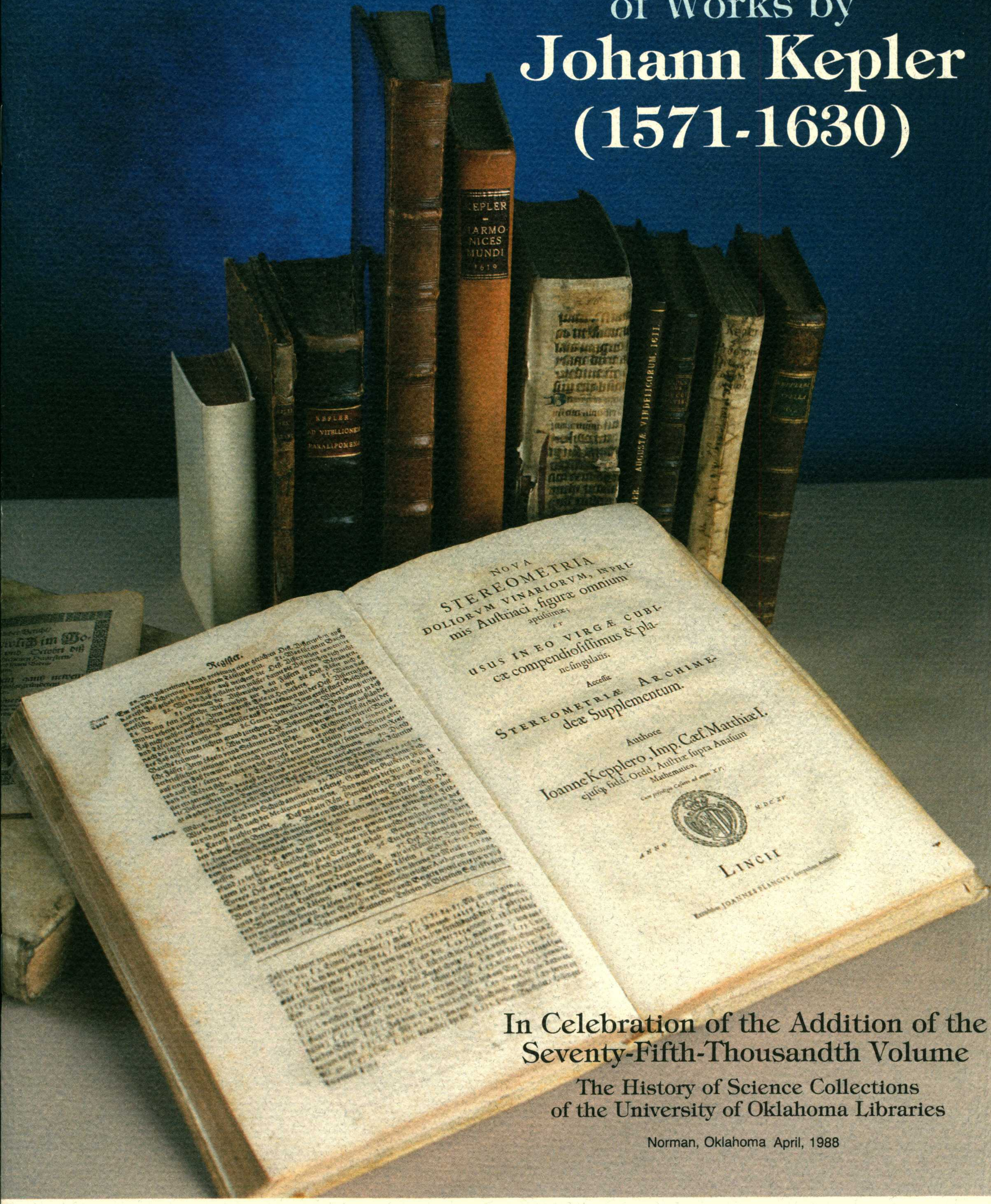
An Exhibition of Works by Johann Kepler (1571-1630)



In Celebration of the Addition of the Seventy-Fifth-Thousandth Volume

The History of Science Collections
of the University of Oklahoma Libraries

Norman, Oklahoma April, 1988

The seventy-fifth-thousandth volume added to the Collections is Johann Kepler's Nova stereometria, *published in 1615. It is a work of great rarity, important in both the development of mathematics and the practical applications of mathematics. This copy, bound with the German version of 1616, has been placed in the Collections in honor of James G. Harlow, Jr., in gratitude for his services to The University, The University Libraries, and the University of Oklahoma Foundation.*

Sul H. Lee
Dean, University Libraries

Johann Kepler (1571–1630) was born in Southern Germany into an era of political, religious, and intellectual upheaval. The Protestant Reformation was tearing the Christian Church into sects that vied for men's souls, minds, and bodies with every weapon at their disposal. Johann was a Lutheran, by accident of geography. As a child he became deeply devoted to Christian idealism, perhaps searching for something his miserable homelife lacked. By the age of eighteen he had entered the University at Tübingen, a Lutheran academic stronghold, on his way to becoming a theologian and entering the Lutheran clergy.

Tübingen, like all universities of the time, was firmly Aristotelian philosophically. The Aristotelian physics that was taught included a cosmology, a general view of the structure of the universe, in which the Earth was motionless at the center of a spherical universe, and the celestial bodies turned about it, as they are seen to do. The stars were on the outer, spherical boundary. This cosmology, like all of Aristotelian physics, was non-mathematical.

Mathematics, taught in the liberal arts portion of the educational system, included astronomy, the mathematical analysis of the motions of the heavenly bodies. Astronomy was distinct from cosmology, as mathematics was distinct from physics and astronomical theory carried no implication of physical reality.

Knowledge of the Platonic philosophy had recently begun to spread in Europe. Platonic idealism taught that ideas are real and that mathematics is the path to understanding the world of nature. Platonism differed in so many ways from the Aristotelianism that dominated the universities that there was no hope of it penetrating the universities except among the relatively unimportant mathematics professors. However, it did slowly become known, largely outside of the universities and Kepler, who read widely, encountered some of the Christian theological writings that discussed (and interpreted) Plato's ideas. These seem to have strengthened his own Christian idealism and made him even more susceptible to Platonic idealism. One channel through which knowledge of idealism moved was in a line of mathematics from teacher to pupil that reached Michael Mästlin (1550–1631), who taught mathematics to Kepler at Tübingen.

From Mästlin Kepler learned something about the astronomical theory of Copernicus, published half a century earlier. Copernicus had also been influenced by Platonic idealism and had developed a theory of planetary motion that he found "more pleasing to the mind" than previous theories. In Copernicus' theory the Sun and stars did not move, their observed motions being accounted for by assuming a moving Earth. This was mathematical, not physical, and hence in no way altered cosmological ideas. But somehow Kepler acquired a momentous idea: the beautiful mathematical elegance of the Copernican theory meant that it was physically true and that the current geostatic cosmological theory was wrong. Where did this idea of using mathematical astronomy as a guide to physical cosmology come from? Not from Copernicus, according to Kepler, and certainly not from Mästlin. Kepler seems to have originated this new approach himself, for theological reasons. He introduced an idea of Plato's that Christian theologians had interpreted to mean that the Creator reveals himself through his Creation. Kepler noted that there is a glorious harmony between the three *motionless* parts of the universe, the Sun, the fixed stars, and the intermediate space, with God the Father, the Son, and the Holy Spirit. But the Sun and the fixed stars *move* in the Aristotelian cosmology. Thus Kepler has brought theology to bear on both astronomy and cosmology.

The Lutheran Church wanted neither dissension nor tolerance of competing forms of Christianity among its clergy. It became clear to Kepler's teachers that the pupil's Christian idealism was far too tolerant of diverse views, that he would not be able to take the oaths necessary for ordination as a Lutheran minister.

In the far away city of Graz, Austria, there was a Lutheran School and the Tübingen faculty was asked to recommend a replacement for a deceased mathematics teacher. Kepler was their choice. It was a clear interruption in his education for the clergy and he regarded it not as a new life but as a temporary diversion. But once he had left Tübingen his return was preventable—and prevented.

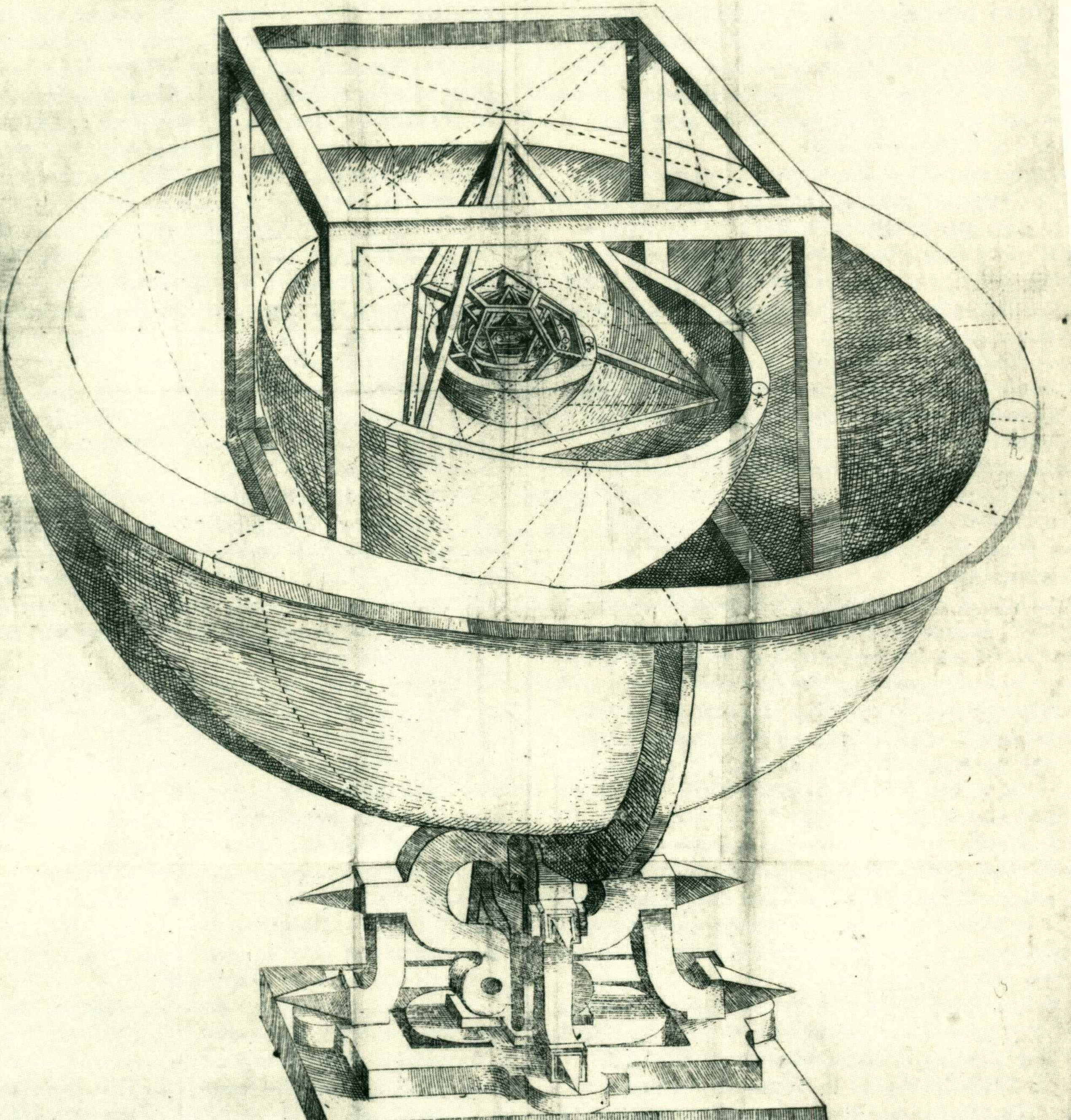
Kepler went to Graz in 1594. A little over 2 years later he wrote to Mästlin that he hoped to be a theologian but now he saw "how God is also praised through my work in astronomy."

