

THE TRIAL OF GALILEO REVISITED YET AGAIN



SUMMER 2024

GEORGE DE RISE

PROFESSOR EMERITUS, PHD - MATHEMATICS

FORMERLY: THOMAS NELSON COMMUNITY COLLEGE

CURRENTLY: VIRGINIA PENINSULA COMMUNITY COLLEGE

OSHER LIFELONG LEARNING INSTITUTE, THE COLLEGE OF WILLIAM & MARY

WAS THE CHURCH JUSTIFIED IN CONDEMNING GALILEO?

DID THE HOLY OFFICE ACT LEGALLY IN THE TRIAL?

THE TRIAL OF GALILEO REVISITED YET AGAIN - PART I BACKGROUND

The goal of these lectures is to give a brief but thorough account of 'the Galileo Affair': to present the basic background of events that led up to the famous trial, the trial itself, and its aftermath. We will look at the people, and the scientific, epistemological, religious, social, political and historic events and conditions that provided the environment that led up to Galileo's confrontation with the Church. Part I is 'Background'.

In Part II, the trial part, I will attempt to prove, using only the documents of that time, that Galileo should not have been convicted of heresy, and that the Church was culpable in using legally defective documents and court procedures in sentencing him.

In Part III, 'Epilogue', the shortest part, a critique of Pope John Paul II's final commission report is presented. I answer the philosopher of science Paul Feyerabend, who zealously stated that, "...the Church at the time of Galileo kept much more closely to reason than did Galileo himself..." I question some of the statements about Galileo made by the Vatican Astronomer, Guy Consolmagno (S. J.) as presented in his books and lectures.

I will also show that the Pope Urban VIII overstepped his bounds, and actually violated canonical law by a decision in the June 16, 1633 meeting.

I was trained in Mathematics and Physics and I am not a historian, but I do believe that I have presented an accurate account of 'the Galileo Affair' based on my extensive readings. Nothing here (with one or two possible exceptions) is original. This presentation is the product of the labors of scholars, many who spent a good part of their lives studying Galileo and his times. I just pieced it all together as many others have. This is a hybrid paper a PowerPoint presentation and so many facts or even opinions are so well known I felt that they needed no reference. I do hope that I did cite those statements that deserve it. Of course, any errors are certainly my own and I would encourage the experts to correct anything that is inaccurate or incorrect.

One of the goals of these lectures is to respond to the internet sites that present distorted, biased, and the dissemination of inaccurate information to the public, many by academics, modern historical revisionists, others by Christian apologists. Some sound so convincing and must be debunked. This distortion of facts and the truth is a pervasive problem today.

For the cognoscenti, the numbers in brackets in blue, e.g. [4] refer to the document number in the definitive *I Documenti Vaticani del processo di Galileo Galilei* published by the Vatican. All the translations of the twenty three documents in the concordance [p 275] (including translations from pp 230-237) are taken from *The Galileo Affair*. [Finocchiaro, p. 270] For Part II, 'The Legal Case', the heart of this paper, one should start reading on page 162. (Caveat: Word 10 occasionally boldens certain words or phrases that I did not intend. It should be clear which words or phrases I put in bold type.)

I have given lectures on 'the Galileo Affair' at these wonderful life long learning societies in Virginia.

RETRYING GALILEO AND THE CHURCH
THE COLLEGE OF WILLIAM & MARY
CHRISTOPHER WREN ASSOCIATION FOR LIFELONG LEARNING
FALL 2015. 3 LECTURES

THE TRIAL OF GALILEO-REVISITED
THE COLLEGE OF WILLIAM & MARY
OSHER LIFELONG LEARNING INSTITUTE
FALL 2018. 6 LECTURES

THE TRIAL OF GALILEO
CHRISTOPHER NEWPORT UNIVERSITY
LIFELONG LEARNING SOCIETY
FALL 2018. 5 LECTURES

THIS PAPER
LECTURE ONE: BACKGROUND
LECTURE TWO: THE LEGAL CASE
LECTURE THREE: VATICAN'S FINAL COMMISSION REPORT
and CONTRA PAUL FEYERABEND



Christopher Wren Association



5

GALILEO GALILEI: b. 1564 in Pisa, Italy.

Astronomer, Physicist, Mathematician,
Professor of Mathematics,
Universities of Pisa and Padua.

In 1610 he observed the heavens
with the newly invented telescope-
mountains and craters of the moon,
the moons of Jupiter,
many stars never seen before;
later, the **phases of Venus** and **sunspots.**

These observations supported his belief that
the Copernican (heliocentric) system was correct,
i.e. that the Sun was the center of the Universe;
the planets including earth revolved around it.

This was in direct contrast to **the Ptolemaic-Aristotelian**
(Geocentric) system which was 1500 years old at the time.



GALILEO

Galileo's Copernican view was also in conflict with the Christian interpretation of Holy Scripture.

Because of the Counter Reformation, Catholic theologians took a literal interpretation of the Bible.

Galileo was investigated by the Inquisition in 1615-1616 and warned not to defend the Copernican view.

His *Dialogue* published in 1632 supported this view.

He was charged by the Inquisition with 'vehement suspicion of heresy'.

He was forced to recant and spent the rest of his life under house arrest.

He died in 1642 still under house arrest by the Inquisition.

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Galileo And The 'Myth' That Won't Go Away - Forbes

<https://www.forbes.com/sites/johnfarrell/.../galileo-and-the-myth-that-wont-go-away/> ▼

Apr 17, 2016 - Four hundred years ago this month, **Galileo** was in Rome, trying to pick up the pieces of the Catholic Church's recent declaration that ...

The Galileo Myths - The Church and Science

www.scientus.org/Galileo-Myths.html ▼

There are many myths about Galileo. Galileo's Tower of Pisa experiment is the most popular **Galileo myth**. This page lists 18 **Galileo Myths**.

The Galileo Affair — A Durable Myth | Evolution News

<https://evolutionnews.org/2017/09/the-galileo-affair-a-durable-myth/> ▼

Sep 12, 2017 - Science writer Katherine Ellen Foley has another article on anthropogenic global warming, or AGW, in Quartz. The AGW theory states that ...

Galileo Goes to Jail and Other Myths about Science and Religion ...

<https://www.amazon.com/Galileo-Other-Myths-Science-Religion/dp/0674057414> ▼

Galileo Goes to Jail and Other **Myths** about Science and Religion [Ronald L. Numbers] on Amazon.com.

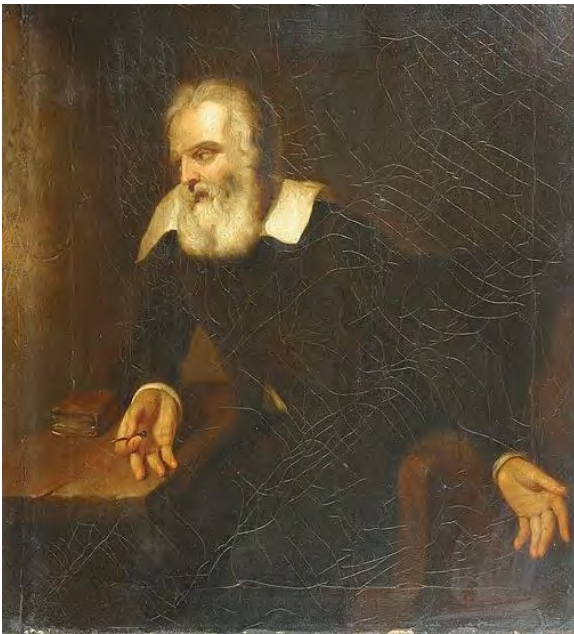
FREE shipping on qualifying offers. If we want ...

