, la determinata setzione, la setzione della proportione, e la setzione dello Spatio. L'Anno del Giubileo, MDCLXXV [1675]"; [p. [2] blank];

pp. 3-33, "Trigonometria piana", with 35 geometric diagrams;

pp. 33-55, "Del misurare in lontananza", with 21 geometric diagrams; [p. 56 blank];

pp. 57, [Titlepage], "Architettura militare con facile metodo ristretta dal Signor Vitale Giordano Ingegniero di Castel S. Angelo e Lettore di Matematica nell'Accademia Reale della Maestà Cristianissima in Roma. L'Anno del Giubileo, MDCLXXV [1675]"; [p. 58 blank];

pp. 59-126, "Architettura militare", with 42 military architectural designs and geometry diagrams;

p. 127, [Titlepage], "Dottrina del moto brevemente spiegata dal Sig.r Vitale Giordano Ingegniero di Castel S. Angelo e Lettore di Matematica nell'Accademia Reale della Maestà Cristianissima in Roma."; [p. 128 blank];

pp. 129-143, "Del moto equabile", with 17 illustrations showing algebraic equations for movement; [p. 144 blank];

p. 145, [Titlepage], "Del moto de i gravi naturalmente accelerato"; [p. 146 blank];

pp. 147-239, "Del moto de i gravi naturalmente accelerato", with 94 illustrations showing algebraic equations, geometric diagrams and parabolas; [p. 240 blank];

p. 241, [Titlepage], "Del moto de proietti"; [p. 242 blank];

pp. 243-463, "Del moto de proietti", with 159 geometry diagrams; [p. 464 blank];

p. 465, [Titlepage], Speculationi d'Apollonio sopra le tattioni, l'inclinazioni, la determinate settione, la settione della proportione, e la settione dello spatio, ridotte insieme dal Sig.r Vitale Giordano Ingegniero di Castel S. Angelo e Lettore di Matematica nell'Accademia Reale della Maestà Cristianissima in Roma."; [p. 466 blank];

pp. 467-488, "Tattioni di Apollonio: Investigate da Franco Vieta [i.e. François Viète]", with 21 geometry diagrams;

pp. 489-507, "Delle inclinazioni di Apollonio investigate da Mario Chetaldo [i.e. Marino Ghetaldi]", with 17 geometry diagrams; [p. 508 blank];

pp. 509-520, "Della determinate settione", with 8 geometry diagrams;

pp. 521-528, "Della settione dello spatio", with 10 geometry diagrams;

[30 unnumbered pages], Index.

Volume 3:

[preliminary unnumbered p. 1], [Titlepage], "Studio di Matematica"; [preliminary unnumbered p. 2, blank];

[preliminary unnumbered p. 3], [Titlepage], "Studio di Matematica fatto da Giacomo Spinola con la direttione del Sig.r Vitale Giordano Ingegniero di Castel S. Angelo e Lettore di Matematica nell'Accademia Reale della Maestà Cristianissima in Roma. Tomo terzo continente

l'Algebra Speciosa. L'Anno del Giubileo, MDCLXXV [1675]"; [preliminary unnumbered p. 4, blank];

p. 1, [Titlepage], "Algebra Speciosa o vero analitica universale con nuove spiegazioni dilucidata dal Signor Vitale Giordano Ingegniero di Castel S. Angelo e Lettore di Matematica nell'Accademia Reale della Maestà Cristianissima in Roma"; [p. [2] blank];

pp. 3-490, "Algebra Speciosa", with 29 illustrations showing algebraic equations, geometry diagrams and parabolas;

[9 unnumbered pages], Index; [3 unnumbered pages, frame ruled, otherwise blank].

We are grateful for the help of Federica Favino and Maria Teresa Borgato, who suggest that this manuscript is a textbook for an entire course of mathematics, most likely the course Giordano taught at Collegio Clementino. As indicated in the title pages of each volume, it was copied with extreme care by Giacomo Spinola, who was one of his students. Giacomo Spinola belonged to a cadet branch of the important Genoese Spinola family, which gave various cardinals to the Church of Rome; in 1696 he led the centenary celebrations at Collegio Clementino (see Rome, Biblioteca universitaria Alessandrina, MS 139; Online Resources). The Collegio Clementino is a palace in Rome, founded by Pope Clement VIII in 1595 to host Slavonian refugees, and re-founded in 1601 by Pope Urban VIII as an elite school for young noblemen of every nation including the richest families in Rome. The Genoese nobility, and the Spinola family in particular, sent the young men in their family to the Collegio Clementino in Rome, run by the Somascan fathers, to be educated.

In our manuscript the first volume contains treatises on arithmetic (pp. 3-98), practical geometry (pp. 99-339) and gnomonics, the study of the design, construction, and use of sundials (pp. 341-418). The second volume deals with trigonometry (pp. 3-33), measuring from a distance (pp. 33-55), military architecture (pp. 57-126), uniform motion (pp. 127-143), naturally accelerated motion of bodies (pp. 145-239), motion of projectiles (pp. 241-463), Apollonius' "tattioni" investigated by François Viète (pp. 465-488), inclinations of Apollonius investigated by Marino Ghetaldi (pp. 489-507), determined section (pp. 509-520), and the section of space (pp. 521-528). The third volume concerns algebra.