Always (wrote Kepler) his mind was on the number, size, and arrangement of the planets. Pursuing a thought that occurred while teaching an astronomy class in Graz, he found the first element of the Architect's plans: the spacing of the planets around the Sun is determined by the five regular geometric solids. This was the first postulate to be used in deducing out mathematically the physical structure of the universe. His duty to God required publication of his discovery.

TABVLA III. ORBIVM PLANETARVM DIMENSIONES, ET DISTANTIAS PER QVINQVE REGVLARIA CORPORA Geometrica exhibens

ILLVSTRISSIMO PRINCIPI, AC DOMINO DOMINO FRIDERICO, DVCI VVIRTENBERGICO, ET TECCIO, COMITI MONTIS Belgarum, &c, consecrata.

Ponatur Tabula ad pag. 24.

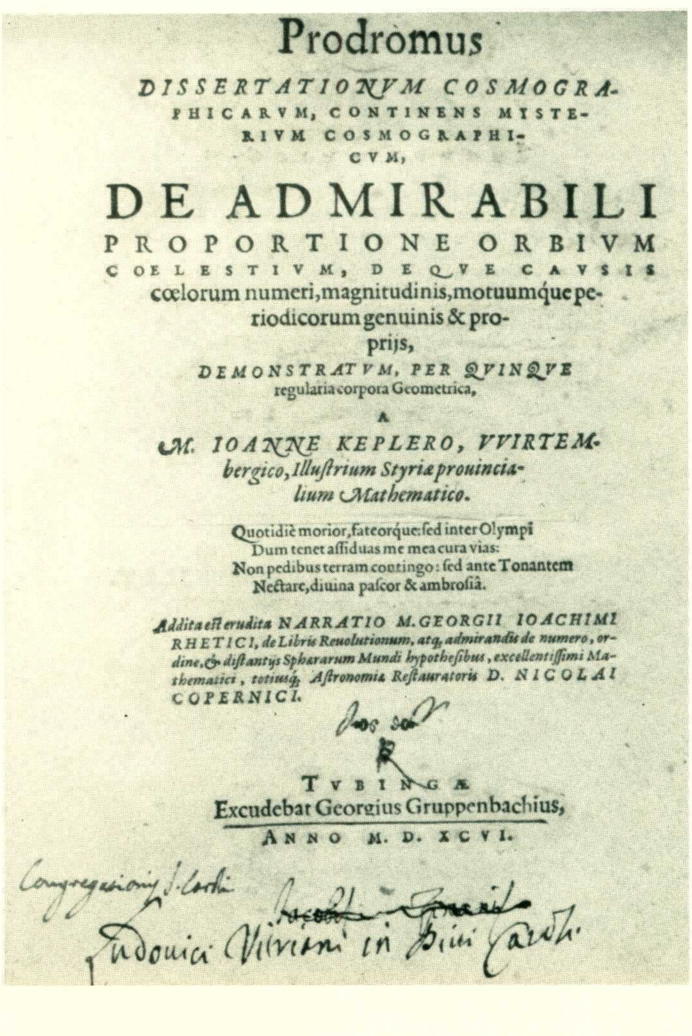


Kepler's former teacher, Michael Mästlin actively assisted in preparing the book for publication, providing Kepler with astronomical computations, arranging for the printing, and obtaining approval from the Faculty Senate of the University. In the course of all of this the Rector of the University successfully urged the removal from the manuscript of a chapter arguing the harmony of the Copernican theory and Scripture. His objection may have stemmed less from the theological problems—of which there were many—than the physical ones. Neither the Rector nor Mästlin ever accepted a heliocentric cosmology.

Prodromus dissertationvm cosmographicarvm, continens Mysterivm cosmographicvm, de admirabili proportione orbivm cœlestivm, de qve cavsis cœlorum numeri, magnitudinis, motuumq́ue periodicorum genuinis & proprijs, demonstratvm, per qvinqve regularia corpora geometrica. Tvbingæ, excudebat Georgius Gruppenbachius, anno M D XCVI.

4°: A–Z[4] [$3 (−L3) signed]; 92 leaves, pp. [2], 1–83 [84], [85] 86–181 (=181) [1]. Page 84 and last page blank. Plates V: I–II, between C2[v] and C3 (pp. 18–19); III, opposite D1[v] (p. 24); IIII, opposite G2 (p. 49); V, opposite G3 (p. 51).

Caspar 6.


Prodromus
DISSERTATIONVM COSMOGRAPHICARVM, CONTINENS MYSTERIVM COSMOGRAPHICVM,
DE ADMIRABILI
PROPORTIONE ORBIVM COELESTIVM, DE QVE CAVSIS
cœlorum numeri, magnitudinis, motuumq́ue periodicorum genuinis & proprijs,
DEMONSTRATVM, PER QVINQVE regularia corpora Geometrica,
A
M. IOANNE KEPLERO, VVIRTEMbergico, Illustrium Styriæ prouincialium Mathematico.

Quotidiè morior, fateorque: sed inter Olympi
Dum tenet assiduas me mea cura vias:
Non pedibus terram contingo: sed ante Tonantem
Nectare, diuina pascor & ambrosiâ.

Addita est erudita NARRATIO M. GEORGII IOACHIMI RHETICI, de Libris Reuolutionum, atq; admirandis de numero, ordine, & distantijs Sphærarum Mundi hypothesibus, excellentissimi Mathematici, totiusq; Astronomiæ Restauratoris D. NICOLAI COPERNICI.

TVBINGÆ
Excudebat Georgius Gruppenbachius,
ANNO M. D. XCVI.

The printer required Kepler to purchase 200 copies of the book. These Kepler sent out to distinguished scholars throughout Europe. By and large those who were physicists and believed that observation is the foundations of knowledge found his suggestion of deducing out the structure of the universe *a priori* to be unimpressive. Mathematicians looked favorably on the idea.

Meanwhile, in Graz, religious controversy was beginning to raise problems. An uneasy peace had existed between the Lutherans and the Catholics in the region, but the Catholics were reaching political dominance. Kepler was too Lutheran to remain welcome in Graz—and too unorthodox a Lutheran to return to Tübingen. He had to find a new home.

Kepler had sent a copy of his book to Tyge (Tycho) Brahe (1546–1601), a Dane who had developed remarkable techniques for making precise observations of planetary positions. Brahe, who was in Prague, on the staff (and payroll) of Rudolph II, Holy Roman Emperor, was unimpressed with the *a priori* method, believing that knowledge of the structure of the universe would come from accurate observing, not mathematics. But Brahe also knew that mathematicians were useful, as computers. As Kepler became trapped between expulsion from Catholic Graz and inability to return to Lutheran Tübingen, Brahe agreed to take him on as an assistant and seek an income from the Emperor for him. It gave Kepler a place to live and he went to Prague in 1600.

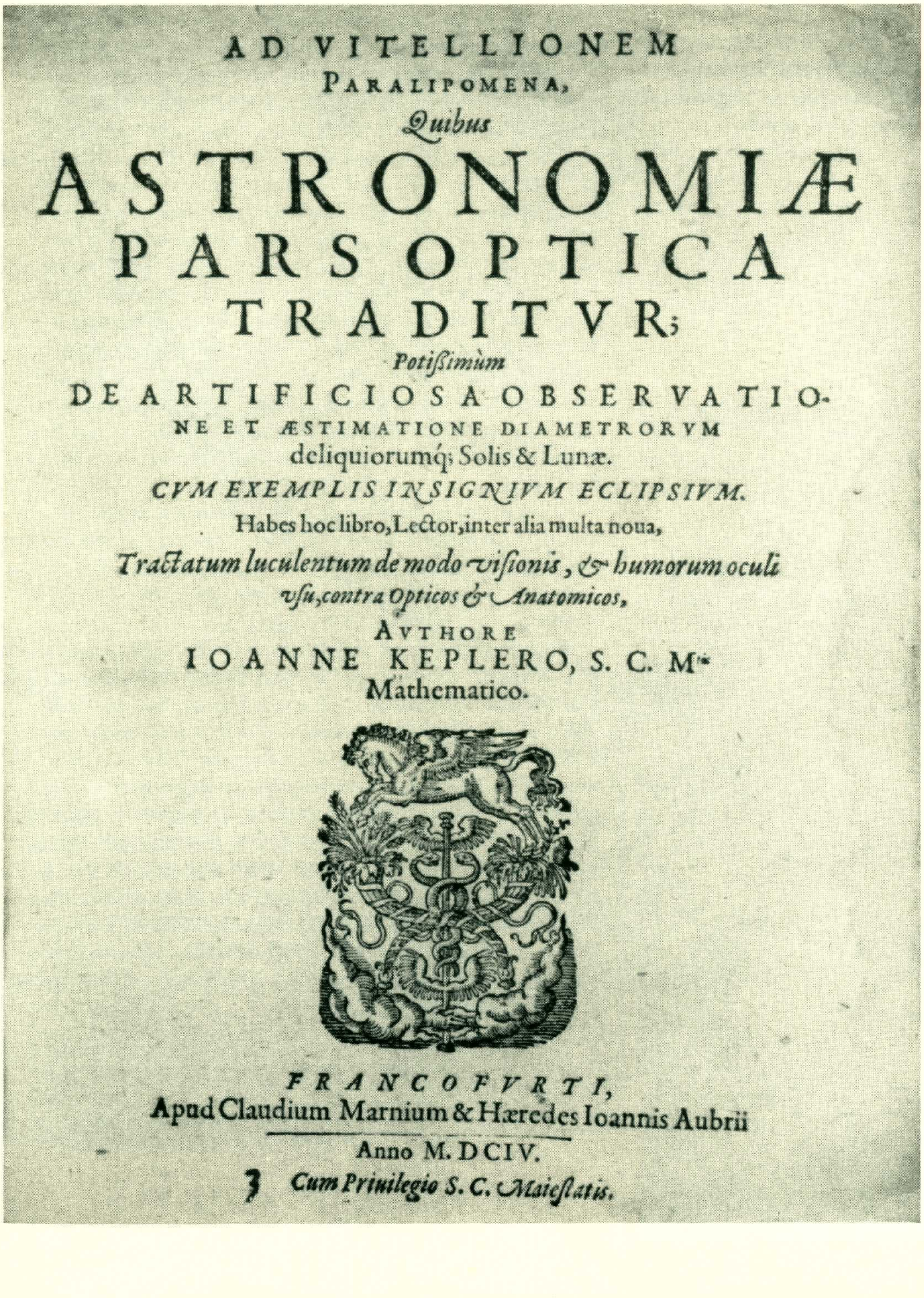
In Prague, Kepler's time was divided between making computations for Brahe, trying to get money from the Emperor, and his own research. The latter was the working out of the great plan of the *Prodromus* and related investigations.

Kepler published extensively, over eighty works in his lifetime. He had published three eulogies while a student at Tübingen and from his arrival in Graz published annual almanacs, for the following years, and continued to do this in Prague. The death of Brahe, in 1601, caused Kepler to write and publish Brahe's eulogy. It also resulted in Kepler's appointment to Brahe's former position as Imperial Mathematician to Rudolph II and what seemed to be, finally, financial security and freedom from distraction from his work. By 1604 he had published a major work on another part of mathematics, geometrical optics, and its application to problems of astronomical observation.

Ad Vitellionem Paralipomena, quibus astronomiæ pars optica traditvr; potissimùm de artificiosa observatione et æstimatione diametrorvm deliquiorumq; solis & lunæ. Francofvrti, apud Claudium Marnium, & Hæredes Ioannis Aubrii, anno M D CIV.

4°:)(^{4} (:)^4 A–3M^4 3N^2 [$3 (+A4, −Q3, 3N2) signed, missigning 2B2 as B2]; 242 leaves, pp. [16], 1–124 [125] 126–337 [338] 339–449 [=449] [18] [1], misnumbering 230 as 320, 346–347 as 246–247, 395 as 359, 412 as 417, last page blank. Fold tables [2] opposite 3G4^v (p. 424), plate [1] and 2 pp. of accompanying explanations misbound between 3N1 and 3N2.