Answering the Galileo Myth | Stand to Reason

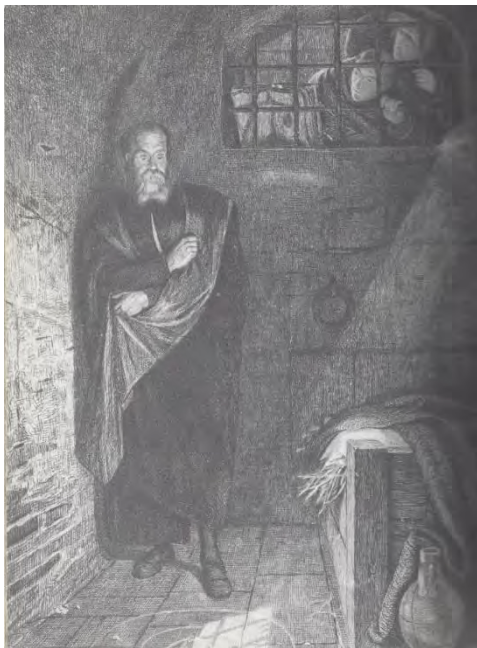
<https://www.str.org/article/answering-galileo-myth> ▼

Oct 18, 2016 - However, most historians of science regard this as a **myth**. The idea that religion is at war with science is called the conflict thesis. **Galileo's** ...

One of the goals of these lectures is to puncture the sites that present distorted, biased and wrong information. Many are by academic, modern historical revisionists, others by Christian and Catholic apologists.



BARTOLOMÉ ESTEBAN MURILLO
1643-1646



WAS GALILEO PUT IN A DUNGEON?

WAS GALILEO HELD IN CHAINS?

WAS GALILEO TORTURED?

Did Galileo say “e pur si muove” - “and yet it moves” ?

These sites usually begin by debunking many common misconceptions about Galileo.

Galileo was never put in a dungeon. They are right.
Galileo was never held in chains. They are right.

But, when ordered by the Holy Office of the Inquisition to come to Rome for questioning, he was threatened to be taken in chains and to pay the expenses!

Most scholars say that Galileo was not tortured, but he was definitely threatened with torture.

If after the trial, Galileo said aloud “and yet it moves”, he would have been recharged as a ‘relapsus’, a relapsed heretic and would be imprisoned and faced possible execution.



FAMOUS TRIALS:

THE TRIAL OF GALILEO: AN ACCOUNT
GALILEO BEFORE THE HOLY OFFICE IN 1633

<https://www.famous-trials.com/galileotrial/1014-home>

VARIOUS DEPICTIONS OF THE TRIAL



THE TRIAL OF GALILEO

Galilée: Joseph Nicholas Robert-Fleury (1847) LOUVRE

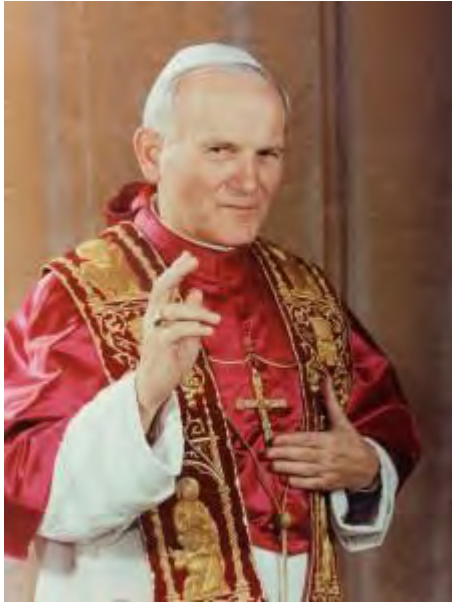


GALILEO FACING THE INQUISITION Cristiano Banti

In this excellent site 'Famous Trials: the Trial of Galileo: an Account'* three depictions of the trial of Galileo are presented. (see previous page) I believe the first is actually a painting of the Council of Trent.

The second by Robert-Fleury seems to have Galileo debating about Copernicanism. The trial in 1633 was not about the truth of the new theory. The Church already determined that. Banti's painting is the closest to reality. Galileo appeared before the Inquisitor four times. In this first deposition, the Inquisitor questioned the scientist while the Prosecutor (to his left) looked on as a notary recorded the proceeding. This was the only time the Prosecutor appeared.

* <https://www.famous-trials.com/galileotrial/1014-home>



POPE JOHN PAUL II

After 350 Years, Vatican Says Galileo Was Right: It Moves

October 31,1992

“Moving formally to rectify a wrong, Pope John Paul II acknowledged ...that the Roman Catholic Church had erred in condemning Galileo 359 years ago for asserting that the Earth revolves around the Sun. The address by the Pope before the Pontifical Academy of Sciences closed a 13-year investigation...”*

*The above was taken from the Times internet site in 2015 or 2018. The current (2023) site for this article is somewhat different.

The Pope’s original address was in November 1979 to study the Galileo case more deeply in a ...”recognition of wrongs from whatever side they come...”

The investigation *did not* last for 13 years. There were only seven plenary meetings from October 1981- November 1983.

The Commission was composed of four subgroups: exegetical, cultural, scientific-epistemological, and historical- juridical. The subgroups never had a joint meeting.

“Galileo was forced to recant his own scientific findings ... a renunciation that caused him great personal anguish but which saved him from being burned at the stake.”

“Summoned to Rome for trial by the Inquisition ... Galileo defended himself by saying that scientific research and the Christian faith were not mutually exclusive and that study of the natural world would promote understanding and interpretation of the scriptures.*”

The N.Y. Times article also stated that Galileo’s book was taken off the Index of Prohibited Books.
*These were taken from the current Times internet site.

With Galileo being charged with ‘vehement suspicion of heresy’ he technically would have to be recharged and requestioned and resented to possibly being sentenced to be burnt at the stake. Some relapsed heretics were just strangled.

The 1835 edition of the Index of Prohibited books for the first time omitted from the list- Galileo’s the *Dialogue Concerning the Two Chief World Systems (Dialogo sopra i due massimi sistemi del mondo)* with four other books, including one by Kepler and Copernicus’ masterpiece. Incidentally, the first Roman Index was printed in 1557, the twentieth and final edition appeared in 1948 and was formally abolished in 1966.

Galileo did not and could not defend himself when summoned to Rome for trial by saying that scientific research and the Christian faith were mutually compatible. His attempt to put forth the compatibility idea occurred from about 1613-1615.

For more on the Pope’s Commission, which was far from favorable to Galileo, see Part III the Epilogue. For example, THE COMMISSION DID NOT EVEN MENTION THE TRIAL!

THE GALILEO AFFAIR, or THE TRIAL OF GALILEO

Reason vs. Faith

Science vs. Religion

Galileo vs. the Church

Galileo vs. his enemies

Galileo - against the Academicians

the Dominicans, a Jesuit conspiracy theory?