More research is needed to compare these volumes with Giordano's partly autographed corpus of manuscripts preserved at the Lincei e Corsiniana Library in Rome; see the publications of Maria Teresa Borgato in 1988 and 1991 for summarized descriptions. The manuscripts of Giordano are: Rome, Biblioteca Corsiniana, MSS 31.B.21-27; Rome, Biblioteca Casanatense, MSS 647, 2072, 2073, 2669, 5479; Rome, Biblioteca Alessandrina, MSS 394-5; Brescia, Biblioteca del Politecnico, Collezione Vigano, MSS 21-22 (see Giordano in Treccani, Online resources). Much of Giordano's work survives only in manuscript. In fact, the preface to Giordano's *Euclide Restituito*, published in 1680, reveals that it was only the first volume of a complete mathematical course in seven volumes on which Giordano worked for twenty-four years (Favino, 2004, p. 445). The other volumes were never published. The subjects dealt with in our manuscript include practical geometry, treatises on military fortifications, and work on movement. These correspond more or less to the third, fourth and fifth volumes of the intended work as described in a table of subjects made in preparation for the competition for

the chair at Sapienza in 1685 (Favino 2004, pp. 445-446). Notably, the preface in our manuscript, as in Giordano's *Euclide Restituito*, begins with the question "Che cosa sia Matematica e quali sieno le sue parti?" (What is Mathematics and what are its parts?) and its contents are almost identical to pages 1-3 of the first chapter in *Euclide Restituito* (vol. 1, preliminary unnumbered pages 7-10 in our manuscript). Our manuscript thus includes what appears to be the first draft of the introductory text that opens Giordano's best-known work.

Vitale Giordano (1633-1711) was a famous Italian mathematician, best known for his theorem on Saccheri quadrilaterals. He was originally from Bitonto and decided at the age of twenty-eight to devote himself to mathematics. In Rome, Giordano became friends with the renowned mathematicians Giovanni Borelli and Michelangelo Ricci. Christina of Sweden employed Giordano as a mathematician from 1663 to 1666 and put him in charge of the astronomical observatory that was planned to be adjacent to her residence in Rome (Favino, 2004, p. 442). In 1667, Giordano was appointed a lecturer in mathematics at the Academy of France in Rome, founded by Louis XIV of France in the previous year. In 1672 he was named Engineer of Castel Sant'Angelo, and during these years he was working on his most famous work, *Euclide Restituito*, initially conceived as a course of lectures, and published in Rome in 1680. In 1685 he was appointed to the chair of mathematics at the prestigious Sapienza University in Rome, a position he won in a competition involving numerous aspirants. There was a huge crowd at Giordano's first lecture, and almost all the city's scholars were present; he continued lecturing at Sapienza until 1711, the year of his death (Favino, 2004, pp. 443-4). As one of the best-known Italian mathematicians, Giordano met Gottfried Wilhelm Leibniz in Rome in 1689-1690; the meeting was followed by correspondence of which three letters survive (Leibniz, 1849, pp. 191-200).

Our manuscript is of consummate importance, as it remains unpublished and provides a rare insight into the leading mathematical teaching in Western Europe in the seventeenth century.

## LITERATURE

Borgato, M. T. "Unpublished manuscripts of Vitale Giordano, correspondent of Leibniz," *V. Internationaler Leibniz-Kongress: Vorträge*, Hannover, 1988, pp. 99-106.

Borgato, M. T. "Una presentazione di opere inedite di Vitale Giordani (1633-1711)," *Giornate di storia della matematica*, ed. by M Galluzzi, Commenda di Rende, 1991, pp. 3-56.

Favino, F. "Matematiche e matematici alla "Sapienza" romana (XVII-XVIII secolo)," *Mélanges de l'école française de Rome* 116-2 (2004), pp. 423-469.

Available online:

[https://www.persee.fr/doc/mefr\\_1123-9891\\_2004\\_num\\_116\\_2\\_10131](https://www.persee.fr/doc/mefr_1123-9891_2004_num_116_2_10131)

Leibniz, G. W. *Mathematische Schriften*, ed. by C. I. Gerhardt, vol. 1, Berlin, 1849, pp. 191-200.

Riccardi, P. *Biblioteca matematica italiana dalla origine della stampa ai primi anni del secolo XIX*, 4 vols in 1, Modena, 1873-93.

Schmitt, C. "Science in the sixteenth and early seventeenth centuries," *The emergence of science in the Western Europe*, ed. by E. Crosland, London, 1975, pp. 45-46.

## ONLINE RESOURCES

Vitale Giordano (Treccani)

[https://www.treccani.it/enciclopedia/vitale-giordano\\_%28Dizionario-Biografico%29/](https://www.treccani.it/enciclopedia/vitale-giordano_%28Dizionario-Biografico%29/)

Vitale Giordano (Wikipedia)

[https://en.wikipedia.org/wiki/Giordano\\_Vitale](https://en.wikipedia.org/wiki/Giordano_Vitale)

Rome, Biblioteca universitaria Alessandrina, MS 139:

<http://id.sbn.it/bid/1173505>

Collegio Clementino (Wikipedia)

[https://en.wikipedia.org/wiki/Collegio\\_Clementino](https://en.wikipedia.org/wiki/Collegio_Clementino)

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