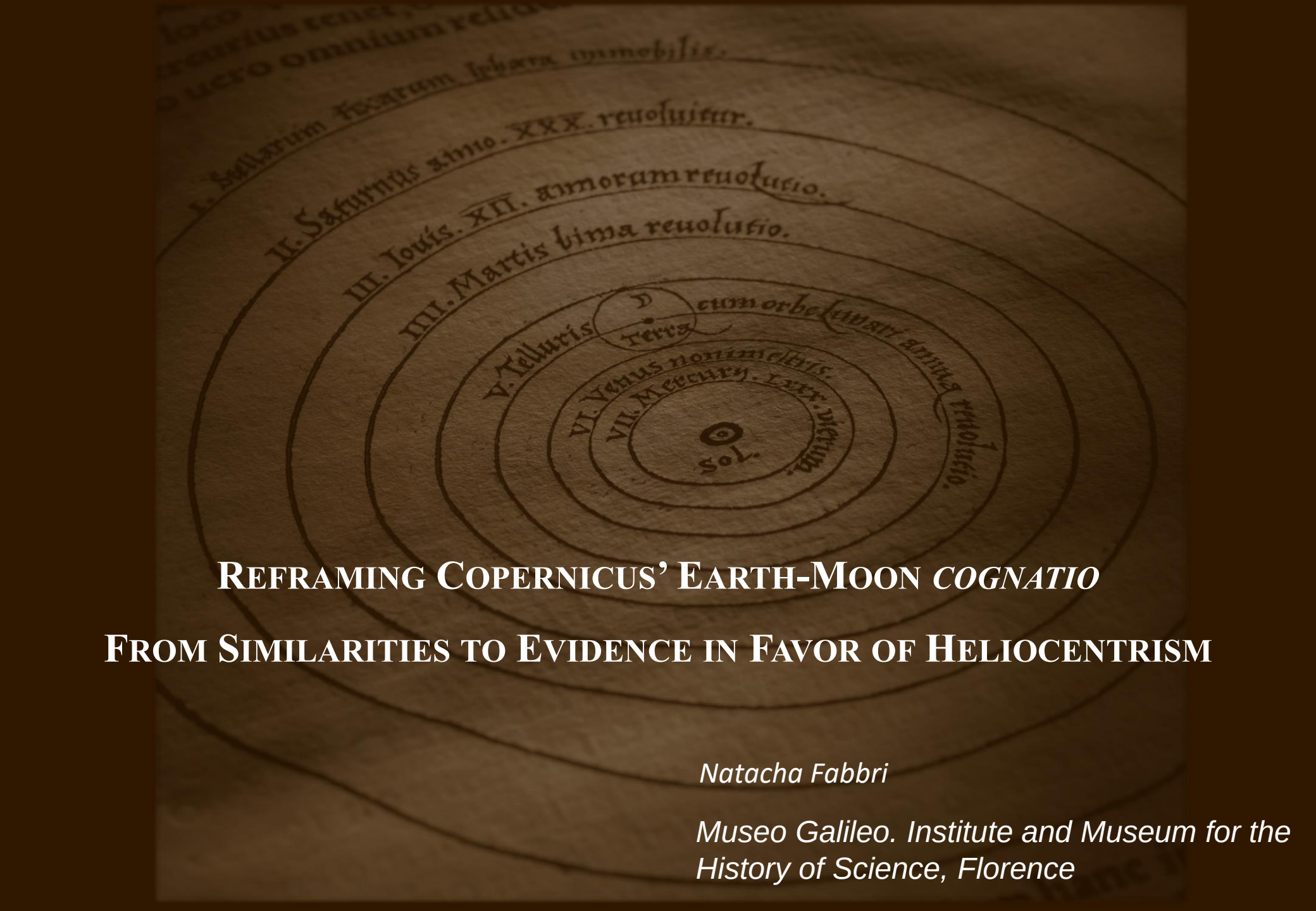


Reframing Copernicus' Earth-Moon *cognatio*

From Similarities to Evidence in Favor of Heliocentrism

Natacha Fabbri

Museo Galileo. Institute and Museum for the History of Science, Florence

CONSTELLATION

Francesco Patrizi
Giordano Bruno
(Francesco Buonamici)

Michael Mästlin
William Gilbert
Simon Stevin

Raffaello Gualterotti
Alimberto Mauri (alias Galileo)

Galileo Galilei

Johannes Kepler

[On the Earth-Moon: kinship:
Ludovico Ariosto, Leon Battista Alberti, Paolo Sarpi, Tommaso Campanella, John Wilkins]

NOVA DE VNIVERSIS PHILOSOPHIA

Libris quinquaginta comprehensa.

