The Galileo Affair

Cardinal Robert Bellarmine
(1542–1621)

Galileo Galilei
(1564–1642)

A Modern Myth

= that educated medieval people believed the earth was flat

‘In fourteen hundred and ninety-two,

Columbus sailed the ocean blue.

He took three ships with him, too,

And called aboard his faithful crew.

Mighty, strong and brave was he

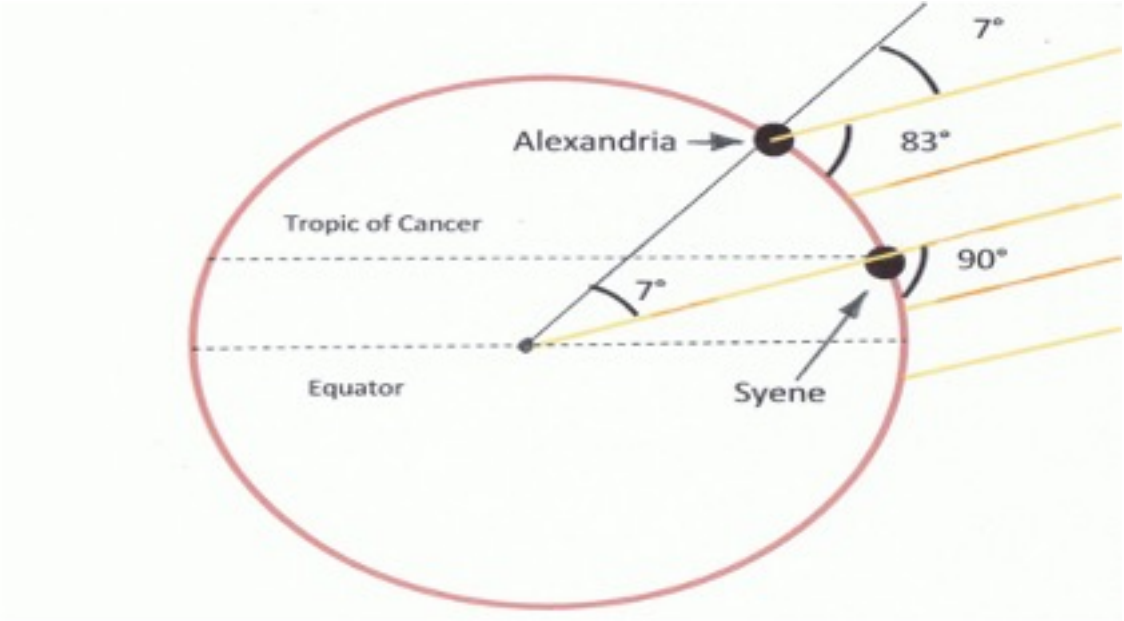
As he sailed across the open sea.

Some people still thought the world was flat!

Can you even imagine that?’

(One version of the traditional children’s poem.)

Ancient Greek Beliefs



An experiment to measure the earth's circumference was undertaken by **Eratosthenes** (*c.* 276–*c.* 194 BC):

the result was either 39,690 or 46,620 km; today's figure is 40,008 km.

The Ptolemaic Cosmos

Popular Representations

Peter Apian,
Cosmographia,
Antwerp, 1524

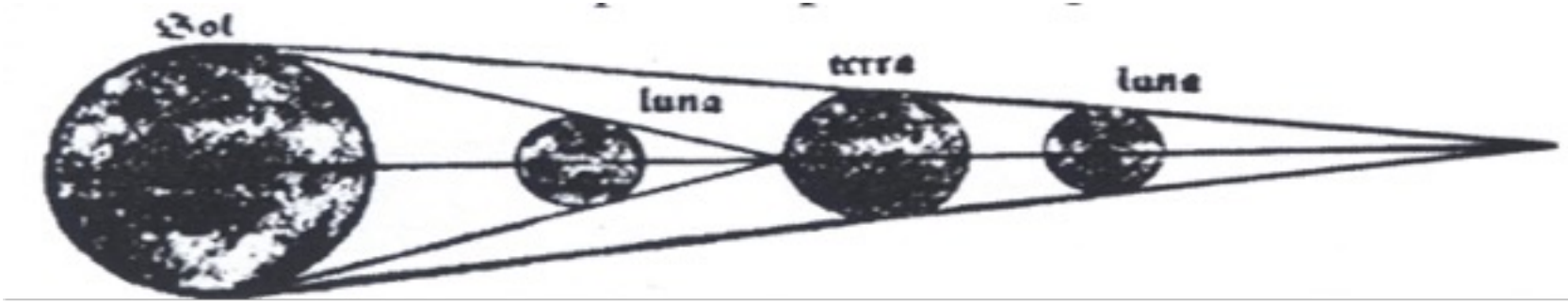
Sacrobosco's *De sphaera* (ca. 1230) – A

An annotated edition of the *Tractatus de Sphaera* (*On the Sphere*) by Ioannis de Sacro Bosco (ca. 1195–1256).