Caspar 18.



AD VITELLIONEM
PARALIPOMENA,
Quibus
ASTRONOMIÆ
PARS OPTICA
TRADITVR;
Potißimùm
DE ARTIFICIOSA OBSERVATIO-
NE ET ÆSTIMATIONE DIAMETRORVM
deliquiorumq; Solis & Lunæ.
CVM EXEMPLIS INSIGNIVM ECLIPSIVM.
Habes hoc libro, Lector, inter alia multa noua,
Tractatum luculentum de modo visionis, & humorum oculi vsu, contra Opticos & Anatomicos,
AVTHORE
IOANNE KEPLERO, S. C. M^{tis}
Mathematico.

FRANCOFVRTI,
Apud Claudium Marnium & Hæredes Ioannis Aubrii
Anno M.DCIV.
Cum Priuilegio S. C. Maiestatis.

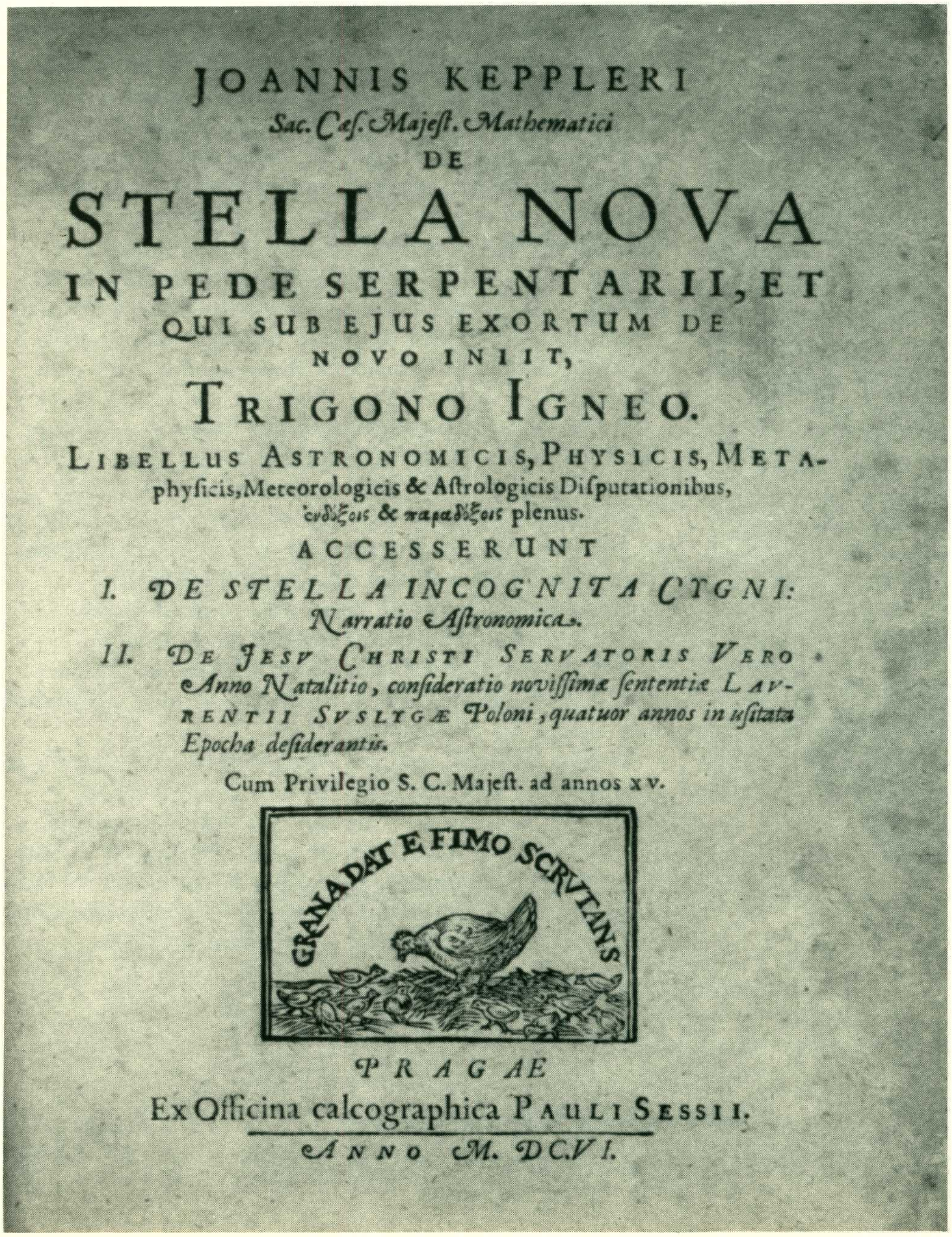
*I*n 1604 a new star appeared that excited widespread interest and questions concerning its astrological meaning. Kepler promptly published a four-page leaflet on the *nova* and, in 1606, a book, *De nova stella*.

In this work he discussed the curious regularities in the locations among the stars of successive conjunctions of Saturn and Jupiter that repeated a cycle of about 800 years. A new star had appeared about two cycles or 1600 years earlier, marking the birth of the Christ. All of this intrigued Kepler. Furthermore, he had recently learned of new scholarly work that suggested an error of four years in establishing the beginning of the Christian calendar. An appendix on this subject was added to the *De nova stella*.

***Joannis Keppleri Sac. Cæs. Majest. Mathematici De stella nova in pede serpentarii, et qui sub ejus exortum de novo iniit, Trigono igneo. Libellus astronomicis, physicis, metaphysicis, meteorologicis & astrologicis disputationibus,* ἐνδόξοις & παραδόξοις plenus. Accesserunt I. De stella incognita Cygni: narratio astronomica. II. De Jesv Christi Servatoris vero anno natalitio, consideratio novissimæ sententiæ Lavrentii Svslygæ Poloni, quatuor annos in usitata epocha desiderantis. Pragæ, Ex officina calcographica Pauli Sessii, anno M DC VI.**

4°:)?(^{6}, A–2C^4 2D^2, A–D^4 E$^{4(-4)}$ ($3 [+)?(4, −T3, Y1, ^{2}A1, E2–3) signed]; 138 leaves, pp. [12], 1–148, [149] 150–168, [169] 170–212 [=212]; ^{2}[1–2] 3–35 [36–38] [=38] [2], misnumbering 207 as 805. Last leaf blank and missing. Fold plate [1], opposite K2^v (p. 76).

Caspar 27.



JOANNIS KEPPLERI
Sac. Cæs. Majest. Mathematici
DE
STELLA NOVA
IN PEDE SERPENTARII, ET
QUI SUB EJUS EXORTUM DE
NOVO INIIT,
TRIGONO IGNEO.
LIBELLUS ASTRONOMICIS, PHYSICIS, METAphysicis, Meteorologicis & Astrologicis Disputationibus, ἐνδόξοις & παραδόξοις plenus.
ACCESSERUNT
I. DE STELLA INCOGNITA CYGNI: Narratio Astronomica.
II. DE JESV CHRISTI SERVATORIS VERO Anno Natalitio, consideratio novissimæ sententiæ LAVRENTII SVSLYGÆ Poloni, quatuor annos in usitata Epocha desiderantis.
Cum Privilegio S. C. Majest. ad annos XV.

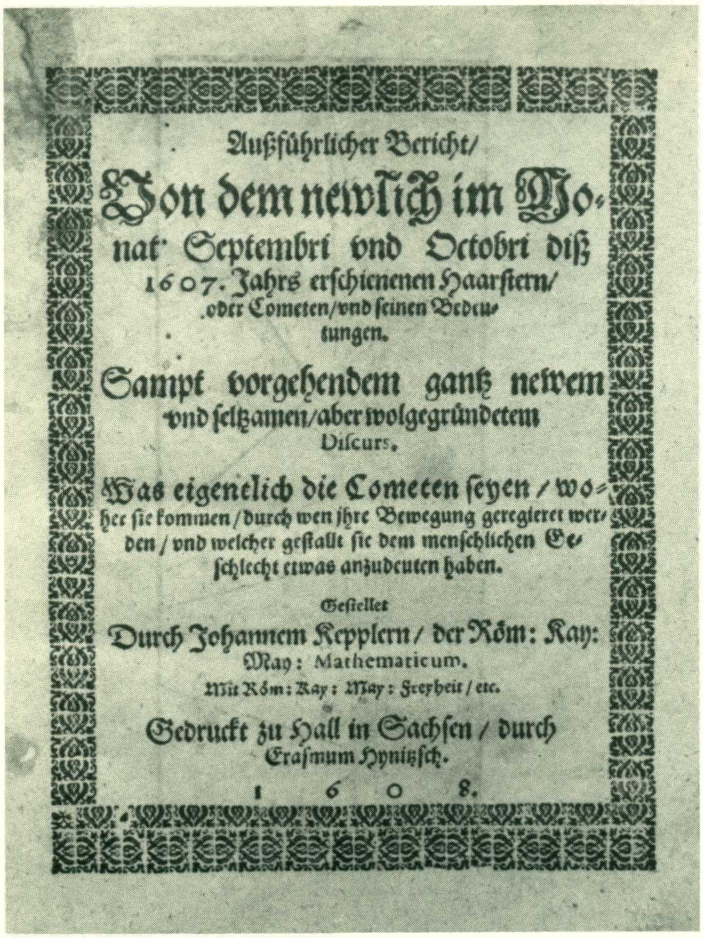
PRAGAE
Ex Officina calcographica PAULI SESSII.
ANNO M. DCVI.

Every astronomical event offered Kepler an opportunity for another work, in which he could expound his ideas on astronomy and astrology and insinuate his new views into comments on cosmology. The comet of 1607 was such an opportunity.

Aussführlicher Bericht von dem newlich im Monat Septembri vnd Octobri diss 1607. Jahrs erschienenen Haarstern oder Cometen, vnd seinen Bedeutungen. Gedruckt zu Hall in Sachsen, durch Erasmum Hynitzsch, 1608.

4°: A–E[4] [$3 signed]; 20 leaves, pp. [1–38] [39–40], pp. [39–40] blank.

Caspar 29.


Außführlicher Bericht/
Von dem newlich im Monat Septembri vnd Octobri diß 1607. Jahrs erschienenen Haarstern/ oder Cometen/ vnd seinen Bedeutungen.
Sampt vorgehendem gantz newem vnd seltzamen/ aber wolgegründetem Discurs.
Was eigentlich die Cometen seyen / woher sie kommen / durch wen jhre Bewegung geregieret werden / vnd welcher gestallt sie dem menschlichen Geschlecht etwas anzudeuten haben.
Gestellet
Durch Johannem Kepplern / der Röm: Kay: May: Mathematicum.
Mit Röm: Kay: May: Freyheit / etc.
Gedruckt zu Hall in Sachsen / durch Erasmum Hynitzsch.
1608.

Despite his busy life and varied interests, Kepler had been steadily pursuing his grand plan to find the harmony of the universe. Brahe had given him the task of computing the motion of Mars, and year after year he had worked on what had seemed at first to be a simple matter. He decided that Copernicus' theory was too primitive for his purposes. Although Copernicus had put the Earth in motion and had stopped the Sun from moving, he had computed planetary positions relative to the center of the earth's orbit, which was near but not at the Sun. This did not suit Kepler's emphasis on the Sun, either theologically or physically. Nor did Copernicus treat the Earth fully as a planet. Kepler reworked the theory and may properly be called the inventor of the solar system, a system in which the planetary orbits are centered on the Sun, their motions are controlled by the Sun, and that control is physical.

Stimulated by a mathematical idea he learned from reading the works of the Greek mathematician Archimedes, Kepler began to try to divide the path of Mars around the Sun into small arcs and see how its distance from the Sun varied. In the course of this work he discovered the second part of the Creator's plan, a second postulate: although the speed of Mars and its distance from the Sun both vary continuously, the line from the Sun to Mars sweeps across equal areas in equal times. Kepler blithely extended this from Mars to all of the planets.

