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ANONYMOUS, *Theorica Planetarum*

In Latin, illustrated manuscript, on paper
Italy, Verona?, c. 1580-1600

33 leaves, on paper (watermark, Eagle, similar to Briquet 207 and 209, Verona, c. 1582-96), complete, in binions, tituli descriptions written in dark brown and red ink in a humanist cursive script, with 55 COLORED DIAGRAMS, 11 with MOVEABLE VOLVELLES. Bound in modern limp vellum binding in imitation of its original Renaissance binding, boxed with the original binding, on the lower cover written M. Giovanelli.
Dimensions 400 x 290 mm.

One of evidently only three copies known of a richly illustrated astronomical handbook filled with colored diagrams and movable volvelles that show the persistence of the Ptolemaic world view as expressed in his *Almagest*, which remained a cornerstone of astronomical thought even after the discoveries of Nicolaus Copernicus (1475-1543). The present manuscript probably served as a demonstration text for a teacher-astronomer.

PROVENANCE

1. Almost certainly made in Northern Italy in the last two decades of the sixteenth century. The humanistic script is of Italian origin, as is the style of binding. Confirming this origin is the paper, which bears a watermark localized to Verona between 1582 and 1596 (see Briquet, *Les Filigranes*, nos. 201-209, esp. 207 & 209).
2. M. Giovanelli (?), Italy, nineteenth-century signature on the lower cover of the original binding.
3. Aachen, Germany, Ludwig Collection (see Anton von Euw and Joachim M. Plotzek, *Die Handschriften der Sammlung Ludwig*, 4 vols, Cologne, 1979, vol. 3, pp. 192-195, figs. 142-146).
4. Los Angeles, California, The J. Paul Getty Museum, MS XII 10, deaccessioned 1997.
5. USA, Private Collection

TEXT

f. 1, title, THEORICE PLANETARUM, "Raccolta" written underneath in the same nineteenth-century (?) hand that appears on the lower cover;

f. 1v, blank;

ff. 2-7, Movement of the sun; as follows; f. 2r, *Theorica orbium sphere solis et primi mobilis et motus eorum*, 1 volvelle with three moving disks including the zodiac circle; f. 2v, *Theorica motus obris supremi sphere solis necessario super centro mundi*, volvelle with 1 moving disk, planetary circle not drawn; f. 34, *Theorica motus orbis infimi sphere solis ...*, volvelle with 2 disks, planetary circle not drawn; f. 3v, *Theorica motus orbis deferentis solem necessario super centro excentricj ...*, Volvelle with 3 disks, planetary circle not completed; f. 4r, *Theorica axium et polorum sphere solis et primi mobilis*, Diagram; f. 4v, *Theorica augis et oppositi solis in circumferentia ...*, Diagram; f. 5r, *Theorica regularitatis motus centri corporis solis ...*, Diagram; f. 5v, *Theorica alia regularitatis motus centri corporis .. zodiaco*, Diagram; f. 6r, *Theorica longitudinum mediarum solis in excentrico*, Diagram; f. 6v, *Theorica equidistantie linee medij ... centrum corporis solis*, Diagram; f. 7r, *Theorica linearum motuum solis et equationis maxime*, Diagram; f. 7v, blank;

ff. 8-12, Movement of the Moon; f. 8r, *Theorica orbium sphere lune et primi mobilis et motus eorum et habitudinis orbium lune ad medium motum solis*, volvelle with 3 disks (as on f. 1); f. 8v, blank; f. 9r, *Theorica auxium et polorum orbium sphere lune et primi mobilis*, Diagram; f. 9v, *Theorica augis et oppositi lune in circumferentia sui circuli excentrici*, Diagram; f. 10r, *Theorica regularitatis motus orbis defferentis epicyclum super centro mundi et irregularitatis eius super centro excentricj*, Diagram; f. 10v, *Theorica regularitatis motus lune in epicyclo ... centro excentrici*, Diagram; f. 11r, *Theorica linearum et motuum lune et equationis maxime*, Diagram; f. 11v, *Theorica minorum proportionalium lune*, Diagram with movable pointer; f. 12r, *Theorica linearum et motuum capitis et caude draconis lune*, Diagram; f. 12v, blank;