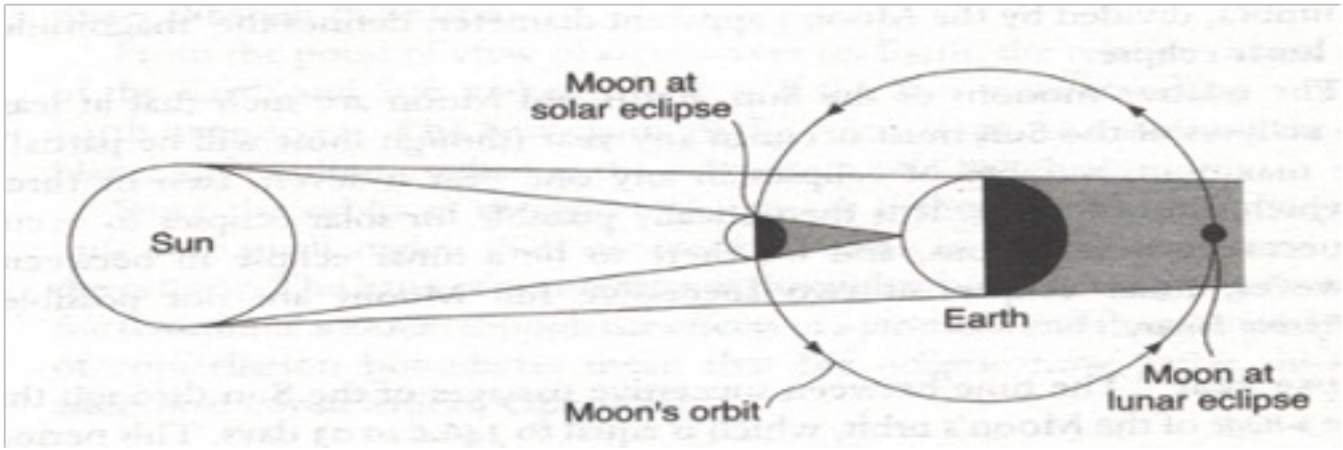
Sacrobosco's *De sphaera* (ca. 1230) – B

The frontispiece of a Portuguese translation of Sacrobosco's *Tractatus de Sphaera* in a book for navigators, published in Lisbon in 1509.

Ptolemaic Astronomy: e.g. Eclipses

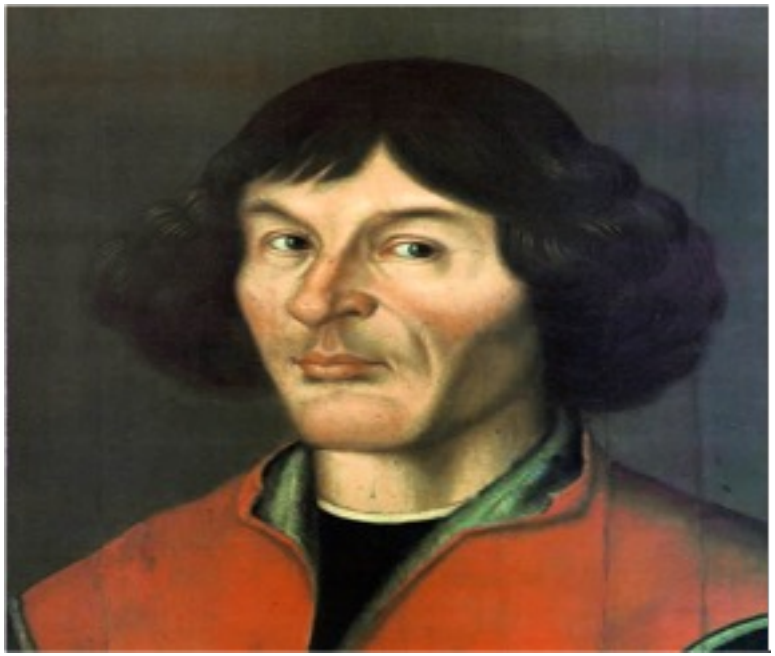


Sacrobosco's *De Sphaera* (1478 edition)