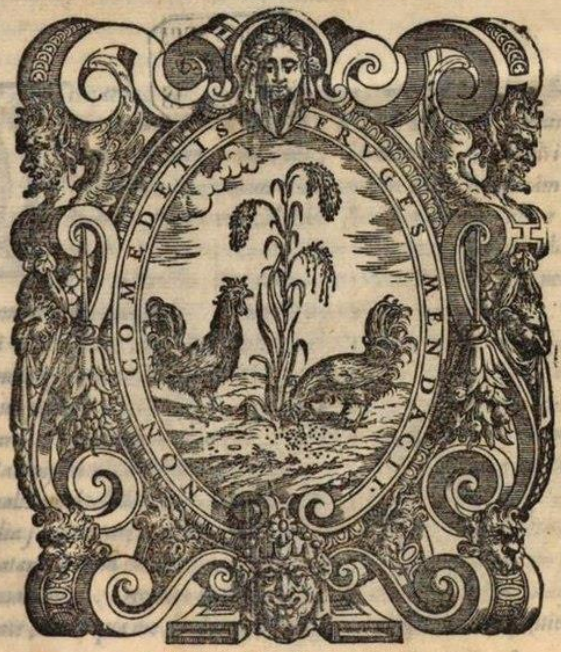
IN QVA ARISTOTELICA METHODO NON PER MOTVM, sed per lucem, & lumina ad primam causam ascenditur. Deinde noua quadam, ac peculiari methodo tota in contemplationem venit diuinitas. Postremo methodo Platonica rerum vniuersitas à conditore Deo deducitur.

AVCTORE FRANCISCO PATRITIO

Philosopho eminentissimo, & in celeberrimo Romano Gymnasio summa cum laude eandem Philosophiam publice interpretante.

QVIBVS POSTREMO SVNT ADIECTA.

Zoroastis oracula CCCXX. ex Platonicis collecta.
Hermetis Trismegisti libelli, & fragmenta, quotcunque reperiuntur, ordine scientifico disposita.
Asclepij discipuli tres libelli.
Mystica Ægyptiorum, à Platone dictata, ab Aristotele excepta, & perscripta Philosophia.
Platonicorum dialogorum nouus penitus à Francisco Patritio inuentus ordo scientificus.
Capita demum multa in quibus Plato Concors, Aristoteles vero Catholicæ fidei aduersarius ostenditur.



Venetijs, Excudebat Robertus Meiettus. 1593.

FRANCISCI Bonamici Florentini

E PRIMO LOCO PHILOSOPHIAM ordinariam in Almo Gymnasio Pisano Profitentis,

DE MOTV LIBRI X.

QVIBVS GENERALIA NATVRALIS PHILOSOPHIAE principia summo studio collecta continentur.

NECNON VNIVERSAE QVAESTIONES AD LIBROS De Physico auditu, de Cælo, de Ortu, & Interitu pertinentes explicantur.