Individual freedom vs. Institution authority, Progressive vs. Conservative

Science vs Social responsibility

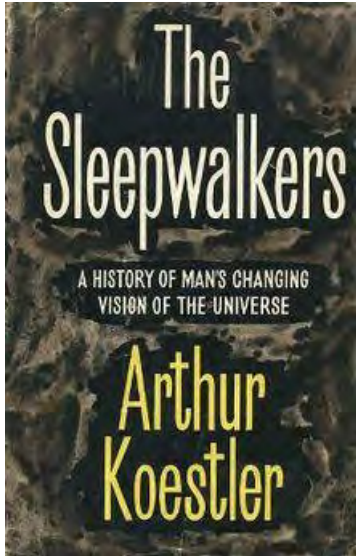
The political situation of the times

Analogies:? Oppenheimer vs. the Atomic Energy Commission.

An Italian soap opera, an academic tragedy, an Italian vendetta

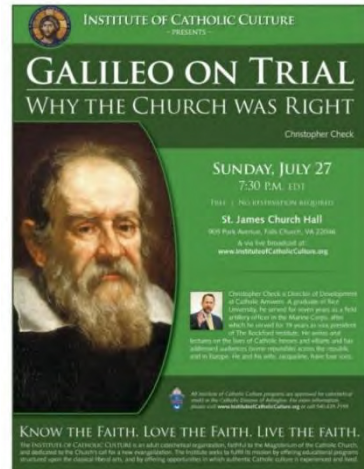
I would say, depending upon one's approach, all of these more or less explain the cause of the Galileo Affair, and I probably missed a few others. No one can construct a recipe for 'The Galileo Problem'- how much of it was science vs. religion, or the political situation of the times, or a failure to communicate, or just human frailty, or....?

However, the 'Trial of Galileo' as a legal case is a totally different situation. The Catholic Church, in particular the Holy Office was culpable in using legally defective documents and court procedures in wrongly sentencing him.



Koestler, author and journalist stressed the harmony of faith and reason that occurred in the past, but lost these days. “Among my earliest and most vivid impressions of history was the wholesale roasting alive of heretics by the Spanish inquisition... On the other hand, I find the personality of Galileo *equally unattractive*, (my italics) mainly on the grounds of his behaviour towards Kepler.” Koestler

Koestler traced the history of Western cosmology from ancient Mesopotamia to Isaac Newton. Although very well researched I found any number misrepresentations about Galileo. He wrote about forty books, fiction and nonfiction and was obviously an anti-Galileist.



I divide the anti-Galileists into two camps; the current historical revisionists and the Christian apologists; they often overlap. Some present fairly cogent arguments but usually falter in a lack of a thorough knowledge of the details of historical events and of the actual trial.

Next: a few comments from the Christian apologists.

1. "Galileo could have safely proposed heliocentricity as a method to more simply account for the planets' motions. His problem arose when he began proclaiming it as truth, though there was no conclusive proof of it at the time. The Copernican system was well regarded by church officials."
2. "Galileo would not have been in so much trouble if he had chosen to stay within the realm of science and out of the realm of theology. He insisted on moving the debate into a theological realm."
3. "Galileo was, in fact, treated with great consideration. Against all precedent, he was housed (when waiting to be tried) with a personal valet in a luxurious apartment overlooking the Vatican gardens. As for the trial itself, given the evidence and the apparent injunction of 1616, it was by the standards of 17th century Europe extremely fair."

1. This is a central question between the Church and Galileo and we will deal with it throughout this paper. They are telling him, study it as a mathematical fiction- that's OK, but don't think that that is truly the way reality is. Today it is a problem of the philosophy of science- Instrumentalism vs. Realism. I will not deal with modern philosophy here. Yes, the Copernicanism was initially well regarded by the Catholic Church as a purely mathematical hypothesis to fix the calendar, but it was not reality. Galileo, a natural philosopher thought it was reality. The problem was that the theory seemed to contradicted the Bible.

2. Only when academicians, who could not disprove Galileo's scientific theories went into the Bible to fortify their views with passages from the scriptures did Galileo delve into theological exegesis. He questioned the current view, 'Theology-the Queen of the Sciences'? *Was the Church the ultimate authority on all other intellectual fields?* It was Galileo's greatness that he had the courage to do this.

3. We will follow the whole time from October 1632 until June 1633 later to see how well the Church *really* treated him.

1. “The Holy Office issued a non-infallible disciplinary ruling concerning a scientist who was advocating a new and still-unproved theory and demanding that the Church change its understanding of Scripture to fit his.”

2. “Galileo almost certainly was not the first man to consult the heavens through a telescope. The Englishman Thomas Harriot certainly observed the moon through a telescope around 1609.”

3. “The records demonstrate that Galileo could not be tortured because of regulations laid down in Eymeric’s 1595 Manual for Inquisitors.”

4. “Genius + arrogance – humility = deadly enemies. Galileo refused to share discoveries.”

1. True- The Holy Office issued a non-infallible disciplinary ruling against him, but he did not demand the Church change its interpretation of scripture. He just wanted the Church to consider the Copernican theory. The Pope, Urban VIII certainly overstepped his bounds as we will in Part III.

2. Galileo did not invent the telescope; he wasn’t the first to look at the moon with a telescope; he wasn’t the first to discover the sunspots. But why is he remembered and others like Thomas Harriot almost totally forgotten? You must read on.

3. We will look at the Inquisition manuals later; they evolved in time, but essentially this is correct. But, one manual said a child could be tortured at age 9, another at age 14. These boundary conditions varied with the times. Eymerich’s earliest edition (?) was dated 1376; the *Sacro Arsenale* last edition was 1730.

4. Absolutely true!

“The worst that happened to the men of science was that Galileo suffered an honorable detention and a mild reproof before dying peacefully in his own bed.”

A. N. Whitehead, *Science and the Modern World*; 1929.

“The Church at the time of Galileo not only kept closer to reason as defined then and, in part, even now: it also considered the ethical and social consequences of Galileo’s views. Its indictment of Galileo was rational ... It had no special features except perhaps that Galileo was treated rather mildly, despite his lies and attempts at deception.”

Paul Feyerabend (Philosopher of Science)

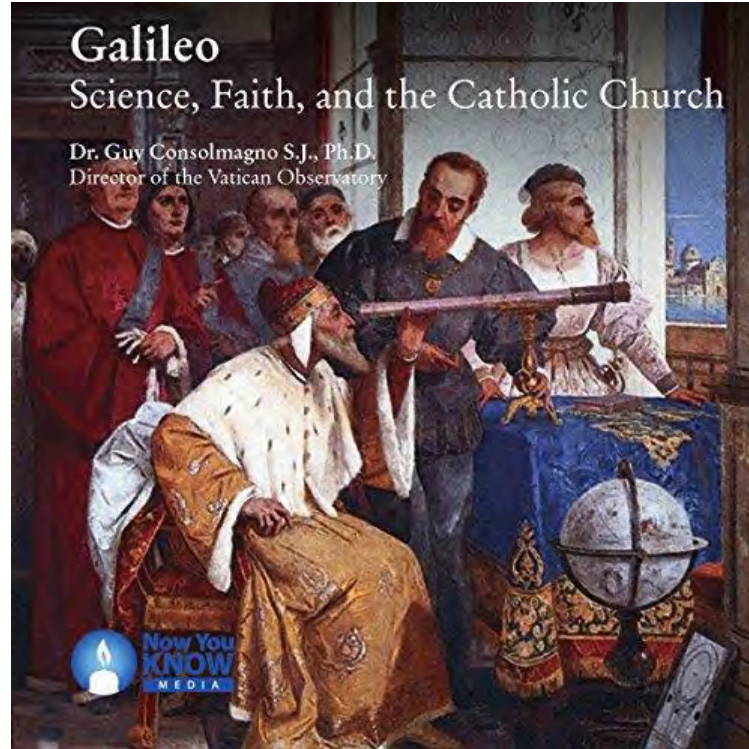
His most famous work is *Against Method*; 1975.