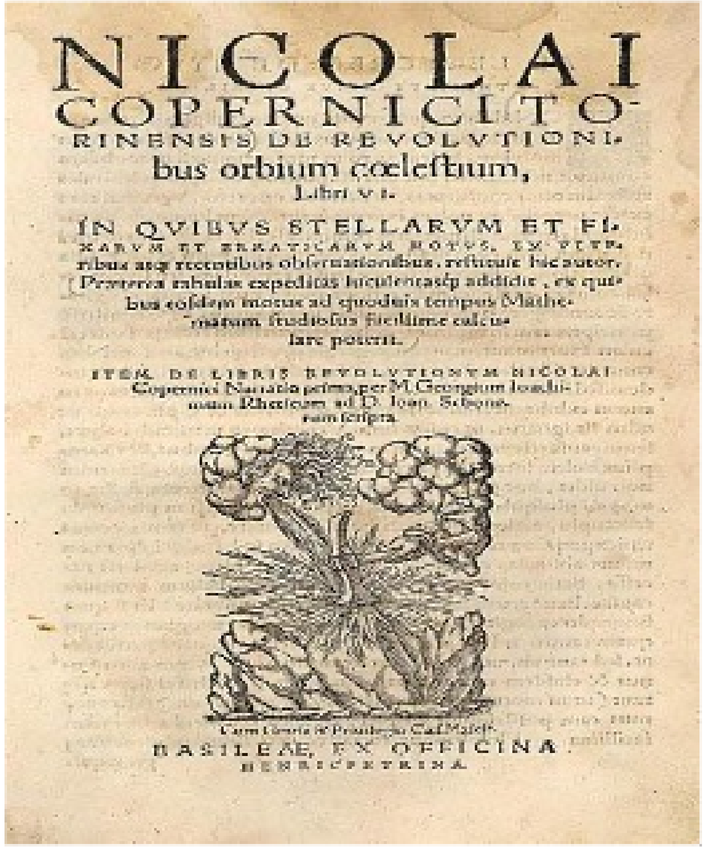
The Penguin Dictionary of Astronomy (1997)

1543: A Revolution in Astronomy



Nicolaus Copernicus (1473–1543)

De revolutionibus orbium coelestium
(*On the Revolutions of the Heavenly Spheres*)


NICOLAI COPERNICI TORINENSIS DE REVOLUTIONIBUS orbium cœlestium, Libri VI.

IN QUIBUS STELLARUM ET FIXARUM ET ERRATICARUM MOTUS, EX VETERIBUS atq; recentibus observationibus, restituit hic autor. Praeterea tabulas expeditas luculentasq; addidit, ex quibus eosdem motus ad quodvis tempus Mathematum studiosus facillime calculare poterit.

ITEM, DE LIBRIS REVOLUTIONUM NICOLAI Copernici Narratio prima, per M. Georgium Ioachimum Rheticum ad D. Ioan. Schonerum scripta.

Cum Gratia & Privilegio Caes. Maiest.

BASILEAE, EX OFFICINA HENRICPETRINA.

Galileo Galilei – A

Galileo Galilei
(1564–1642)

1564: Born in **Pisa** (Toscana / Tuscany), in Northern (N. Central) Italy.

1581–85: Studies Medicine (University of Pisa) & Mathematics (privately).

1589: Teaches Mathematics at University of **Pisa**.

1592: Professor of Mathematics at University of **Padua** (Padova), N. Italy.

1609: Builds a telescope & begins astronomical observations.

1610: Philosopher & Chief Mathematician in **Florence** (Fiorenze), at the court of **Cosimo de' Medici**, the Grand Duke of Tuscany.

Galileo Galilei – B

Galileo Galilei
(1564–1642)

1616: The consultors to the Inquisition condemn the Copernican view.

1616: Galileo is warned by **Cardinal Bellarmine** not to advocate it.

1623: **Maffeo Barberini** from Florence, an admirer of Galileo, is elected Pope; in 1624 Galileo meets with the new Pope.

1632–33: Galileo, summoned to Rome, is formally examined 'under threat of torture', and renounces Copernicanism.

1633–42: Galileo lives under house arrest at his home in **Arcetri** near Florence.