For 2,000 years astronomy had been the attempt to express planetary motions in terms of combinations of circles. Kepler abandoned this and found a third part of the Divine Plan. Mars moves in an ellipse. Again he extended this, saying all of the planets move about the Sun in ellipses. This "breaking of the circle" had an intellectual influence that extended far beyond astronomy.

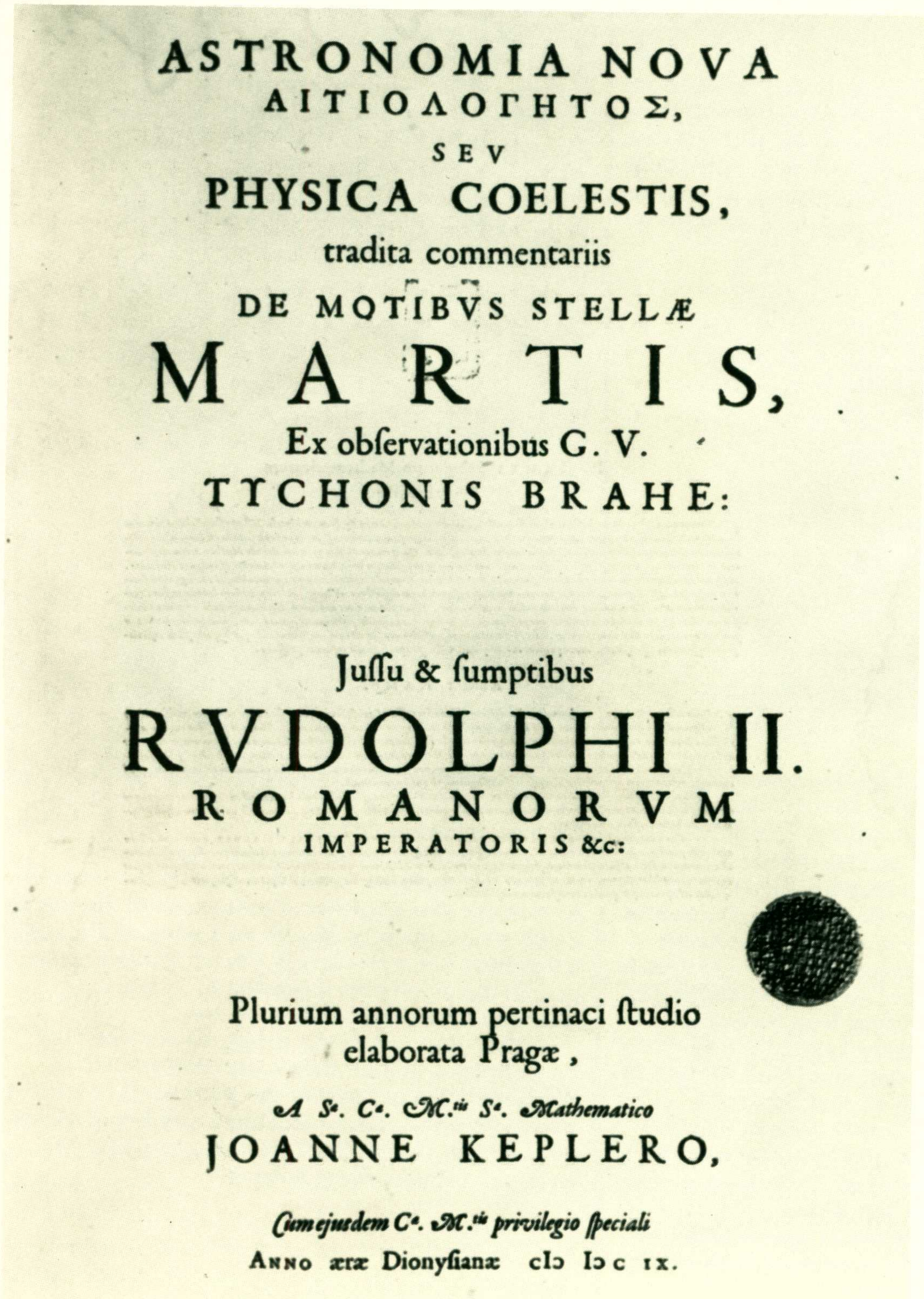
These two notable new postulates of Kepler's, with their elaboration, appeared in a book published in Leipzig, in 1609.

Kepler had claimed that the *Prodromus* was a cosmological work, but Mästlin and the Rector at Tübingen had forced him to back away from that claim. But this book was not only dedicated to the Holy Roman Emperor, it had his permission for publication. Kepler entitled the work *A new astronomy inquiring into causes or a Celestial physics.*

Astronomia nova αιτιολογητος seu Physica coelestis, tradita commentariis de motibus stellae Martis, ex observationibus G. V. Tychonis Brahe. [Heidelberg, E Vögelin] M DC IX.

2°: [(⋆)^{1}] (⋆⋆)–(⋆⋆⋆⋆)^{6} A–2D^{6} 2E^{8} [$4 (−O4, R4, +2E5) signed]; 189 leaves, pp. [38], [1]–97 [98] 99–107 [108–109] 110–161 [162–163] 164–262 [263] 264–337 [338] [=338] [2], misnumbering 15 as 14, 81 as 89, 268 as 269, 286 as 289, last 2 pp. blank. Fold. plate [1] opposite [(⋆)1]^{v}.

Caspar 31.



ASTRONOMIA NOVA
ΑΙΤΙΟΛΟΓΗΤΟΣ,
SEV
PHYSICA COELESTIS,
tradita commentariis
DE MOTIBVS STELLÆ
MARTIS,
Ex obſervationibus G. V.
TYCHONIS BRAHE:

Juſſu & ſumptibus
RVDOLPHI II.
ROMANORVM
IMPERATORIS &c:

Plurium annorum pertinaci ſtudio
elaborata Pragæ,

A S^{ae}. C^{ae}. M.^{tis} S^{ae}. Mathematico
JOANNE KEPLERO,

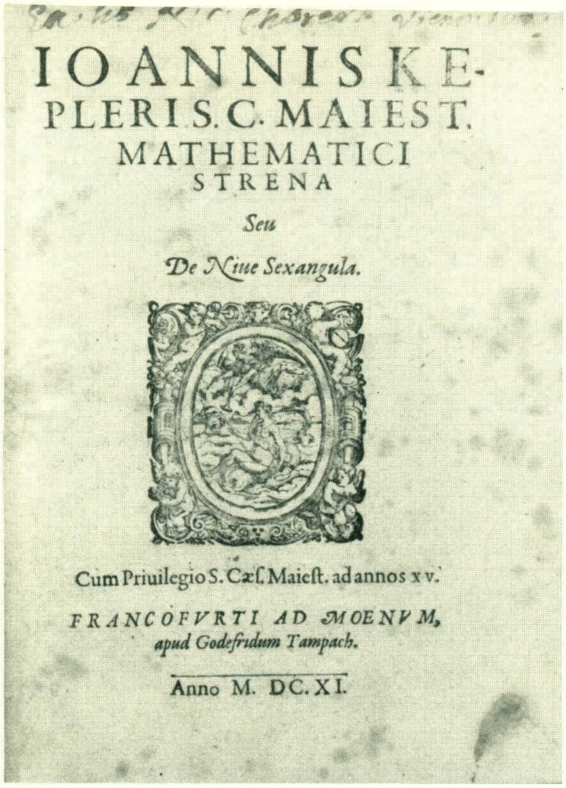
Cum ejusdem C^{ae}. M.^{tis} privilegio ſpeciali
ANNO æræ Dionyſianæ clↃ IↃ c IX.

*K*epler had a remarkable ability to work on many projects at once and complete them all. In 1611 he prepared and published a *Strena* or *New Year's Greeting*, a 24-page book on the geometry of the snowflake.

Ioannis Kepleris C. Maiest. Mathematici Strena seu De niue sexangula. Francofvrti ad Mœnvm, apud Godefridum Tampach, anno M DC XI.

4°: A–C^4 [$3 signed]; 12 leaves, pp. [1–2] 3–24, misnumbering 3 as 1.

Caspar 39.


IOANNIS KE-
PLERI S.C. MAIEST.
MATHEMATICI
STRENA
Seu
De Niue Sexangula.

Cum Priuilegio S. Cæs. Maiest. ad annos xv.

FRANCOFVRTI AD MOENVM,
apud Godefridum Tampach.

Anno M. DC.XI.

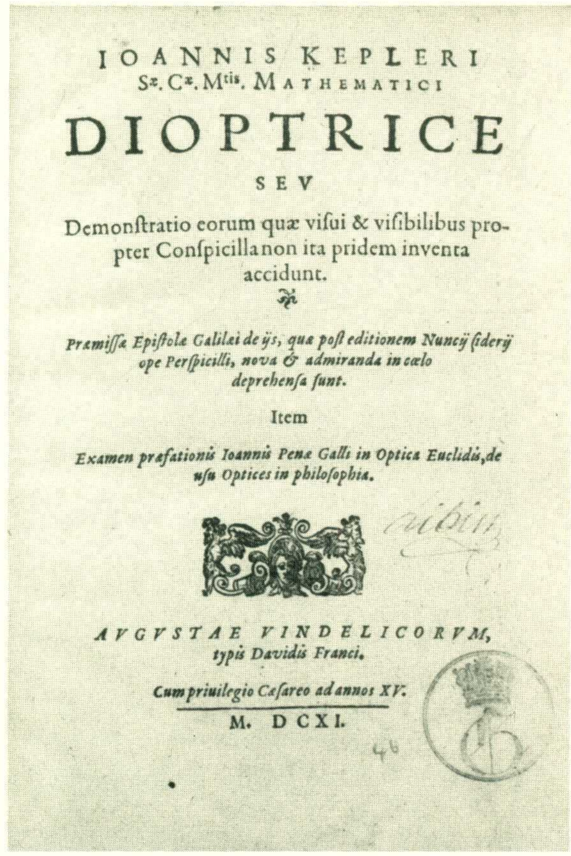
*K*epler had sent a copy of the *Prodromus* to the Italian mathematician, Galileo Galilei (1564–1642) in Padua and he and Kepler quickly recognized that they were both Platonistic mathematicians and both "Copernicans"—a term coming to include all of those who believed that the Earth physically moved and the Sun physically stood still. Galileo never abandoned the age-old idea that planetary motion is to be understood in terms of circles and hence never accepted the elliptical orbits. Still he was a Copernican and when he turned the newly invented telescope on the skies he saw many new things, all of which he turned into arguments for the heliocentric theory in his *Sidereus nuncius* published in Venice in 1610. Kepler quickly learned about the book and its startling discoveries, so useful for the pro-Copernican argument.

In 1611 he published a work on optics, inspired by the telescope and chiefly concerned with the optics of lenses and the telescope.

Ioannis Kepleri Sæ. Cæ. Mtis. Mathematici Dioptrice sev Demonstratio eorum quæ visui & visibilibus propter conspicilla non ita pridem inventa accidunt. Avgvstæ Vindelicorvm, typis Davidis Franci, M DC XI.

4°:)(^{4}, a–c^4 d^2, A–I^4 K^6 [$3 signed]; 60 leaves, pp. [8], 1–28, ^{2}1–16 [17] 18–80 [81–84].)(1^v,)(4^v, [K5^r] blank.

Caspar 40.


IOANNIS KEPLERI
Sæ. Cæ. Mtis. MATHEMATICI
DIOPTRICE
SEV
Demonstratio eorum quæ visui & visibilibus propter Conspicilla non ita pridem inventa accidunt.

Præmissæ Epistolæ Galilæi de iis, quæ post editionem Nuncii siderii ope Perspicilli, nova & admiranda in cælo deprehensa sunt.

Item

Examen præfationis Ioannis Penæ Galli in Optica Euclidis, de usu Optices in philosophia.