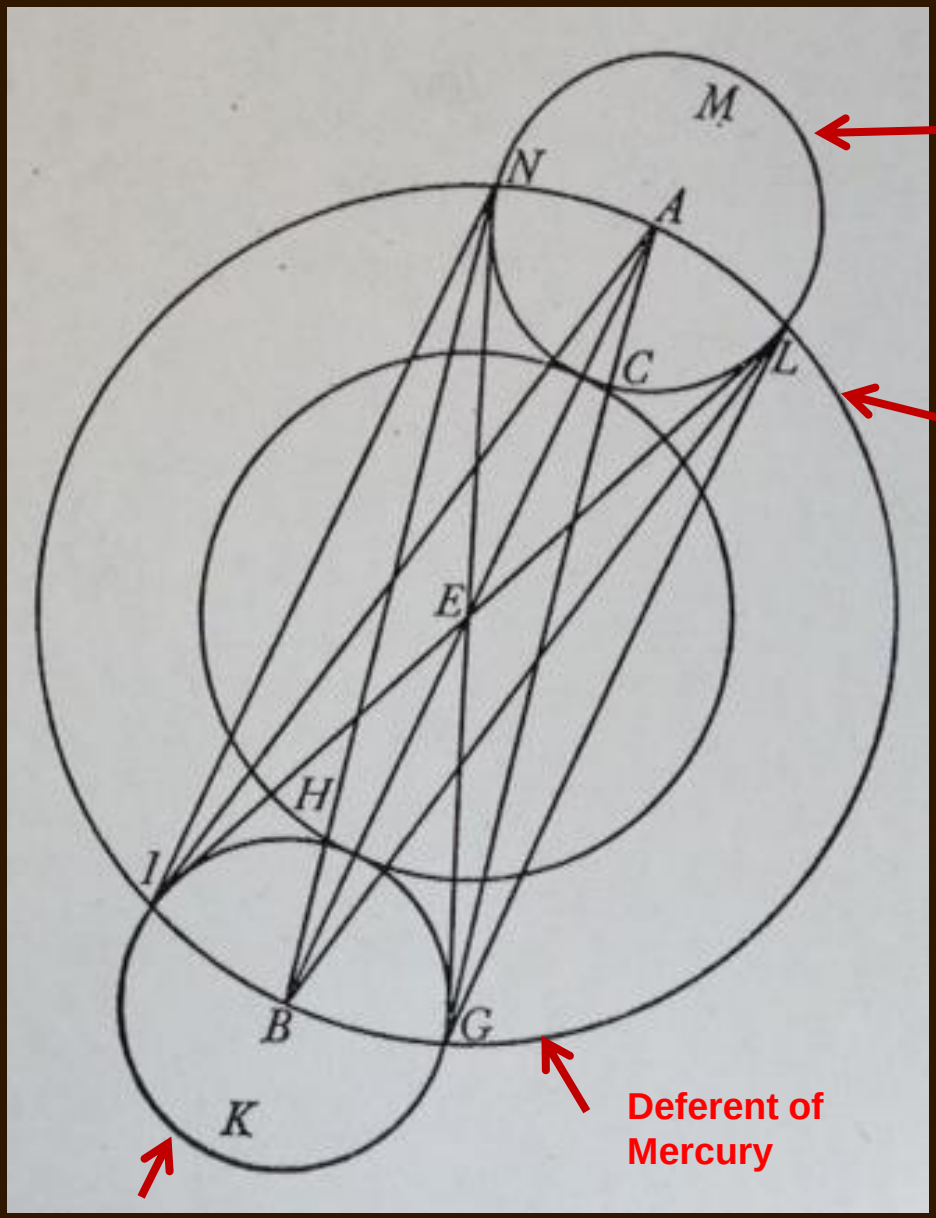
MVLTA ITEM ARISTOTELIS LOCA EXPLANANTVR, & Graecorum, Auerroïs, aliorumq; doctorum sententia ad Thesis Peripateticas diriguntur.

ACCESSIT INDEX CAPITVM, RERVMQ. MEMORABILIVM.

AD FERDINANDVM MEDICEM MAGNVM Etruriæ Ducem Serenissimum.

EX SVPERIORVM CONSENSV.

FLORENTIAE,
Apud Bartholomæum Sermartellium.
MDXCI.



Bruno, *De immenso* (1591), book III, chap. X; Bruno, *Articuli adversus mathematicos* (1588), III, 7, art. 160.

GVILIELMI GIL-
BERTI COLCESTREN-
SIS, MEDICI LONDI-
NENSIS,

DE MAGNETE, MAGNETI-
CISQVE CORPORIBVS, ET DE MAG-
no magnete tellure; Physiologia noua,
plurimis & argumentis, & experimentis demonstrata.

GVILIELMI GILBERTI
COLCESTRENSIS,
Medici Regii,

De Mundo nostro Sublunari
PHILOSOPHIA
NOVA.

Opus posthumum,

Ab Authoris fratre collectum pridem & dispositum,

NVNC

Ex duobus MSS. codicibus editum.

Ex Musæio viri perillustris

GVILIELMI BOSWELLI Equitis aurati &c.
& Oratoris apud Fœderatos Belgas Angli.

AMSTELODAMI,
Apud Ludovicum Elzevirium,
CIↃ IↃ CLI.