The Church's Condemnation of Copernicanism

In 1616, the Consultants of the Roman Inquisition condemned these two propositions:

(1) '**the sun is the centre of the world, and is completely devoid of local motion**', which is 'foolish and absurd in philosophy' and 'formally heretical since it explicitly contradicts in many places the sense of Holy Scripture, according to the literal meaning of the words and according to the common interpretation and understanding of the Holy Fathers and doctors of theology' and

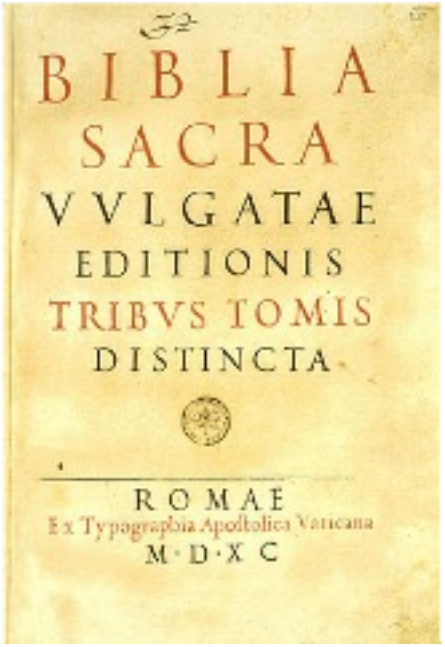
(2) '**the earth is not the centre of the world, nor motionless, but it moves as a whole and with diurnal motion**', which is 'absurd in philosophy' and 'at least erroneous in faith'.

A Dispute about Biblical Authority

Qu: What were the **theological** issues at stake in the debate between Galileo and his ecclesiastical opponents?

Ans: Two issues

1. the scope of biblical authority
2. how to deal with apparent conflicts.


BIBLIA
SACRA
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EDITIONIS
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ROMAE
Ex Typographia Apostolica Vaticana
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Issue 1: The Scope of Biblical Authority – A

Galileo suggests that the authority of Scripture is *limited* to matters directly related to salvation.

Galileo Galilei
(1564–1642)

'The authority of Holy Scripture aims chiefly [*principalmente*] at persuading men about those articles and propositions which, surpassing all human reason, could not be discovered by scientific research.'

'The authority of the Holy Writ has merely [*solamente*] the aim of persuading men of those articles and propositions which are necessary for their salvation and surpass all human reason, and so could not become credible through some other science.'

Issue 1: The Scope of Biblical Authority – B

Cardinal Bellarmine (1542–1621)

Cardinal Bellarmine holds quite a different view:

'In Scripture there are many things which of themselves do not pertain to the faith, that is, which were not written because it is necessary [for salvation] to believe them.

But it is necessary to believe them because they were written.'

Issue 2: What to do with apparent conflict – A

Galileo and **Bellarmine** agree on two principles.

Cardinal Bellarmine (1542–1621)

1. The Priority of Demonstration:

'When there is conflict between a proven truth about nature and a particular reading of Scripture, an alternative reading of Scripture must be sought.'

Galileo Galilei (1564–1642)

2. The Priority of Scripture: 'Where there is an apparent conflict between a Scripture passage and an assertion about the natural world grounded on sense or reason, the literal reading of the Scripture passage should prevail as long as the latter assertion lacks demonstration.'

Issue 2: What to do with apparent conflict – B

Cardinal Bellarmine (1542–1621)

Scientific theory lacking proof	Literal sense of scripture to be followed
Proven scientific theory	Scripture to be reinterpreted (figurative sense)

Galileo Galilei (1564–1642)