AVGVSTAE VINDELICORVM,
typis Davidis Franci.

Cum priuilegio Cæsareo ad annos XV.

M. DCXI.

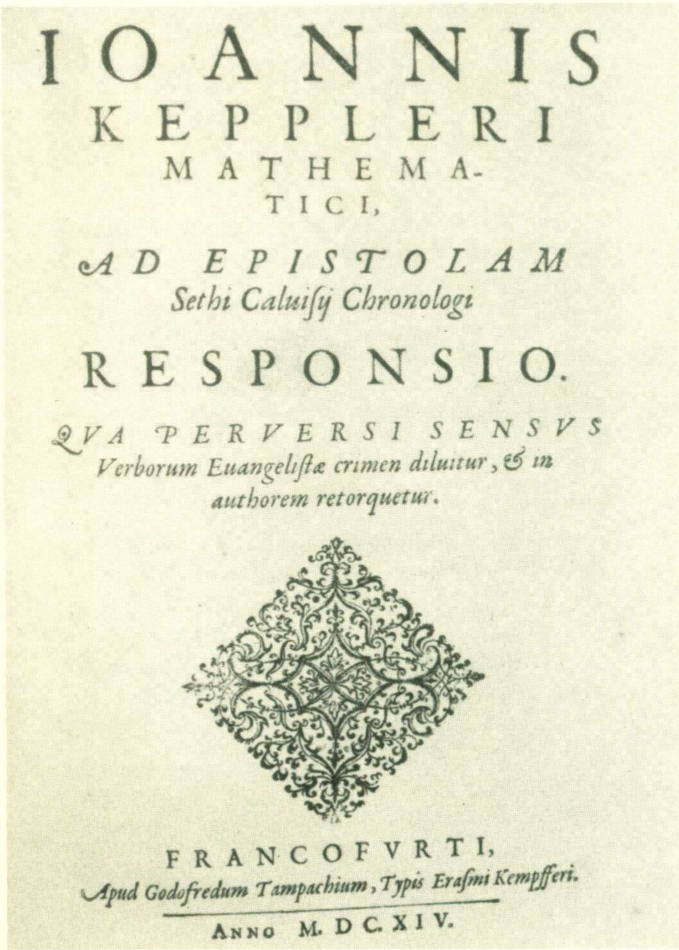
*M*eanwhile the security Kepler had found in Prague was melting away under an upheaval that, for both religious and political reasons, had forced Rudolph to abdicate as Emperor. Again Kepler turned to Tübingen, seeking a post at the University. Routine investigation of records there turned up a statement, made by Kepler as a student, that even a Calvinist was a Brother in Christ. There was no possibility of his ever returning to Tübingen, although he was to continue to try.

In 1612 Rudolph died, cutting Kepler's last thin tie to Prague, and he took a position as District Mathematician in Linz on the Danube. He continued to work incessantly, producing a number of works on the birth year of the Christ and responses to works by others on the subject.

Ioannis Keppleri Mathematici Ad epistolam Sethi Caluisij chronologi responsio. Francofvrti, apud Godofredum Tampachium, typis Erasmi Kempfferi, anno M DC XIV.

4°: A–B⁴ C² [$3 signed]; 10 leaves, pp. [1–3] 4–19 [=19][1]. A1ᵛ and C2ᵛ blank.

Caspar 45.

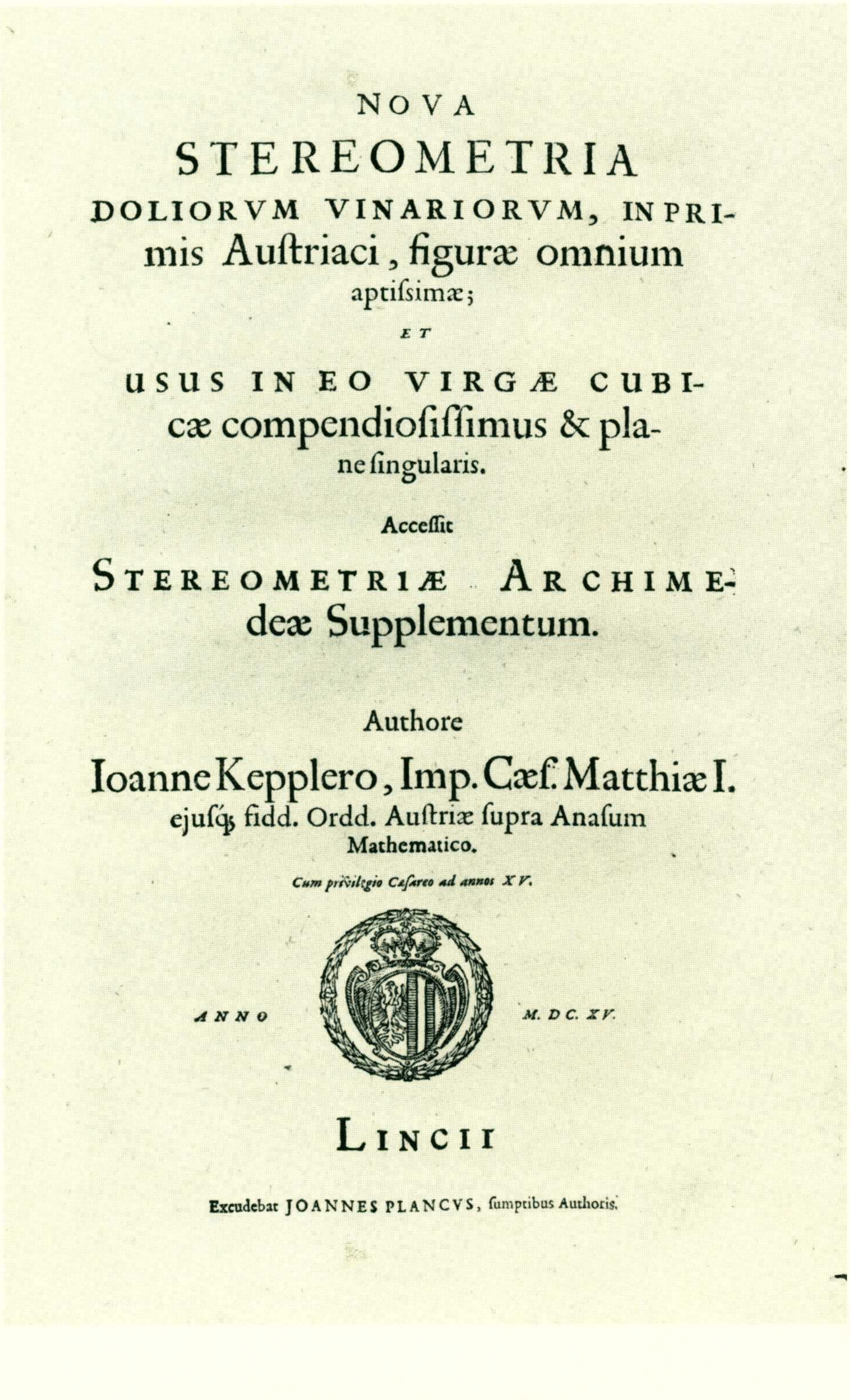

IOANNIS KEPPLERI MATHEMATICI, AD EPISTOLAM Sethi Caluisij Chronologi RESPONSIO. QVA PERVERSI SENSVS Verborum Euangelistæ crimen diluitur, & in authorem retorquetur. FRANCOFVRTI, Apud Godofredum Tampachium, Typis Erasmi Kempfferi. ANNO M. DC. XIV.

Kepler had a wine cellar built into his home in Linz and set about stocking it. To his astonishment he found that wine dealers determined the amount of wine put in a cask by measuring the depth of the cask, without regard to shape. This, he felt, called for mathematical investigation. Beginning with techniques of computing volumes of various geometrical solids developed in Antiquity by Archimedes, Kepler made computations for ninety-two different sorts of solid figures. His work took him far beyond the initial problem of determining the amount of wine obtained, opening up general mathematical problems. Believing that the work was thus of interest both to wine-gaugers and mathematicians, Kepler had it printed at his own expense. It is the first book to be printed in Linz and the seventy-fifth-thousandth volume to be added to the History of Science Collections.

Nova stereometria doliorvm vinariorvm, in primis Austriaci, figuræ omnium aptissimæ; et usus in eo virgæ cubicæ compendiosissimus & plane singularis. Accessit Stereometriæ Archimedeæ supplementum. Authore Ioanne Kepplero, Imp. Cæs. Matthiæ I. ejusq; fidd. Ordd. Austriae supra Anasum Mathematico. Lincii, excudebat Joannes Plancvs, sumptibus authoris, anno M DC XV.

2°: A–O^4 [$3 signed]; 56 leaves without foliation or pagination, errata slip [18½ × 15 cm.] opposite O4^v. Bound with Caspar 49.

Caspar 48.



NOVA

STEREOMETRIA

DOLIORVM VINARIORVM, IN PRIMIS Austriaci, figuræ omnium aptiſsimæ;

ET

USUS IN EO VIRGÆ CUBICÆ compendioſiſſimus & plane ſingularis.

Acceſſit

STEREOMETRIÆ ARCHIMEDEÆ Supplementum.

Authore

Ioanne Kepplero, Imp. Cæſ. Matthiæ I. ejuſq; fidd. Ordd. Auſtriæ ſupra Anaſum Mathematico.

Cum privilegio Cæſareo ad annos XV.

ANNO *M. DC. XV.*

LINCII

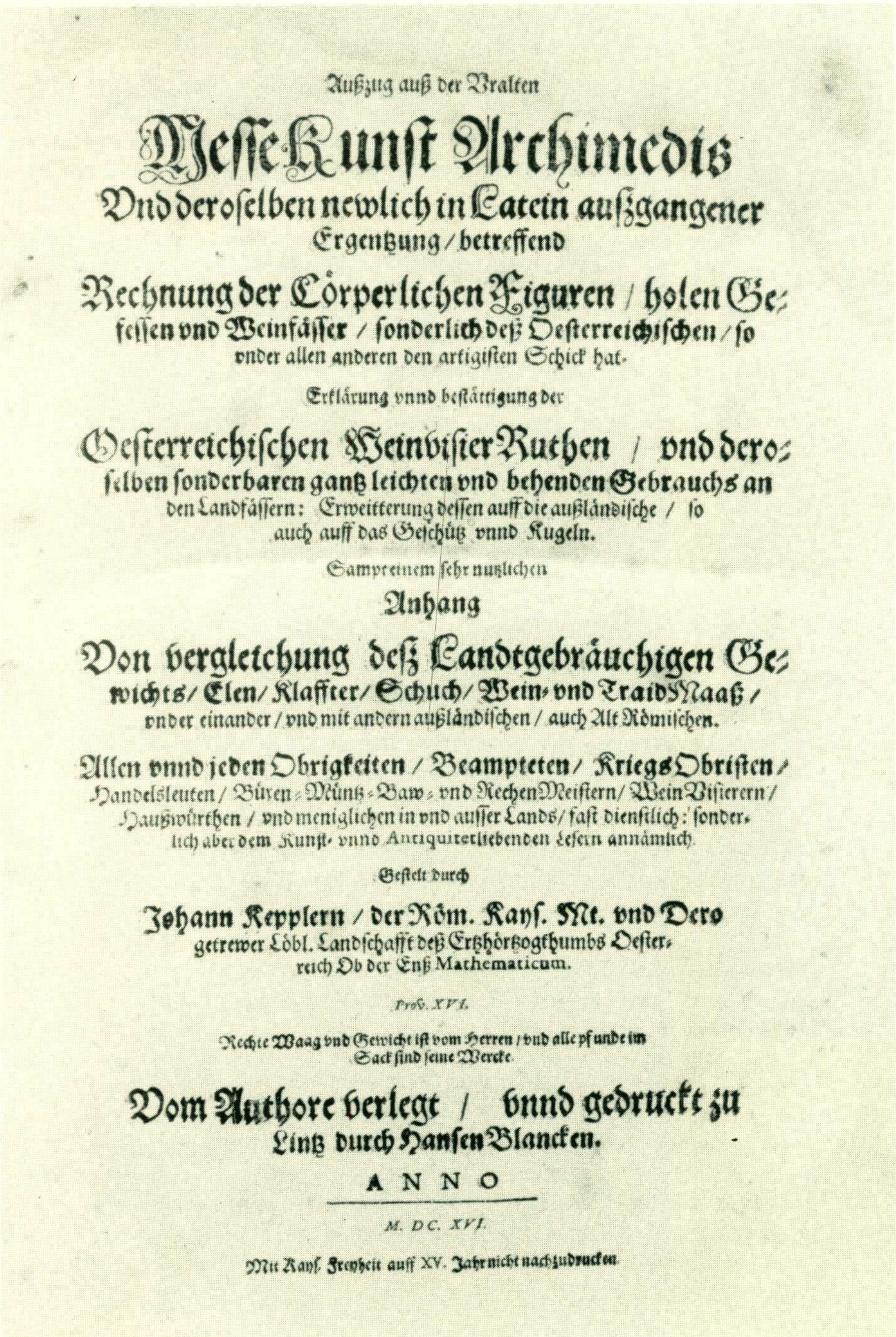
Excudebat JOANNES PLANCVS, ſumptibus Authoris.