Collegij Dom. Soc. Jesu

EPITOME
ASTRONO-
MIÆ, QVÁ BREVI EXPLI-
CATIONE OMNIA, TAM AD
Sphæricam, quàm Theoricam eius partem pertinentia, ex ipsius scientiæ fontibus deducta, perspicuè per quæstiones traduntur:
Conscripta per

M. MICHAELEM MAESTLINVM GOEP-
pingensem, Matheseos in Academia Tubingensi Professorem.

Iam nunc ab ipso Autore diligenter recognita.

Cum Priuilegio Cæsareæ Maiestatis.

TVBINGAE

Excudebat Georgius Gruppenbachius.

ANNO 1593.

B. 5.

HYPOMNEMATA
MATHEMATICA.

Hoc est eruditus illi pulvis, in quo se exercuit

ILLVSTRISSIMVS, ILLVSTRIS-
simo & antiquissimo stemmate ortus Princeps, ac Dominus,
MAVRITIVS Princeps Auraicus, Comes Nassoviæ, Catzenelebocorum, Viandæ, Moersii, &c. Marchio Veræ, & Vlissingæ, &c. Dominus civitatis Geavæ, & ditionis Cuyc, civitatum Uyt, Daelburch, &c. Gubernator Geldriæ, Hollandiæ, Zelandiæ, Westfrisiæ, Zutphaniæ, Vlrajecti, Transisalaniæ, &c. Imperator exercitus Provinciarum fœdere consociatarum Belgii, Archiadmissus Generalis, &c.

ad SIMONE STEVINO *conscripta, & è Belgico in Latinum à* VVII. SN. *conversa.*

LVGDVNI BATAVORVM,
Ex Officinâ Ioannis Patii, Academiæ Typographi.
Anno CIↃ. IↃ. C. VIII.

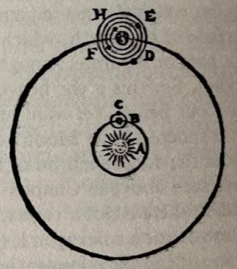
Kepler's Earth-Moon *cognatio*

- 1593 lunar Thesis
- 1597 and 1621 *Mysterium Cosmographicum*
- 1604 *Astronomia pars optica*
- 1610 *Dissertatio cum Nuncio Sidereo*
- 1609- *Somnium* and its *Notes; Appendix Selenographica* and *Notes to the Appendix*
- Latin translation of Plutarch's *De facie*

IN CAPVT DECIMVMSEXTVM
Notæ Auctoris.

(1) NEc hercle scio, quorsum magis inclinent rationes.] *At iam in lucem prolatis contemplationibus Harmonicis, decisa est hæc controuersia, lib. V. Harmon. Primum enim corporibus ipsis quinque ademptæ sunt proportiones Orbium ex parte: vltima sc. & absolutissima Orbiũ proportio communis est facta & corporibus & Harmoniis Prop. XLVIII. & XLIX. cap. IX. Quo nomine nihil ex solis corporibus in hanc vel illam partem de Luna disputari potest. Deinde si maximæ ex Solis quinque corporibus formarentur proportiones orbium; huius tamen formationis modus alius, vt in quo inscriptio orbium Physica gradus perfectionis proportionum Geometricarum æmularetur stabilitus est Prop. XLVI. XLVII. Tertio constat ex omnibus illius libri axiomatibus & propositionib. vltimam limitationem proportionis diastematum fieri necessariam, propter motus Planetarum; vt sc. inter extremos motus esse possent harmoniæ certæ. Si hoc; nulla igitur potest haberi ratio Lunæ, terram circumcursitantis, vt quæ nihil confert ad incitandum vel retardandum vllius Planetæ motum, nec curriculum suum circa Solem exercet, nec ex Sole regularis apparet eius motus. Nam ex Sole inspectus Lunæ motus videretur saltuatim incedere. Sic igitur de orbe Telluris est disputandum, ac si Lunæ cœlum nullam ei crassitiem adderet.*