His philosophy of science. There are no universally valid methodological rules for scientific inquiry.

My answer to Professor Whitehead of Trinity College Cambridge. Imagine your theory of process philosophy was debunked without a fair analysis by Oxford Dons. You were called into the Oxford University chapel, read that your theory was absurd and had to kneel before the senior Dons and recant it. Then you can go home and die peacefully in your bed.

I’ll deal with the philosopher of Science, Feyerabend in the Epilogue in great detail.

CONTRA THE VATICAN ASTRONOMER
GALILEO: SCIENCE, FAITH,
AND THE CATHOLIC CHURCH
Guy Consolmagno (S.J.)



An important secondary reason for my lectures is to counteract the frankly one sided, distorted and totally biased view about Galileo based on the books and videos of the Vatican Astronomer, the Jesuit Dr. Guy Consolmagno. This will not be a review of his works but I will focus on a few crucial issues that he distorted and disseminated widely. My personal opinion, and I hope that I am wrong, but after listening to the twelve lectures at least twice, I came to the conclusion that this man hates Galileo.

SANTA MARIA SOPRA MINERVA



BASILICA DI SANTA MARIA SOPRA MINERVA, ROMA

Wednesday, June 22, 1633
at the Dominican Convent
Santa Maria Sopra Minerva

Galileo was sentenced and, on his knees, abjured before the cardinals and guests of the Holy Office of the Inquisition.

Galileo's abjuration was a private affair with about twenty attending. Usually an abjuration is public. Bernini's elephant with obelisk was placed there 34 years later. Its derriere faces the convent.

I, Galileo Galilei... seventy years old, arraigned personally for judgment, kneeling before you...

...whereas, after **having been judicially instructed with an injunction** by the Holy Office **to abandon completely the false opinion**

that the sun is the center of the world and does not move and the earth is not the center of the world and moves,

and not to hold, defend, or teach this false doctrine in any way whatever, orally or in writing; and **after having been notified that this doctrine is contrary to Holy Scripture;**

I wrote and published a book in which I treat of this already condemned doctrine...

I have been judged vehemently suspected of heresy, namely of having held and believed... [the false doctrine]

I abjure, curse, and detest the abovementioned ...

I, Galileo Galilei, have abjured as above...

I have highlighted Galileo's 'confession', which are really really the charges of the Inquisition. We must look carefully at what Galileo 'confessed' to here.

1. violating an Injunction of the Holy Office,
2. holding, defending or teaching Copernicanism and
3. writing and publishing a book defending the Copernican theory.

This document [115] was composed by the Inquisition. The charge 'vehement suspicion' of heresy' was the second worst crime; formal heresy was the worst.

POPE URBAN VIII:**“THE GREATEST SCANDAL IN CHRISTENDOM”**

He sent a letter to all ambassadors and inquisitors in Europe.
 “The Congregation of the Index had suspended Nicolaus Copernicus’ treatise... an opinion contrary to Sacred Scripture...”

TELL ALL PROFESSORS OF PHILOSOPHY AND OF MATHEMATICS
 OF GALILEO’S SENTENCE AND RECANTATION.

**UNPRECEDENTED IN THE ANNALS OF
 THE HOLY OFFICE OF THE INQUISITION!**

The letter was sent all over Europe; Vienna, Paris, Cologne, Brussels, Madrid etc. The Nuncios, (ambassadors from the city or foreign court to the Vatican) had to respond! After Galileo’s house arrest he questioned Urban’s statement (not publicly).

“Even more than Luther or Calvin?”

We will see what was on the Pope’s mind later on.

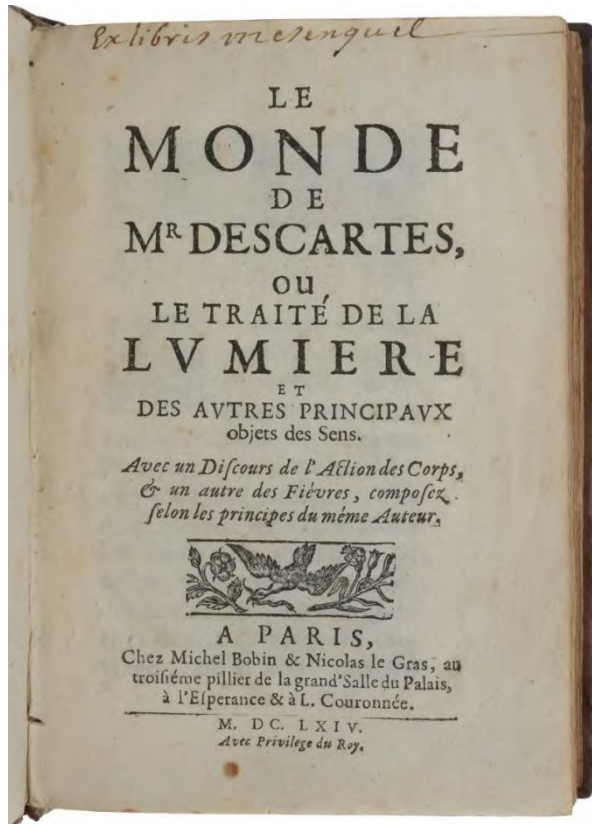
This directive of Urban will be crucial later- the making public of Galileo’s ‘sin’. There are strong arguments that this was done ‘Ex Cathedra’!

We will show in Part III that Urban violated canonical law by sending these letters throughout Europe.



URBAN VIII

BERNINI, c. 1631-1632
 about the time of his
 confrontation with Galileo.