Kepler found the sales of the *Nova stereometria* disappointingly meager. Accordingly he prepared a version directed at the practical user and written in German, eliminating much of the esoteric mathematical work.

Ausszug auss der vralten Messekunst Archimedis. Vom Authore verlegt, vnnd gedruckt zu Lintz durch Hansen Blancken, anno M DC XVI.

2°: π^2, A–N^4 O^6 [$3 signed]; 60 leaves, pp. [4], 1–73 [74] 75–113 [=113][3], misnumbering 17 as 19, 28 as 27, 29 as 28, 30 as 31, 39 as 41. Bound with Caspar 48.

Caspar 49.



Außzug auß der Vralten

MesseKunst Archimedis

Vnd deroselben newlich in Latein außgangener Ergentzung / betreffend

Rechnung der Cörperlichen Figuren / holen Gefessen vnd Weinfässer / sonderlich deß Oesterreichischen / so vnder allen anderen den artigisten Schick hat.

Erklärung vnnd bestättigung der

Oesterreichischen WeinvisierRuthen / vnd deroselben sonderbaren gantz leichten vnd behenden Gebrauchs an den Landfässern: Erweitterung dessen auff die außländische / so auch auff das Geschütz vnnd Kugeln.

Sampt einem sehr nutzlichen

Anhang

Von vergleichung deß Landtgebräuchigen Gewichts / Elen / Klaffter / Schuch / Wein- vnd TraidMaaß / vnder einander / vnd mit andern außländischen / auch Alt Römischen.

Allen vnnd jeden Obrigkeiten / Beampteten / KriegsObristen / Handelsleuten / Büren- Müntz- Baw- vnd RechenMeistern / WeinVisierern / Haußwürthen / vnd meniglichen in vnd ausser Lands / fast dienstlich: sonderlich aber dem Kunst- vnnd Antiquitetliebenden Lesern annämlich.

Gestelt durch

Johann Kepplern / der Röm. Kays. Mt. vnd Dero getrewer Löbl. Landschafft deß Ertzhörtzogthumbs Oesterreich Ob der Enß Mathematicum.

Prov. XVI.

Rechte Waag vnd Gewicht ist vom Herren / vnd alle pfunde im Sack sind seine Wercke.

Vom Authore verlegt / vnnd gedruckt zu Lintz durch Hansen Blancken.

ANNO

M. DC. XVI.

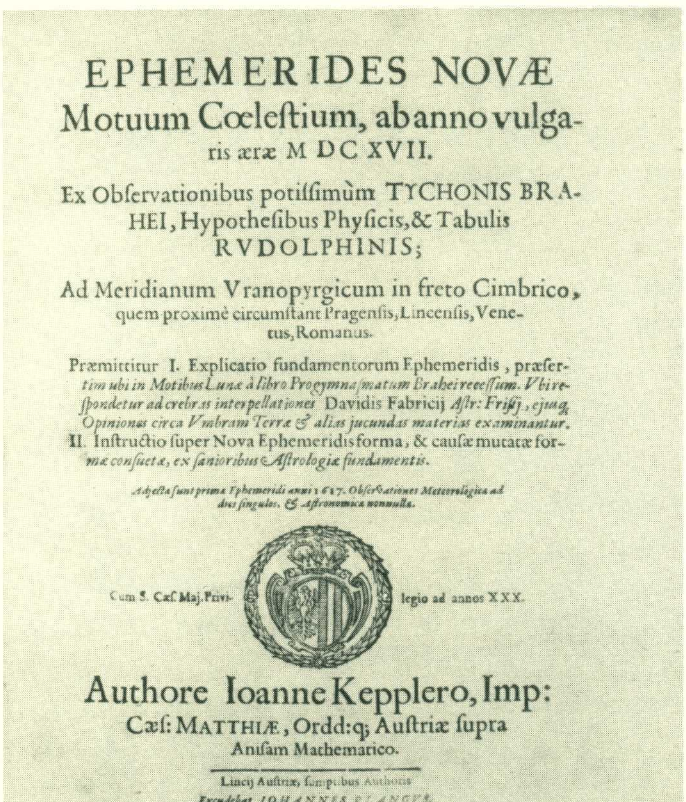
Mit Kays. Freyheit auff XV. Jahr nicht nachzudrucken.

*K*epler had acquired Brahe's recorded observations, a wealth of data on planetary positions, by agreeing to publish them. Meanwhile they could be used for many purposes. One was to produce ephemerides based on astronomical theory and observation and that also treated meteorological and astrological problems. Ultimately these ephemerides covered the years 1617–1636.

Ephemerides novæ motuum cœlestium. Lincij Austriæ, sumptibus authoris, excudebat Iohannes Plancvs [M DC XVII]–M DC XXX.

[3 pts. in 1 v.] 4°: a^6, b–f^4 A–Q^4; r^4 R–$3B^4$ $3b^4$ 3C–$4L^4$ [$3 (+a4, 3B4, –C3, F2, H2–3, I3, M2–3, P3, Q3, r1, S3, 2A3, 3b1, 3S3) signed, missigning d2 as dƷ, M as L, T3 as 3T3, 2D2–3 as 3D2–3, 2O3 as 2O2, 3C3 as C3, 4K3 as 4K2]; 354 leaves, pp. [12], [1] 2–19 [20] 21–39 [2] 40–45 [=45] [misnumbering 18 as 21, 23 as 17], 121 unnumbered pages; 264 unnumbered pages; 264 unnumbered pages.

Caspar 52, 84/1–2.


EPHEMERIDES NOVÆ
Motuum Cœleſtium, ab anno vulgaris æræ M DC XVII.
Ex Obſervationibus potiſſimùm TYCHONIS BRAHEI, Hypotheſibus Phyſicis, & Tabulis RVDOLPHINIS;
Ad Meridianum Vranopyrgicum in freto Cimbrico, quem proximè circumſtant Pragenſis, Lincenſis, Venetus, Romanus.
Præmittitur I. Explicatio fundamentorum Ephemeridis, præſertim ubi in Motibus Lunæ à libro Progymnaſmatum Brahei receſſum. Ubi reſpondetur ad crebras interpellationes Davidis Fabricij Aſtr: Friſij, ejusq; Opiniones circa Umbram Terræ & alias jucundas materias examinantur.
II. Inſtructio ſuper Nova Ephemeridis forma, & cauſæ mutatæ formæ conſuetæ, ex ſanioribus Aſtrologiæ fundamentis.
Adjecta ſunt prima Ephemeridi anni 1617. Obſervationes Meteorologicæ ad dies ſingulos, & Aſtronomica nonnulla.
Cum S. Cæſ. Maj. Privilegio ad annos XXX.
Authore Ioanne Kepplero, Imp: Cæſ: MATTHIÆ, Ordd: q; Auſtriæ ſupra Aniſam Mathematico.
Lincij Auſtriæ, ſumptibus Authoris
Excudebat IOHANNES PLANCVS

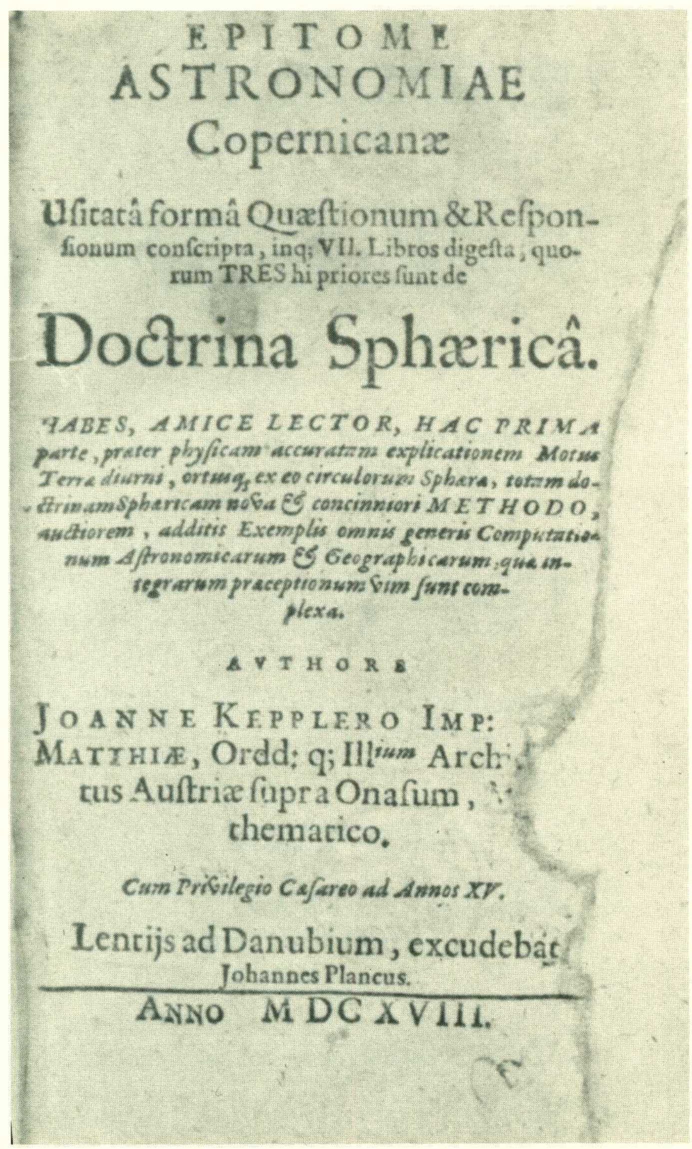
*I*n 1618 Kepler published the first volume of the *Epitome*, a school textbook on the heliocentric theory. A second volume was published in 1620 and a third in 1621.

Epitome astronomiae Copernicanæ usitatâ formâ quæstionum & responsionum conscripta, inq; VII. libros digesta, quorum tres hi priores sunt de doctrina sphæricâ. Lentijs ad Danubium, excudebat Johannes Plancus, anno M DC XVIII–M DC XXII.

[Libri I–III]. 8°: $*^6$ $**^4$ $***^4$, A–$2B^8$ $2C^{6(-6)}$ [$5 (–A4, C3, D2, L5, 2B3, 2C5) signed, missigning D3 as D4, F4 as E4, 2C3 as 2C2, P5 as O5]; 220 leaves, pp. [28], [1]2–140 [141] 142–400 409–417 [=409] [1], misnumbering 8 as 6, 261 as 263, 272 as 872, 401–409 as 409–417, last page blank. Last leaf blank and missing. Caspar 55.

[Lib. IV, M DC XXII]. 8°: $††^8$, 3A–$3M^8$ [$5 (–3A3) signed]; 104 leaves, pp. [2], 419–622 [623] [1], last page blank. Caspar 69.