(2) Concinnum quidem, vt non sit talis orbis cum Nodo.] *Hæc gemino sensu possunt accipi; primus, textui conueniens, est hic: vt sit quidem Orbis cum nodo, sed includatur Orbita Planetæ, tantæ spissitudini, vt nodus hic, seu Lunæ cœlum, lateat totum intus, nihil impediens extremæ intimæque superficiei rotunditatem absolutam. Alter sensus horum verborum; posset arripi iste: quod in genere absurdum sit Lunam circumire Terram, dum hæc interim circa Solem incedit. Vt igitur hanc etiam obiectionem diluam: dico, quod hoc tunc concinnum videri potuerit, cum nondum detecti essent Iouiales Planetæ, & cætera in cœlo noua. At ex quo illa scimus, concinnum nequaquam amplius videri debet, non esse, quod omnino est, Nodus sc. quadruplex circa Iouem, si pro Nodo corporeo spatia curriculorum intelligas, sic circa Iouem ordinatorum, vt circa Terram Lunæ curriculum ordinatum est. Nam de corporea Orbium soliditate supra satis cautum, & cauetur etiam in textu sequenti.*



* Multas conditiones globi terreni adeptam.] *Consensus in hoc multorum per omnes ætates philosophorum, qui supra vulgus sapere sunt ausi. Diogenes Laertius Anaxagoræ tribuit; libro meo, cui Titulus, Ad Vitellionem Paralipomena, capite de Luce siderum, allegaui Plutarchum de facie Lunæ. Citatur & Aristoteles ab Auerroë. Verum hoc dogma postremus Galilæus Telescopio Belgico confirmatissimum reddidit. Vide etiam dissertationem meam cum nuncio siderio Galilei.*

(3) Eadem fere proportio globi Telluris ad Orbem Lunæ.] *Certa quidem est proportio ista, sc. quæ 1. ad 59. circiter: at proportio corporis Solis ad orbem Mercurij est paulo alia; sc. non medius orbis Mercurij, sed intimus & angustissimus est assumendus; cui in Tabella capitis XV. tribuuntur gr. 14. cum Solis semidiameter ex eadem Tellure inspectus, contineat minuta 15. quare fere est proportio quæ 1. ad 56.*

(4) Moderante cursus, intellectu proportionum.] *Ita quidem tunc censebam; at postea in Comment. de Marte, ne hoc quidem intellectu in motore opus esse demonstraui. Nam etsi proportiones certæ sunt præscriptæ motibus omnibus, idque ab Intelligentia ipsa suprema & vnica, hoc est, à Deo creatore: illæ tamen proportiones motuum inde à creatione hucusque conseruantur inuariabiles, non per intellectum aliquem Motori concreatum, sed per duas res alias; prima est, æquabilissima & perennis rotatio corporis solaris, cum specie sui immateriata, in totum mundum emanante, quæ species vicem motoris præstat; altera causa, sunt libramenta & magnetica directiones corporum ipsorum mobilium immutabilia & perennia. Vt sic æque non magis sit opus creaturis istis intellectu ad tuendas motuum proportiones, atq; libræ lancibus & pondcribus mente est opus ad probẽdam proportionem ponderum. Etsi sunt alia argumenta quibus probatur, inesse in corporibus Planetarum, saltem Telluris & Solis, intellectum aliquem, non quidem ratiocinatiuum vt in homine; at tamen instinctum*

Kepler, *Mysterium Cosmographicum* (1621, 2nd edition), Notes to chap. XVI

DISCORSO

DI RAFFAEL GVALTEROTTI

Centilhuomo Fiorentino.

SOPRA L'APPARIZIONE

DE LA NVOVA STELLA.

E ſopra le tre oſcurazioni del Sole, e de la Luna nel anno 1605.

Con alquanto di lume del arte del Oro.

Dedicato al Sereniſs. Gran Duca di Toſcana

D. FERDINANDO MEDICI.

IN FIRENZE.

Nella Stamperia di COSIMO GIVNTI.

M D C V.

SCHERZI

DEGLI SPIRITI ANIMALI

Dettati con l'occaſione de l'oſcurazione de l'Anno 1605.

DA RAFFAEL GVALTEROTTI

Gentil'huomo Fiorentino.

E DEDICATI

AL SERENISS. D. FERDINANDO MEDICI

III. GRAN DVCA DI TOSCANA.

Con alcune particularità del cangiamento del vniuerſo, & alcuni cenni de la poſsibilità del arte del oro, e d'altre coſe curioſe.

CON LICENZIA DE SVPERIORI.

IN FIRENZE

Nella Stamperia di COSIMO GIVNTI.

M D C V.

CONSIDERAZIONI D'ALIMBERTO MAVRI

SOPRA ALCVNI LVOGHI DEL Diſcorſo di Lodouico delle Colombe intorno alla ſtella apparita 1604.