Written: 1629 to 1633

Published: 1664

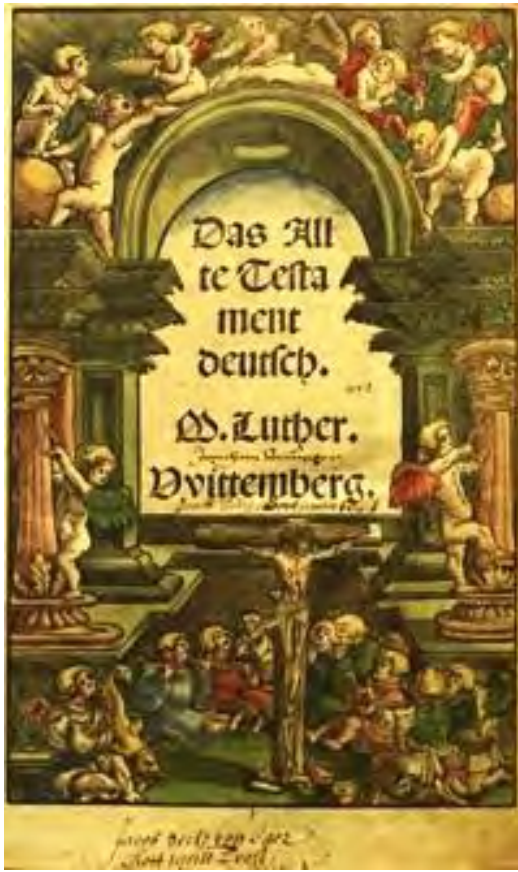


RENE DESCARTES

FRANZ HALS

Descartes read one of the letters in Holland. He held back the publication of *Le Monde (the World)* for 31 years. "...Shocked me so much that I almost decided to burn all my papers." Descartes never corresponded with Galileo and France did not even have an Index or Inquisition.

Incidentally, Descartes was the first to coin the phrase 'the Galileo Affair'.



<https://wege-zu-cranach.de/cranach-magazin/beitrag/article/lucas-cranach-und-die-anfaenge-von-copyright-und-urheberschutz-416.html>

WORKSHOP OF LUCAS CRANACH THE ELDER



MARTIN LUTHER

LUCAS CRANACH THE ELDER

95 THESES - 1517 CHURCH WITTENBERG

DIE BIBEL (1522, 1534) EXCOMMUNICATED 1521.

Luther was Professor of Moral Theology at the University of Wittenberg. In 1517 he attached the 95 Theses to a wall of the Church of Wittenberg. This document listed propositions for debate concerned with the question of indulgences (the atonement of sins through monetary payment). This event came to be considered the beginning of the Protestant Reformation. He put forth two central beliefs - that the Bible is the central religious authority and that people may reach salvation only by their faith and not by their deeds.



LUTHER

The fool wants to turn the whole art of astronomy upside-down. However, as Holy Scripture tells us, so did Joshua bid the sun to stand still and not the earth.



COPERNICUS

Mathemata mathematicis scribuntur
Mathematics is written for mathematicians

MARTIN LUTHER
NINETY-FIVE THESES (1517)

Pope Leo X excommunicated Luther on January 3, 1521.

THE DIET OF WORMS, MAY 1521

(Diet-a formal deliberative assembly of the Holy Roman Empire called by the emperor.) Luther was summoned in order to renounce or reaffirm his views in response to a Papal bull of Leo X. He refused to recant them.

THE EDICT OF WORMS, 1521

Emperor Charles V passed the Edict of Worms, which banned Luther's writings and declared him a heretic and an enemy of the state.

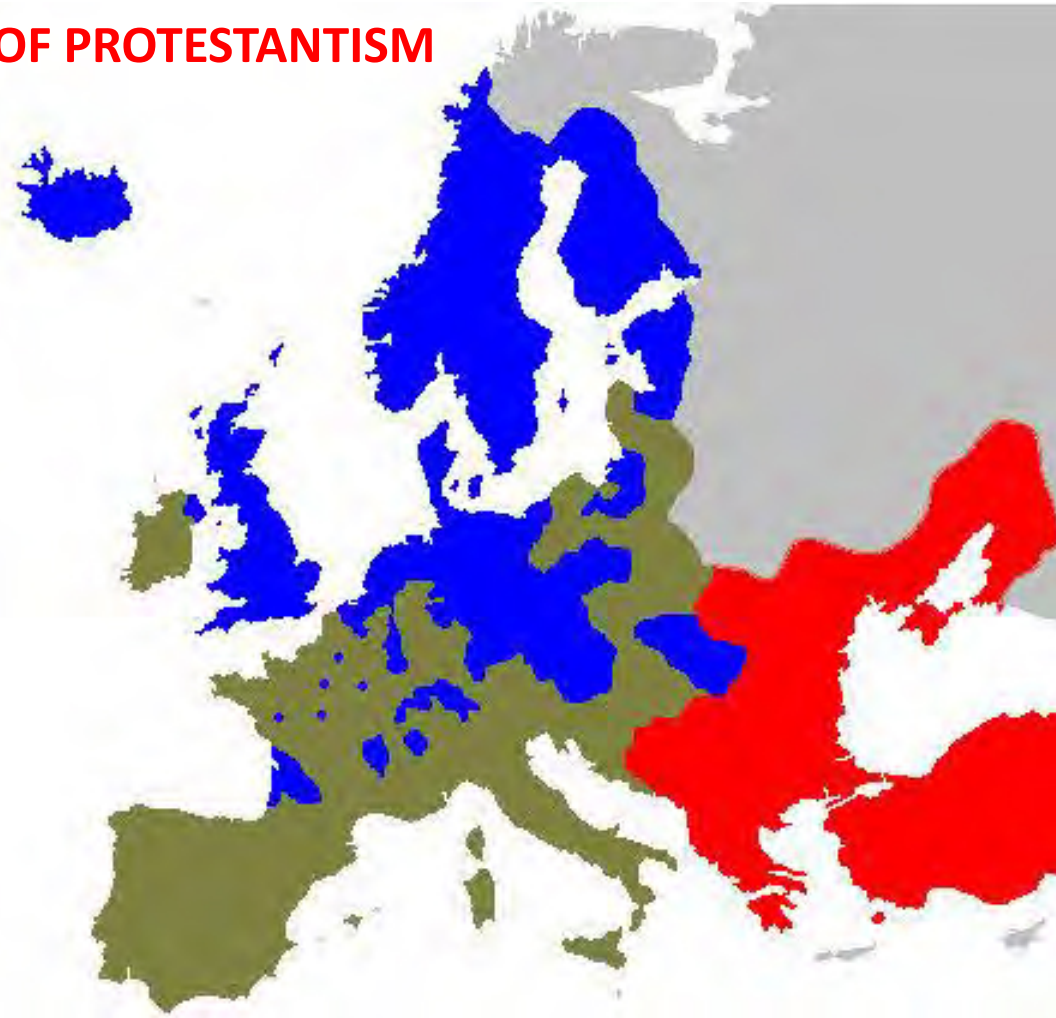
Critics of Galileo compare him to Luther: Luther's boldness in standing up to the Pope and the whole Church to Galileo on his knees abjuring. The difference? Germany vs. Italy. Some powerful princes of Germany were willing to protect Luther. Compare that to the young weak Duke of Tuscany (23 years old at the time of Galileo's trial in 1633) and the Church friends of Galileo who succumbed to the power of the Pope.



MARTIN LUTHER AS 'JUNKER JÖRG'
Lucas Cranach the Elder c.1521

https://lucascranach.org/en/DE_KSW_G9

SPREAD OF PROTESTANTISM



In the 16th century, Lutheranism spread from Germany into Denmark, Norway, Sweden, Finland, Latvia, Estonia, and Iceland. Calvinist churches spread in Germany, Hungary, the Netherlands, Scotland, Switzerland and France. In 1534 Henry pushed through the Act of Supremacy which made him Supreme Head of the Church of England.