[Lib. V–VII]. Francofvrti, sumptibus Godefridi Tampachij, M DC XXI]. 8° $†^6$, 4A–$4S^8$ $4T^2$ $4V^8$ [$5 signed]; 160 leaves, pp. [12] 641–932 [16], misnumbering 769–784 as 767–774, 745, 776–777, 776–780; 848 as 846, 891 as 491, 895 as 595. Fold. plate [1]: opposite $4M2^v$ (p. 820). Caspar 66.


EPITOME
ASTRONOMIAE
Copernicanæ
Uſitatâ formâ Quæſtionum & Reſponſionum conſcripta, inq; VII. Libros digeſta, quorum TRES hi priores ſunt de
Doctrina Sphæricâ.
HABES, AMICE LECTOR, HAC PRIMA parte, præter phyſicam accuratam explicationem Motus Terræ diurni, ortusq; ex eo circulorum Sphæræ, totam doctrinam Sphæricam nova & concinniori METHODO, auctiorem, additis Exemplis omnis generis Computationum Aſtronomicarum & Geographicarum, quæ integrarum præceptionum vim ſunt complexa.
AVTHORE
JOANNE KEPPLERO IMP: MATTHIÆ, Ordd: q; Ill^ium Arch[...] tus Auſtriæ ſupra Onaſum, [...]thematico.
Cum Privilegio Cæſareo ad Annos XV.
Lentijs ad Danubium, excudebat Johannes Plancus.
ANNO M DC XVIII.

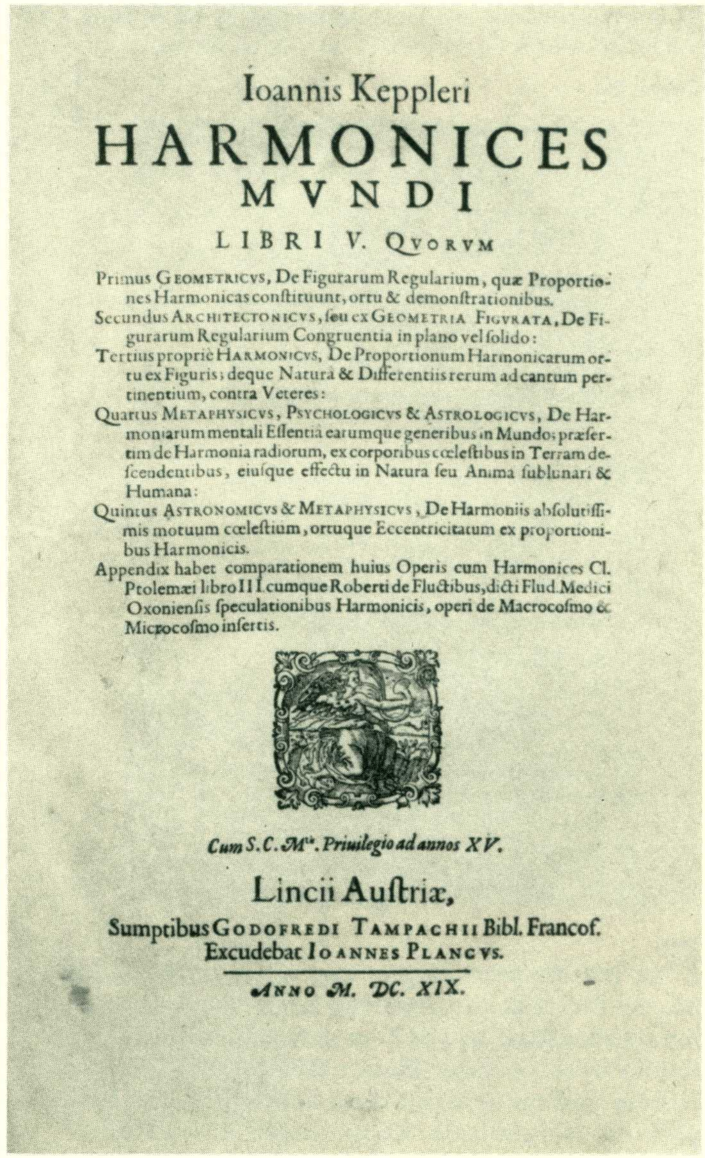
In the *Prodromus* of 1594 Kepler had envisaged the development of a general theory of the harmonious universe that would consist of the plans by which it was constructed. Throughout two decades of work in astronomy, astrology, meteorology, and cosmology, the pursuit of the Divine Architect's plans had been a central thread in Kepler's work. Now he wrote his last great work on *The Harmony of the Universe.*

Kepler had drawn back somewhat from his earlier hope of providing a general theory of the entire physical Universe, restricting himself principally to two areas that had been parts of mathematics since Antiquity: music and astronomy. He offered a general geometric theory of music from which the lengths of strings producing harmonious ratios could be derived. He added to the three astronomical postulates of the *Prodromus* and the *Astronomia nova* a fourth, the "Harmonic Law," that relates the periods of the planets to their mean distances from the Sun. And he found that the mathematical characteristics of the planets' motions produced musically harmonic ratios.

Ioannis Keppleri Harmonices mvndi Libri V. Lincii Austriæ sumptibus Godofredi Tampachii Bibl. Francof., excudebat Ioannes Plancvs, anno M DC XIX.

2°: $\star^4$, A^4 b–h^4 A–$2I^4$ [$3 (–⋆3, A1, ^{2}A1, O1, Z1, 2D3, 2F2) signed]; 164 leaves, pp. [8], [1] 2–52 55–66 [=64], ^{2}[1] 2–103 [104], [105] 106–176 [177] 178–248 [249] 250–255 [=255] [1], misnumbering 41 as 43, 53–64 as 55–66; ^{2}50 as 47, 112 as 108, 150 as 149, 200 as 100, 212 as 213, 228–229 as 225–226, 236 as 225, 237 as 231, ⋆1^v, $N4^v$, $2I4^v$ blank. Plates [5], [1]–[4] opposite $g2^v$ (p. 52), [5] opposite $2A1^v$ (p. 186).

Caspar 58/1.



Ioannis Keppleri
HARMONICES
MVNDI
LIBRI V. QVORVM

Primus GEOMETRICVS, De Figurarum Regularium, quæ Proportiones Harmonicas conſtituunt, ortu & demonſtrationibus.
Secundus ARCHITECTONICVS, ſeu ex GEOMETRIA FIGVRATA, De Figurarum Regularium Congruentia in plano vel ſolido:
Tertius propriè HARMONICVS, De Proportionum Harmonicarum ortu ex Figuris; deque Naturâ & Differentiis rerum ad cantum pertinentium, contra Veteres:
Quartus METAPHYSICVS, PSYCHOLOGICVS & ASTROLOGICVS, De Harmoniarum mentali Eſſentiâ earumque generibus in Mundo; præſertim de Harmonia radiorum, ex corporibus cœleſtibus in Terram deſcendentibus, eiuſque effectu in Natura ſeu Anima ſublunari & Humana:
Quintus ASTRONOMICVS & METAPHYSICVS, De Harmoniis abſolutiſſimis motuum cœleſtium, ortuque Eccentricitatum ex proportionibus Harmonicis.
Appendix habet comparationem huius Operis cum Harmonices Cl. Ptolemæi libro III. cumque Roberti de Fluctibus, dicti Flud. Medici Oxonienſis ſpeculationibus Harmonicis, operi de Macrocoſmo & Microcoſmo inſertis.

Cum S.C. Mtis. Priuilegio ad annos XV.

Lincii Auſtriæ,
Sumptibus GODOFREDI TAMPACHII Bibl. Francof.
Excudebat IOANNES PLANCVS.

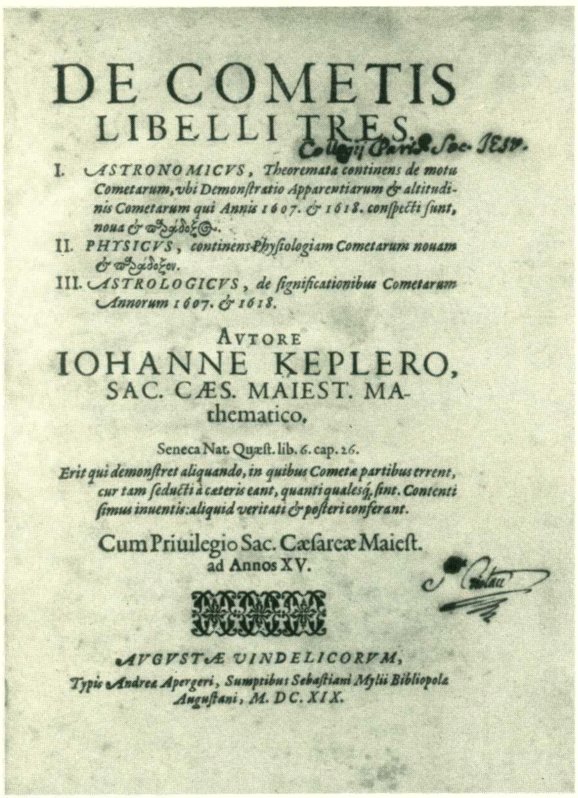
ANNO M. DC. XIX.

Kepler greatly expanded and published in 1619–1620 a Latin version of his earlier book in German on the comet of 1607. In it he treated the physical origins, the astronomical path, and the astrological meanings of the comet.

De cometis libelli tres. Avgvstæ Vindelicorvm, typis Andræ Apergeri, sumptibus Sebastiani Mylii bibliopolæ Augustani, M DC XIX.

4°: ⋆[4] A–S[4] T[4] [$3 (–N2–3, P3) signed]; 80 leaves, pp. [8], 1–98 [6] 99–110 [5] 110–138 [=139] [2], 110 repeated. Last leaf blank. Fold. plates [5]: [1]–[2] between ⋆4ᵛ and A1; [3] opposite A4ᵛ (p. 8); [4] between F2ᵛ and F3 (pp. 44–45); [5] between F4ᵛ and G1 (pp. 48–49).

Caspar 60.



DE COMETIS
LIBELLI TRES.

Collegij Paris. Soc. IESV.

I. ASTRONOMICVS, Theoremata continens de motu Cometarum, vbi Demonstratio Apparentiarum & altitudinis Cometarum qui Annis 1607. & 1618. conspecti sunt, noua & ἀπαράδοξος.

II. PHYSICVS, continens Physiologiam Cometarum nouam & παράδοξον.

III. ASTROLOGICVS, de significationibus Cometarum Annorum 1607. & 1618.

AVTORE
IOHANNE KEPLERO,
SAC. CÆS. MAIEST. MAthematico,

Seneca Nat. Quæst. lib. 6. cap. 26.

Erit qui demonstret aliquando, in quibus Cometæ partibus errent, cur tam seducti à cæteris eant, quanti qualesq; sint. Contenti simus inuentis: aliquid veritati & posteri conferant.

Cum Priuilegio Sac. Cæsareæ Maiest. ad Annos XV.