IN FIRENZE.

Appreſſo Gio. Antonio Canco, 1606.

Con licenza de' Superiori.

Raffaello Gualterotti, *Discourse on the appearance of the New Star* (1605)

“if it [the Earth] is around the Sun, which is placed in the center, it is in Heaven; and wherever it is and struck by the Sun it shines, as does the Moon, or more; and the Moon, and the Earth ***are of equal definition***; that is, both are a dense and black body, surrounded by the sky, when wounded by the Sun it shines, and not struck by the Sun it appears, and is black; and this is made clear through the obscuration of the Moon.”

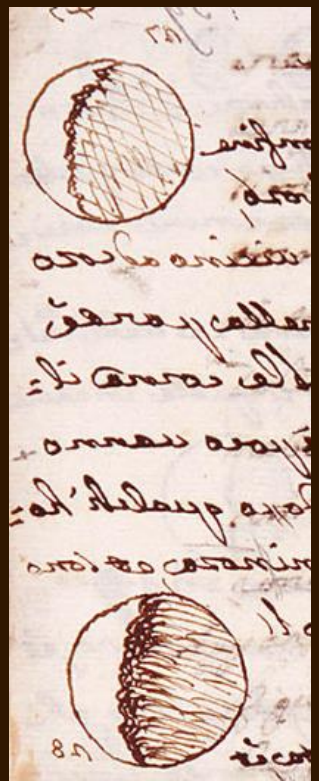
Raffaello Gualterotti, *Play of animal spirits on the occasion of the eclipse of 1605* (1605)

“The Moon is a dense and black body; and as we have said elsewhere, ***of equal definition*** with the Earth [...]. And if Aristotle does not say this, it is written in a better book than his one; since it is in the ***book of Nature***, and of God [...]. And perhaps since the Sun always illuminates the half of the Earth, the Earth reflects the rays of the Sun on the new Moon; then when the Moon approaches the first quarter, since there is no place for the Air to reflect the Sun's rays, nor for the Earth to reflect the illumination that the Sun gives it, it remains half luminous and visible, and the other black in colour, which is the air covered by the shadow of the night.”

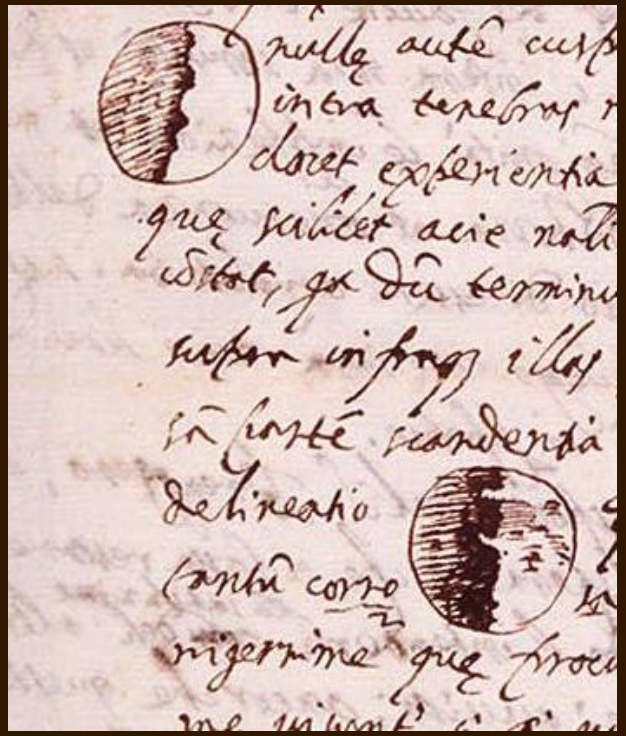
Alimberto Mauri (Galileo), *Considerations on some points of Lodovico delle Colombe's Discourse around the appeared star* (1606)

"So, as the **Perspectivists** teach, the huge curvature of mountains cannot receive and reflect the sunlight in the same manner as the Moon's even and smooth remaining part does. And to prove this, I would put forward an ***easy and fine observation*** that you can repeatedly make, when it [i.e. the Moon] is in square aspect to the Sun. It is for this reason then that it does not do the half circle, in a tidy and sharp way, but it does so always with some bump in the middle. And what reason may be offered, which could always be considered probable, if not the curvature of those mountains? Because of these, and especially in that place, it loses its perfect roundness."