Issue 2: What to do with apparent conflict – C

The Problem: Galileo has no <u>proof</u> of the Copernican theory,

because there exists another theory that is

both

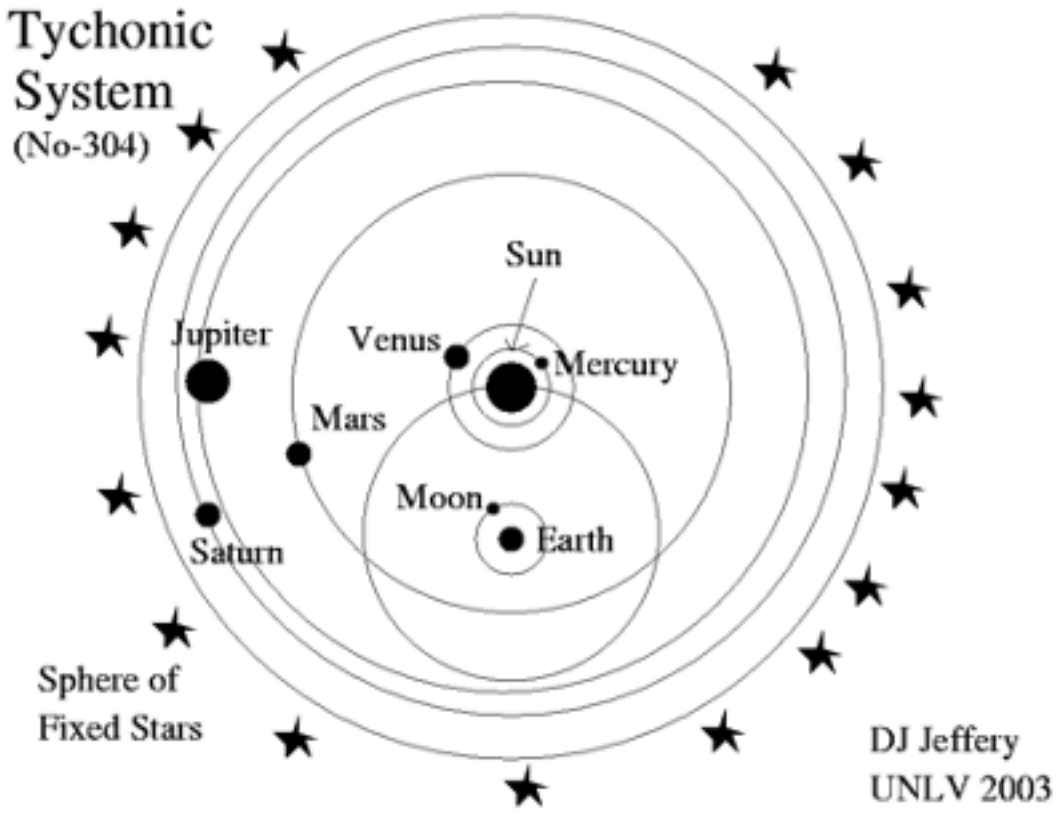
(a) consistent with the new (telescopic) evidence,

and

(b) consistent with a literal interpretation of Scripture.

Galileo Galilei
(1564–1642)

Issue 2: What to do with apparent conflict – D



Tycho Brahe
(1546–1601)

Issue 2: What to do with apparent conflict – D

So Galileo appeals to a further principle, a **Principle of Prudence**:

‘I should think it would be very prudent not to allow anyone to commit and in a way oblige scriptural passages to have to maintain the truth of any physical conclusions
whose contrary could ever be proven to us by the senses and demonstrative and necessary reasons.’

Galileo Galilei
(1564–1642)

Issue 2: What to do with apparent conflict – E

Scientific theory lacking proof	Literal sense of scripture to be followed
Proven scientific theory	Scripture to be reinterpreted (figurative sense)
Scientific theory that may one day be proven	

Galileo Galilei
(1564–1642)

Qu: Is this a Conflict between Science and Religion?

Cardinal Bellarmine (1542–1621)

Ans: *On the one hand*, **it seems not**: it looks like an argument among believers about how to interpret what they all agree is a divinely revealed text.

Galileo Galilei (1564–1642)

On the other hand, **it seems it is**, because the authority of a divinely revealed text and its associated tradition

is being used to reject a theory that promises to be the best explanation of the phenomena.

Religion and Science as Social Practices

A Social Practice is

‘a relatively coherent set of human actions, characterized by

[a] a commonly understood object, or good – i.e. a *telos* [goal]; …

[b] a … commonly accepted repertoire of means, whether instruments or skills, … understood as means to the end or the good of that practice – i.e. a *techne*; …

[c] commonly understood *norms*.’

Marx Wartofsky
(1928-1997)

(Transcendentalist) **Religion**	(Modern) **Science**
Goals = (a) the salvation of the individual (b) a society shaped by divine revelation	**Goals** = advancement of knowledge, by way of testable causal hypotheses.
Means = (a) correct living in accordance with authority (b) ritual practices	**Means** = (a) controlled experiment (b) collective criticism
Norm = Acceptance by faith of the authority of Scripture and (in the Roman Catholic case) the Church	**Norm** = Question authority e.g. *Nullius in verba* ('Take no one's word for it')