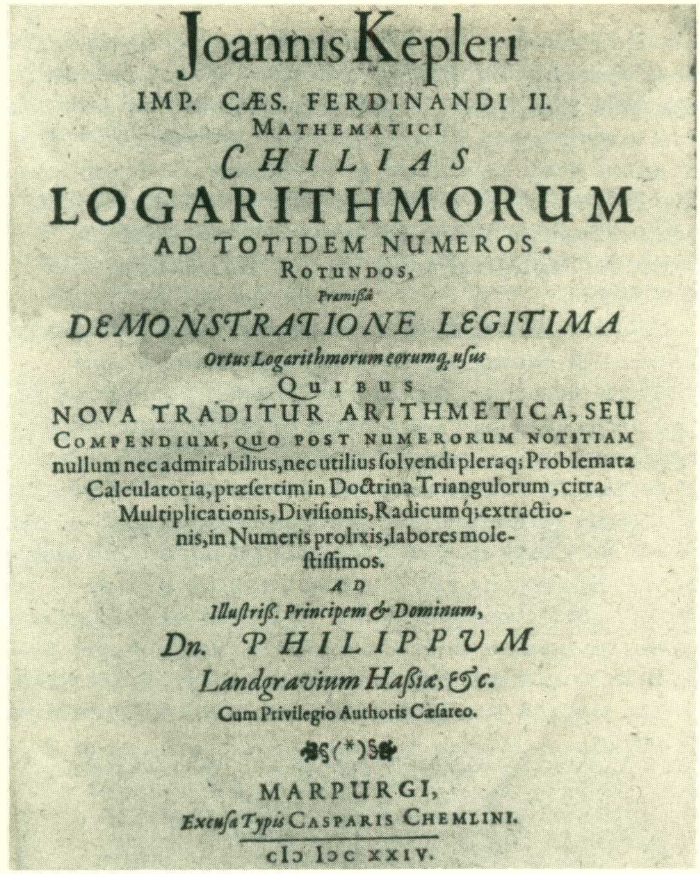
AVGVSTÆ VINDELICORVM,
Typis Andreæ Apergeri, Sumptibus Sebastiani Mylii Bibliopolæ Augustani, M. DC. XIX.

For two decades Kepler had been working, off and on, on the task of preparing Brahe's observations for publication. In 1617 he saw the recently published work of John Napier (1550–1617) on logarithms and recognized their enormous use in simplifying calculations. Kepler wrote a book that approached logarithms in a quite different way than Napier's.

Joannis Kepleri Imp. Cæs. Ferdinandi II. Mathematici Chilias. Marpurgi, excusa typis Casparis Chemlini, M DC XXIV.

4°: A–N[4] O[2] [$3 (–A2 signed]; 54 leaves, pp. [1–2] 3–55 [56] [=56] [52] Fold. plate [1] opposite A3 (p. 5).

Caspar 74.



Joannis Kepleri
IMP. CÆS. FERDINANDI II.
MATHEMATICI
CHILIAS
LOGARITHMORUM
AD TOTIDEM NUMEROS.
ROTUNDOS,
Præmissâ
DEMONSTRATIONE LEGITIMA
Ortus Logarithmorum eorumq; usus
QUIBUS
NOVA TRADITUR ARITHMETICA, SEU
COMPENDIUM, QUO POST NUMERORUM NOTITIAM
nullum nec admirabilius, nec utilius solvendi pleraq; Problemata
Calculatoria, præsertim in Doctrina Triangulorum, citra
Multiplicationis, Divisionis, Radicumq; extractionis, in Numeris prolixis, labores molestissimos.
AD
Illustriss. Principem & Dominum,
Dn. PHILIPPUM
Landgravium Hassiæ, &c.
Cum Privilegio Authoris Cæsareo.

MARPURGI,
Excusa Typis CASPARIS CHEMLINI.
cIↃ IↃC XXIV.

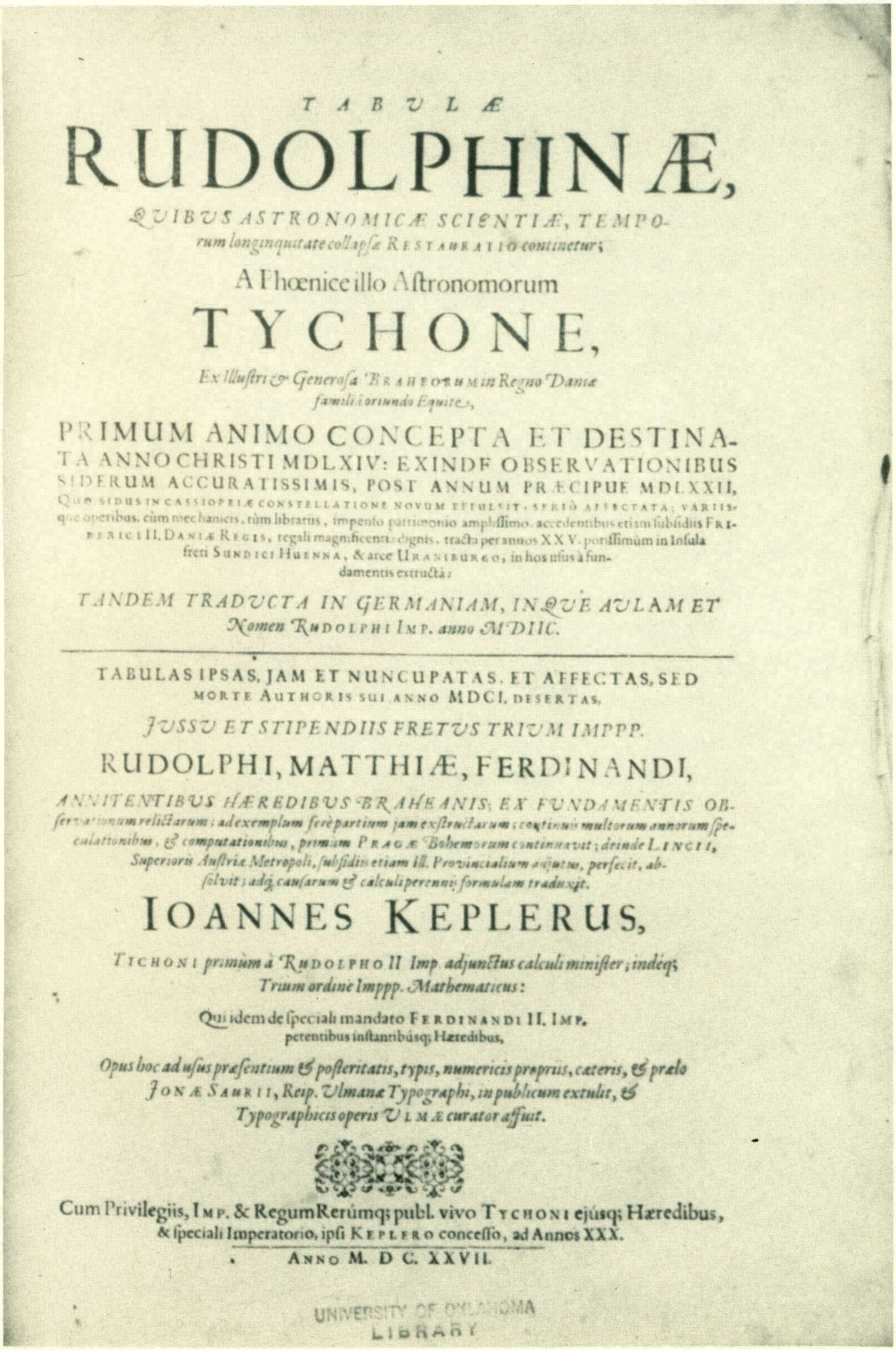
Kepler's relationship to the mass of astronomical observations recorded by Brahe is complex. His idealistic lack of interest in observations as a source of true knowledge was, from the time of publication of the *Prodromus*, tempered by the possibility that the observations would threaten his theories. Before long he found himself using the observations continuously to verify or deny the flood of ideas his mind uncovered. They gave him the essential material for Ephemerides.

Furthermore he had undertaken to see that they were arranged, the necessary computations made, and the tables published in Brahe's memory and in honor of the Emperor Rudolph. Through war and religious strife and harassment from Brahe's heirs, while working on his own researches, he bore the responsibility that the tables must be prepared and published. Finally the goal was achieved, twenty-six years after Brahe's death.

Tabvlæ Rudolphinæ, qvibvs astronomicæ scientiæ, temporum longinquitate collapsæ restauratio continetur. Vlmæ, typis Jonæ Saurii, anno M DC XXVII [–M DC XXIX].

2°:):(^{4}):():(^{4} a–q^4, A–N^4 O^8 [$ 3 (–B2, +O4–6) signed, missigning b3 as 2A3]; 132 leaves, pp. [16], 1–77 [78] 79–125 [126–127] [128], ^{2}[1] 2–119 [=119] [1], misnumbering 12 as 4, 13 as 5, ^{2}51 as 5, ^{2}119 as 115; q4^v [p. 128] and last page blank.

Caspar 79/3.


TABVLÆ

RUDOLPHINÆ,

QVIBVS ASTRONOMICÆ SCIENTIÆ, TEMPOrum longinquitate collapsæ RESTAURATIO continetur;

A Phœnice illo Astronomorum

TYCHONE,

Ex Illustri & Generosa BRAHEORUM in Regno Daniæ familia oriundo Equite,

PRIMUM ANIMO CONCEPTA ET DESTINATA ANNO CHRISTI MDLXIV: EXINDE OBSERVATIONIBUS SIDERUM ACCURATISSIMIS, POST ANNUM PRÆCIPUE MDLXXII, QUO SIDUS IN CASSIOPEIÆ CONSTELLATIONE NOVUM EFFULSIT, SERIÒ AFFECTATA; VARIISque operibus, cùm mechanicis, tùm librariis, impenso patrimonio amplissimo, accedentibus etiam subsidiis FRIDERICI II. DANIÆ REGIS, regali magnificentiâ dignis, tracta per annos XXV. potissimùm in Insula freti SUNDICI HUENNA, & arce URANIBURGO, in hos usus à fundamentis extructâ:

TANDEM TRADUCTA IN GERMANIAM, INQUE AULAM ET Nomen RUDOLPHI IMP. anno MDIIC.

TABULAS IPSAS, JAM ET NUNCUPATAS, ET AFFECTAS, SED MORTE AUTHORIS SUI ANNO MDCI. DESERTAS,

JUSSU ET STIPENDIIS FRETUS TRIUM IMPPP.

RUDOLPHI, MATTHIÆ, FERDINANDI,

ANNITENTIBUS HÆREDIBUS BRAHEANIS; EX FUNDAMENTIS OBservationum relictarum; ad exemplum ferè partium jam exstructarum; continuis multorum annorum speculationibus, & computationibus, primùm PRAGÆ Bohemorum continuavit; deinde LINCII, Superioris Austriæ Metropoli, subsidiis etiam Ill. Provincialium adjutus, perfecit, absolvit; adq; causarum & calculi perennis formulam traduxit.

IOANNES KEPLERUS,

TYCHONI primùm à RUDOLPHO II Imp. adjunctus calculi minister; indéq; Trium ordine Imppp. Mathematicus:

Qui idem de speciali mandato FERDINANDI II. IMP. petentibus instantibúsq; Hæredibus,

Opus hoc ad usus præsentium & posteritatis, typis, numericis propriis, cæteris, & prælo JONÆ SAURII, Reip. Ulmanæ Typographi, in publicum extulit, & Typographicis operis ULMÆ curator affuit.

Cum Privilegiis, IMP. & Regum Rerúmq; publ. vivo TYCHONI ejúsq; Hæredibus, & speciali Imperatorio, ipsi KEPLERO concesso, ad Annos XXX.

ANNO M. DC. XXVII.

The History of Science Collections of the University of Oklahoma Libraries is a rapidly growing teaching and research facility. In the thirty-nine years since Everette Lee DeGolyer began the DeGolyer Collection at the University of Oklahoma with a gift of 600 volumes, numerous other gifts of book collections and funds for the purchase of books have brought the History of Science Collections to 75,000 volumes. The first 40,000 volumes are described in our *Catalogue of The History of Science Collections of the University of Oklahoma Libraries*, two volumes, London, Mansell, 1976. All current holdings are listed in the *Short-title Catalog of The History of Science Collections*, published in microfiche.

The core of the Collections is the printed writings of scientists, in both monographic and periodical form, and one goal is the acquisition of every edition of every such work. However, supporting materials are being acquired as well: science textbooks and popular works on science, encyclopedias, dictionaries, bibliographical works, biographies of scientists, history of science journals, histories of science, histories of individual sciences, and histories of scientific institutions. There are also substantial collections of portraits of scientists and slides relevant to the history of science.

Housed in separate quarters in the main building of the 2.2-million-volume University of Oklahoma Libraries, the Collections offer excellent facilities for research in the history of science.

Duane H. D. Roller, Curator
Marcia M. Goodman, Librarian

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