Galileo to Antonio de' Medici,
7 January 1610
(Ms Gal. 53, 60r-v)



Galileo to Welser,
February 1611
(Ms Gal. 53, 40v)



Alimberto Mauri (Galileo), *Considerations on Delle Colombe's…*

"But, because each thing has its own cause, I would go to investigate it differently, and I would say that according to ***Posidonius and other ancient philosophers, as Macrobius reports,*** the Moon is so similar to the Earth that ***another Earth is named by them***, it is not improper to think that she is not all the same in the same way, but, as on the Earth, mountains of immeasurable size are still found on her, as much greater as they are perceptible to us: from them and nothing else, that little bit of mottled obscurity then arises in her".

Kepler, *Optical Part of Astronomy*, part I, chap. VI, §1

"The opinion of ***Posidonius, as reporter Macrobius***, as also proved from this evidence; **Reinhold** recalls this on fol. 164 of his commentaries upon the theories of Peuerbach. While he correctly **attributed to the Moon *the same matter* which the Earth** also comprises (which in fact appears to have been the most ancient opinion of the Pythagoreans) […]

Reinhold, *De illuminatione lunae*, in Peuerbach, *Novae Theoricae Planetarum* (1542)

"[…] ut Possidonius, et alij, qui teste Macrobio, dixerunt **luna esse terram quondam aetheream** […]"

Galileo's Earth-Moon *cognatio*

- 1606 Alimberto Mauri's *Considerations*
- 1610 *Sidereus Nuncius*
- 1610-1611 correspondence
- 1613 *Istoria e dimostrazioni intorno alle macchie solari*
- 1623 *Il Saggiatore*
- 1632 *Dialogo sopra i due massimi sistemi del mondo*
- 1640 Letter to Leopoldo de' Medici "on the ashen light"

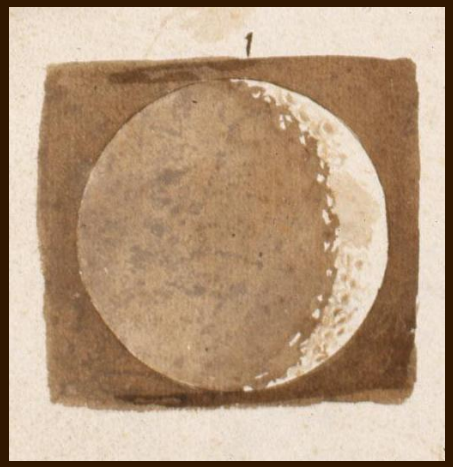
Galileo, *Dialogue on the two world systems* (1632)

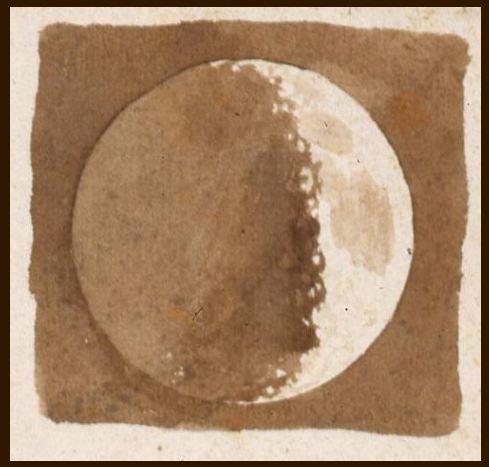
1) agreement in their shape, which is spherical
2) both are dark and opaque
3) both are dense and solid, with an uneven surface
4) both are composed of two different parts characterized by luminosity and darkness
5) both have phases
6) both reflect the sunlight and reciprocally illuminate each other
7) both can be deprived of light and eclipsed

Galileo, *Letter to Leopoldo de' Medici "on the ashen light"* (1640)

"among the phenomena that induced great philosophers and Aristotle himself, supreme among all, to grant great sympathy and correspondence between the Moon and the Earth, there was not only the similarity of shape and spotted face, such as we see in the Moon and in the Earth – caused by the seas and continents, when we could observe the illuminated face of the Earth from a dark and very distant place –, but much more the correspondence of this illumination; that it is not credible that this beautiful and noble thing remained unknown to Aristotle, such a sagacious contemplator of the effects of nature."

Waxing Moon





Waning Moon

Galileo, Ms. Gal. 48, foll. 28r and 29v