ff. 13v-17v, Movement of the planets Mars, Jupiter, and Saturn; f. 13r, *Theorica orbium spherarum trium superiorum ... motus eorum*, volvelle with 3 disks and movable planetary disks; f. 13v, blank; f. 14r, *Theorica auxium et polorum orbium ... primi mobilis*, Diagram; f. 14v, *Theorica augis et oppositi trium superiorum ... excentricorum*, Diagram; f. 15r, *Theorica regularis motus orbium defferentium ... super centra mundi et suorum deferentium*, Diagram; f. 15v, *Theorica regularitatis motus corporum trium superiorum ... a linea a centro deferentis*, Diagram; f. 16r, *Theorica habitudinis corporum trium ... motus solis in zodiaco*, Diagram; f. 16v, *Theorica maxime equationis centri in zodiaco et in epicyclo trium superiorum*, Diagram; f. 17r, *Theorica linearum et motuum trium superiorum et equationis argumenti maxime*, Diagram; f. 17v, *Theorica minorum proportionalium longiorum... sua extrema longitudines medias*, Diagram with movable pointer;

ff. 18-20, Movement of Venus; f. 18r, *Theorica orbium sphere Veneris et primi mobilis et motus eorum*, volvelle with three disks and movable planetary disks on the differentials; f. 18v, blank; f. 19r, *Theorica axium et polorum orbium sphere Veneris et primi mobilis*, Diagram; f. 19v, *Theorica regularitatis motus centri epicycli Veneris super centro equantis et irregularitatis eius super centro mundi et deferentis*, Diagram; f. 20r, *Theorica linearum et motuum orbium sphere Veneris et habitudinis eius ad solem*, Diagram; f. 20v, blank;

ff. 21v-24v, Movement of Mercury; f. 21r, *Theorica orbium sphere Mercurii et primi mobilis et motus eorum*, volvelle with 4 disks and movable planetary disks on the differential; f. 21v, blank; f. 22r, *Theorica axium et polorum sphere Mercurii et primi mobilis*, Diagram; f. 22v, *Theorica regulationis motus deferentis epicyclum Mercurii super centro equantis et irregularis eius super centro mundi*, Diagram; f. 23r, *Theorica motus augis et oppositi deferentis Mercurii*, Diagram; f. 23v, *Theorica alia motus augis et oppositi deferentis*

Mercurii mobilis, Diagram; f. 24r, *Theorica linearum et motuum orbium sphere Mercurii et habitudinis eius ad solem*, Diagram; f. 24v, *Theorica minorum proportionalium longiorum et priorum Mercurii*, Diagram with movable pointer;

ff. 25-33, Movement of Different Planets; Eclipses of the Sun and the Moon; f. 25r, *Theorica directionis, retrogradationis et stationum planetarum*, Diagram; f. 25v, *Theorica ortus et occasus matutini et vespertini Veneris et Mercurii*, volvelle with a large movable disk with the planet Venus and a small movable epicycle disk for the movement of the planet Mercury; f. 26r, *Theorica diversitatis aspectus absolute et diversitatis in longitudine et latitudine*, Diagram; f. 26v, *Theorica eclipsium lune*, Diagram; f. 27r, *Theorica eclipsis particularis solis*, Diagram; f. 27v, *Theorica eclipsis universalis solis*, Diagram; f. 28r, *Theorica declinationis et latitudinis*, Diagram; f. 28v, *Theorica declinationis et reflexionis epiciclorum et deviationis deferentium planetarum*, Diagram; f. 29r, blank; f. 29v, *Theorica motus accessus et recessus octave sphere*, Diagram with a volvelle of Aries in the West and a volvelle of the movement in the East; f. 30r, *Theorica punctorum ecliptice octave sphere non describentium circumferentias circularum perfectas*, Diagram; f. 20v, *Theorica figurarum conoidalium et proportionum circularum parvorum alternati equalium*, Diagram; f. 21r, *Theorica habitudinis capitum Cancri et Capricorni octave ad capita Cancri et Capricorni non*, Diagram with small disk in the center of the world; f. 31v, *Theorica habitudinis ecliptice octave ad equinoctialem primi mobilis et variationis tropicorum*, Diagram; f. 32r, *Theorica linearum et motuum octave sphere*, Diagram; f. 32v, *Theorica motus octave sphere secundum thebit et habitudinis ecliptice eius ad equinoctialem primi mobilis*, Diagram with 5 zones and one in the center of the world; f. 33r, *Theorica alia motus octave sphere et habitudinis eius varie ad equinoctialem et maxime equationis eiusdem*, Diagram; f. 33v, blank.