World map, Brescia, 1483 ca.

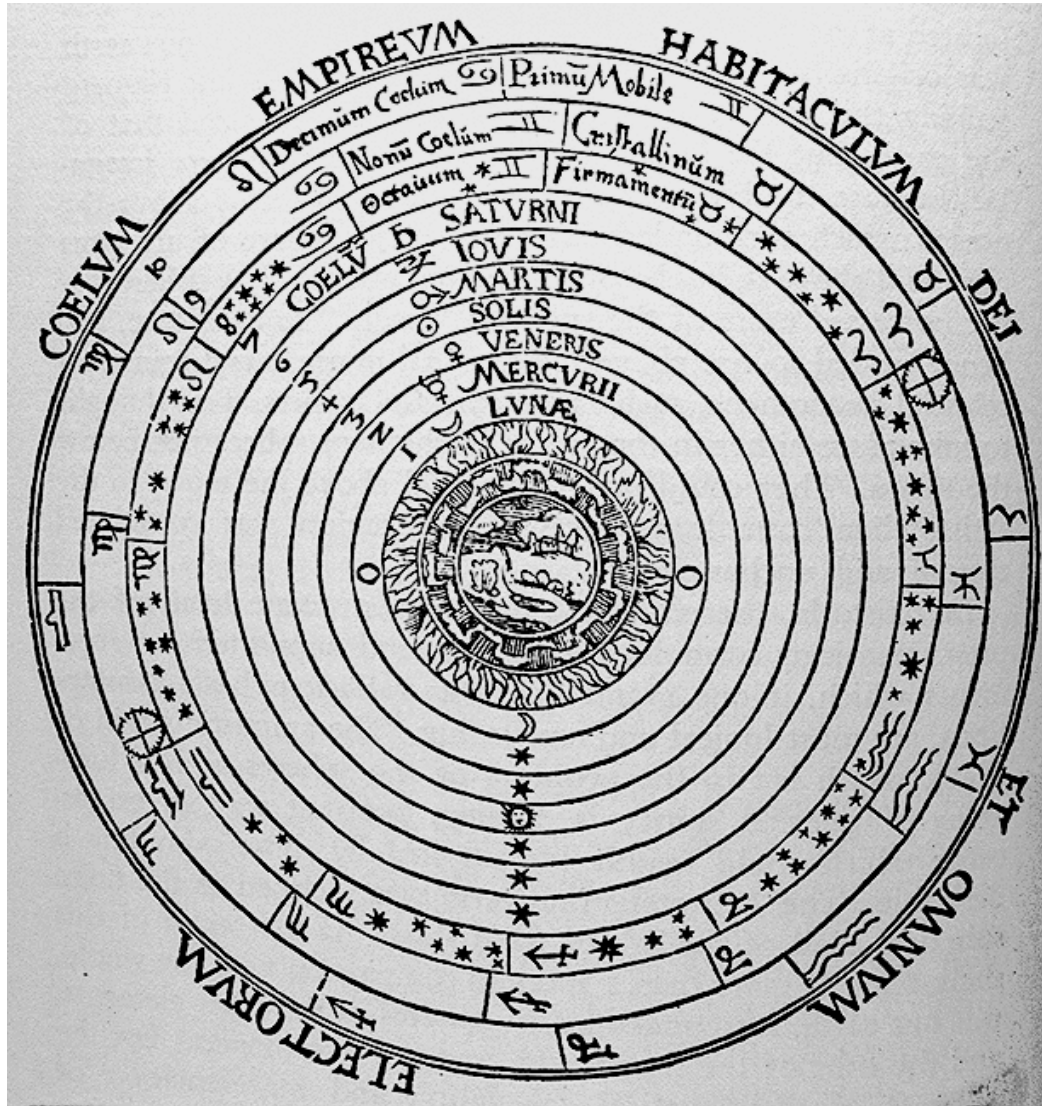
<https://mapsinchoate.tumblr.com/post/106582672946/map-of-the-world-printed-in-1483-in-brescia>



World map, Amsterdam 1570

<https://www.theworldofmaps.com/digital-vector-maps/world-vector-maps/digital-world-map-year-1570-abraham-ortelius>

Left: The ‘Mappa Mundi’. The map showing the parallel zones of climate. We see a central uninhabited hot equatorial zone (perusta) flanked by two inhabited temperate regions; above and below these are the cold uninhabited zones in the polar areas. We will revisit this map later- it has religious implications! Less than 100 years later- how the world has changed!



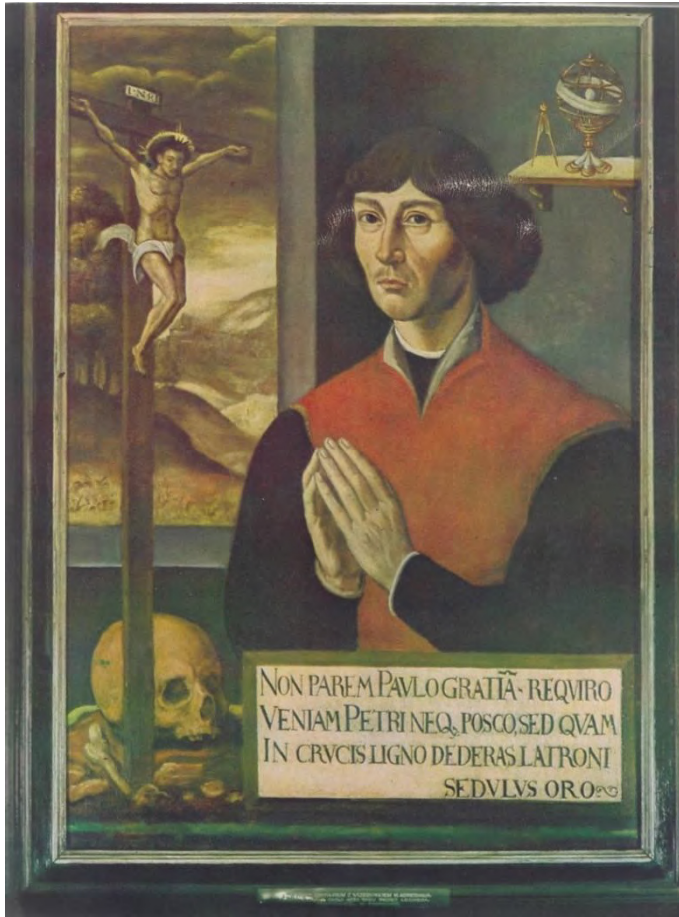
PETER APIAN'S COSMOGRAPHIA (ANTWERP 1539)

Apian's books were very popular in his time with many editions being published until 1609.

Latin: 'empyrean'- heaven,* the abode of God and the saints.

At the center was the Earth. The sublunary sphere was comprised of the four elements (earth, water, fire, and air). Next followed the 7 spheres of the planets (which included the sun and the moon). After these came the sphere of the fixed stars. Outermost was the Primum Mobile, sometimes divided into three spheres of the Crystalline Heaven, the First Moveable, and the Empyrean, or highest heaven.

*Latin Google translator: 'Empyreum' – Empire. My 1191 page 'A Latin Dictionary for Schools' Charlton Lewis 1889 has neither as an entry. The word is originally derived from the Greek.