This work contains volvelles and diagrams that treat the theories and projections of Claudius Ptolemaeus (fl. 127-145 A.D), ancient astronomer, geographer, and mathematician who considered the Earth the center of the universe (the "Ptolemaic system") and who presented these ideas in the *Almagest*, written c. 140. Ptolemy's *Almagest* is a comprehensive presentation of mathematical astronomy, the work through which he became one of the most important figures in all the history of astronomy. It is divided into 13 books, each of which deals with certain astronomical concepts pertaining to stars and to objects in the solar system, and it dominated astronomy for more than 1500 years (see Manitius, 1912-13, and Neugebauer, 1975, Pt. II, p.922ff, Part III, p. 1403ff., fig. 90ff).

The work is close to but does not seem to be identical to the "Epitome of the *Almagest*" written between 1460 and 1463 by Georg Peurbach (1423-1461?) and Johannes Regiomontanus (1436-1476) at the suggestion of Cardinal Bessarion. It gave Europeans the first sophisticated understanding of Ptolemy's astronomy and was studied by every competent astronomer in the sixteenth century. Published 20 times, the first edition appeared in Nuremberg as *Theoricae novae planetarum*. However, the present work is not the same as the "Epitome"; in our manuscript the diagrams and volvelles are far more complex than in the printed editions.

A sister manuscript with a similar set of diagrams, volvelles and tituli is known from the collection of Harrison D. Horblit NY, (ex. H.P. Kraus, Cat.155, 1980, no.12, no.31; Cat.155, 1980, p.14;) and another in the Schoenberg Collection (see catalogue, privately printed, no. 64). The Kraus catalogue ascribed the content to Gerhard von Sabbioneta-Cremona (1114-1187), later (115) to Georg Peurbach, (1423-1461?). However, it is unlikely that any of the three can be attributed with certainty. Nevertheless, the known manuscripts all originate in

northern Italy, in the area of Padua-Verona, and they recall the presence there of Peurbach and Regiomontanus, who lectured at the Universities of Padua and Ferrara in the fifteenth century.

The Almagest was only superseded as the cornerstone of astronomical calculation by Copernicus's momentous work *De Revolutionibus Orbium Caelestium* (On the Orbits of Celestial Bodies) published in 1542, and even Copernicus's work was cast in a very Ptolemaic mold, comprising combinations of the same geometrical elements of uniform circular motion.

ILLUSTRATION

The manuscript is illustrated with 55 full-page diagrams, of which 11 have volvelles or other moving parts attached with pins and threads. As many as 4 moving disks and two pivots are used in order to represent epicyclic and epicentric motions, trepidations, etc. A volvelle is: "An old device consisting of one or more movable circles surrounded by other graduated or figured circles, servicing to ascertain the rising and setting of the sun and moon, the state of the tides, etc. (OED, 2nd ed.). The careful hand-coloring of the volvelles and the circles makes the manuscript attractive and the diagrams more readily comprehensible.

LITERATURE

K. Manitius, *Des Claudius Ptolemäus Handbuch der Astronomie I-II*, Leipzig, 1912-1913.

Otto Neugebauer, *A History of Ancient Mathematical Astronomy*, Berlin-Herdelberg, New York, 1975.

Von Euw, Anton and Joachim M. Plotzek, *Die Handschriften der Sammlung Ludwig*, 4 vols, Cologne, 1979.

E. Zinner, *Geschichte und Bibliographie der astronomischen Literatur in Deutschland zur zeit der Renaissance*, Leipzig, 1941.

Online Resources

Almagest homepage
<http://www.almagest.co.uk/>

On Ptolemy with good diagrams
<http://zebu.uoregon.edu/textbook/planets.html>