DE REVOLUTIONIBUS ORBIUM COELESTIUM
ON THE REVOLUTION OF THE HEAVENLY ORBS
1543

Copernicus was a mathematician, astronomer, and Catholic canon. He dedicated his masterpiece to Pope Paul III. He held back on publication fearing criticism (from the Aristotelians). By the 1500s, the discrepancy between the seasonal calendar and the civil calendar had become a real problem. Ultimately Christmas would become a spring festival and (on occasion) occur on the same day as Easter! This problem prompted Copernicus to conclude that something was fundamentally wrong with Ptolemy's system.

The over twelve hundred year stability of the Catholic Church was split by Luther, Calvin and others; the age of discovery and of exploration was peaking- the world was so much larger than thought of before. Now Copernicus turned the Universe upside down; the earth is no longer the center of the Universe. But this was no big deal like the other two. Since the publication of Copernicus' classic until 1600, only about ten people were true Copernicans because only mathematicians and astronomers could read the book.

COPERNICAN UNIVERSE

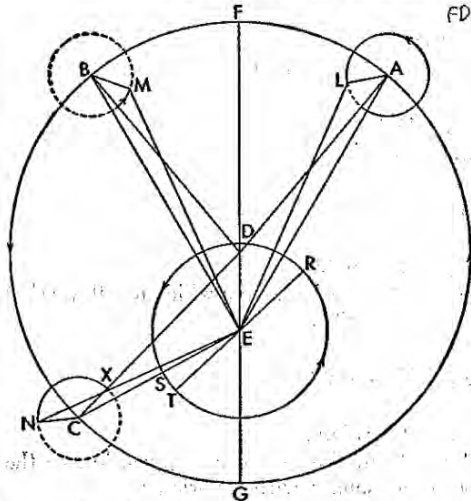


'A PERFIT DESCRIPTION OF THE CAELESTIAL ORBES'
 THOMAS DIGGES; 1576

Thomas Digges, English mathematician and astronomer. He was the first to present the Copernican system in English. He abandoned the notion of a fixed shell of immovable stars. Instead he believed that there were infinitely many stars at varying distances.

eccentric circle ABC
center D

REVOLUTIONS OF HEAVENLY SPHERES, V 769



FDG as the diameter through both apses; and let *E* the centre of the orbital circle of annual revolution be on the diameter. Let *A*, *B*, and *C* be the points of solar opposition, in that order; and let

arc $AF = 41^{\circ}34'$,
arc $FB = 40^{\circ}11'$,

and

arc $CG = 44^{\circ}21'$.

At the separate points *A*, *B*, and *C* let the epicycle be described with one-third of distance *DE* as radius. And let *AD*, *BD*, *CD*, *AE*, *BE*, and *CE* be joined. On the epicycle let *AL*, *BM*, and *CN* be joined, but in such a way that

angle $DAL = \text{angle } ADF$,
angle $DBM = \text{angle } BDF$,

and

angle $DCN = \text{angle } CDF$.

Accordingly, since in triangle *ADE*

angle $ADE = 138^{\circ}26'$,

because angle *FDA* was given and also the two sides, viz.,

$DE = 1,500$

where $AD = 10,000$;

it follows from this that

side $AE = 11,172$,

and

angle $DAE = 5^{\circ}7'$.

[156°] Hence, by addition,

angle $EAL = 46^{\circ}41'$.

So also in triangle *EAL* angle *EAL* is given, together with the two sides:

$AE = 11,172$

and

$AL = 500$,

where $AD = 10,000$.

Moreover,

angle $AEL = 1^{\circ}56'$;

and

angle $AEL + \text{angle } DAE = 7^{\circ}3'$,

which is the total difference between angles *ADF* and *LED*; and hence

angle $DEL = 34\frac{1}{2}^{\circ}$.

Similarly at the second opposition: in triangle *BDE*

angle $BDE = 139^{\circ}49'$

DE REVOLUTIONIBUS ORBIUM COELESTIUM

ON THE REVOLUTIONS OF THE HEAVENLY SPHERES

“ON THE PLANET MARS”

BOOK V

Celestial bodies, including the earth, have regular circular and everlasting movements. The Earth rotates on its axis and revolves around the Sun. The Earth's North-South rotation axis "wobbles" slowly like a spinning top. This is called 'precession' and Copernicus knew of that too. His calculations are accurate to the arc minute. A full moon is about 30 arc minutes across. Observational naked eye measurements at the time were accurate to the arc minute or 1/30 the width of the full moon.

AD LECTOREM DE HYPO.
THESISVS HVIYS OPERIS.



ON dubito, quin eruditi quidam, uulgata iam de nouitate hypotheseon huius operis fama, quod terram mobilem, Solem uero in medio uniuersi immobilem constituit, uehementer sint offensi, putetes

*Note To The Reader Concerning
the Hypotheses Put Forward in This Work.*

No doubt there are learned men who have been shocked by the rumor that has already spread abroad touching the strange new hypotheses put forward in this work: for it states that the Earth is in motion and that it is the Sun that holds a fixed position at the center of the universe. These

OSIANDER'S PREFACE TO COPERNICUS' 'DE REVOLUTIONIBUS'

"For these hypotheses need not be true nor even probable. On the contrary, if they provide a calculus consistent with the observations, that alone is enough ... For this art, it is quite clear, is completely and absolutely ignorant of the causes of the apparent movement of the heavens."

Copernicus received a copy of his book on his deathbed. I hope that he did not read the preface. Osiander's preface was originally written anonymously. He was a leading theologian and preacher in Nuremberg and he knew Luther and Melancthon's attitude toward the heliocentric theory. He claimed that the theory was a hypothesis, just a mathematical fiction that explains the motion of the planets. Copernicus believed that his theory truly explained reality. Kepler's response to Osiander:

"Written by a jackass for the use of other jackasses."

We will see why the following three terms will play a crucial role in Galileo's confrontation with the Church- **'ex suppositione'** (**'by supposition'**) **'saving the appearances'**, **'by hypothesis'**.

POPE PAUL III STARTS THE CATHOLIC COUNTER REFORMATION

1538. He excommunicated King Henry VIII and issued an Interdict on England.

1540. The Church officially recognized **the Society of Jesus**.

1542. He reorganized **the Holy Office of the Inquisition**, initially to combat Protestant heretics in Italy. It also prosecuted witches, blasphemers, polygamists, etc.

1545 -1563. **The Council of Trent** was a meeting of Catholic clerics convened by Pope Paul III.

The first session of the Council met a bit over two years after the publication of Copernicus' book but the new theory was of no concern, it was not even mentioned. The main objective was to solidify Catholic Church teaching to combat the new movement - the Protestant Reformation.



POPE PAUL III

age 75, TITIAN 1543

COUNCIL OF TRENT

SESSION IV SECOND DECREE; April 8, 1546.

CATHOLIC ANSWER TO THE REFORMATION

THE COUNTER REFORMATION

HOLY MOTHER CHURCH IS THE ULTIMATE INTERPRETER OF SCRIPTURE

(LITERAL INTERPRETATION?)

DECREE CONCERNING THE CANONICAL SCRIPTURES

“...no one, relying on his own skill, shall, --**in matters of faith, and of morals** pertaining to the edification of Christian doctrine, --
wresting the sacred Scripture to his own senses, presume to interpret the said sacred Scripture contrary to that sense which holy mother Church, whose it is to judge of the true sense and interpretation of the holy Scriptures,--hath held and doth hold; or **even contrary to the unanimous consent of the Fathers...**”

The Council of Trent did not explicitly state anything about the literal interpretation of Scripture.

One of the key dispute in the Galileo Affair was whether the motion of the earth was a matter of faith and morals. The Church said yes, Galileo said no.



“THE CANONS AND DECREES OF THE SACRED AND OECUMENICAL COUNCIL OF TRENT” 1564

Who interprets the Bible? Holy Mother Church! Recall Luther’s ‘Sola Scriptura’, ‘by Scripture alone’. This doctrine is held by most Protestants; it states that the Bible is the sole infallible source of authority for Christian faith and practice.

The Catholic response to Luther... Both Scripture and Church tradition are crucial, The writings of the Holy Fathers are to be taken ‘with equal piety and reverence’ both the Old Testament and the New Testament.

The Catholic Church teaches that only the church can rightly interpret the Bible. Protestants believe that human leaders can err in their interpretation of Scripture. Every believer interprets the word of God themselves.

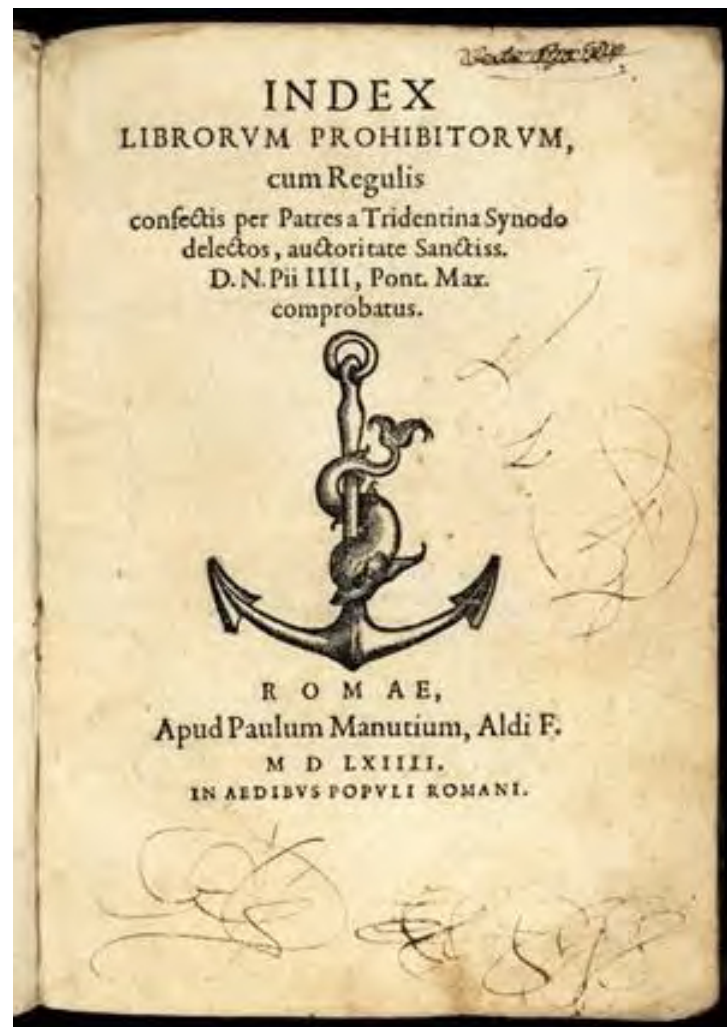
COUNCIL OF TRENT

(18th session 1562)

DECREE ON THE CHOICE OF BOOKS

List of prohibited, suspected or pernicious books

The Council took up the issue of the Index. The new Tridentine index was taken up by Pope Pius IV and published two years later. This index formed the basis of all subsequent indexes, while its rules were accepted as the guide for future censors. The Index condemned both religious and secular texts. The purpose of these indexes was to censor the proliferation of writings by the Protestants. It was a guide for book publishers in their decisions of what publications they could or could not print. In order to publish a book official permission from the Church was required.



TRIDENTINE INDEX 1564



UNIVERSITY OF PISA. GALILEO, STUDENT – 1581-1585; PROFESSOR – 1589-1592

In July 1589 Galileo was called to a teaching position at Pisa. He taught the elements of mathematics and astronomy. The sources for Galileo's teaching were the lecture notes of the Jesuits at the Roman College.



Only three city states played an important role in the Galileo Affair.

THE GRAND DUCHY OF TUSCANY (Firenze)
 THE REPUBLIC OF VENICE (Venezia)
 THE PAPAL STATES (Pontificio)

Galileo held the chair of Mathematics at the University of Padua in the Republic of Venice from 1592 to 1610. The Venetian Church was remarkably separate from the Roman Church. The Republic of Venice was a haven for free thought, far away from the Vatican.

PAUL THE POPE vs PAUL THE FRIAR
VENETIAN INTERDICTION 1606-1607



POPE PAUL V
 CARAVAGGIO
 GALLERIA BORGHESE



PAOLO SARPI
 CAMPO SANTA FOSCA
 VENICE

The Venetian Interdict: April 1606-April 1607.

1. Two clerics accused of crimes including murder were arrested by the Republic to be tried in the secular rather than ecclesiastical court.
2. Laws prohibited the construction of church buildings without state permission.

Paul V put an interdict on Venice and excommunicated the Senate. The papacy forbade clergy to offer mass or administer any of the sacraments. The Senate in Venice invited all priests and clergy members to operate as usual, and everyone followed suit except the Jesuits. They were officially expelled. Sarpi, a Venetian statesman was friends with Galileo.



PAOLO SARPI

PAOLO SARPI was an historian, priest, scientist, canon lawyer, statesman and a friend and patron of Galileo. He was a defender of free thought and a proponent of the separation of Church and State. He was the intellect behind the Venetian side of the interdict; his opponent was Cardinal Bellarmine, the scholar of the Church. We will meet him later. Sarpi's *History of the Council of Trent* was published in 1621 and was immediately put on 'the Index of Prohibited Books'. Trent was treated as a political phenomenon and Sarpi stated that the Church went astray by claiming power over temporal matters. Paul V was enraged. On October 5, 1607 Sarpi was attacked by assassins and left for dead. They escaped and were well received in the papal territories. Brother Paul told his friend Galileo about an 'occhiale', a spyglass that was invented in Netherlands.

Sarpi's last words, "Esto perpetua" ("may she (i.e., the republic) live forever"), were recalled by John Adams in 1820 in a letter to Thomas Jefferson, when Adams "wished 'as devoutly as Father Paul for the preservation of our vast American empire and our free institutions', as Sarpi had wished for the preservation of Venice and its institutions." This was 200 years later! (Wikipedia-'Paolo Sarpi')



CESARE CREMONINI
PROFESSOR OF PHILOSOPHY,



FRA FULGENZIO MANFREDI

During the Interdict he gained particular prominence for his anti-Roman sermons, preaching against papal regulation of religious orders in the Venetian republic.

CREMONINI (1550-1631) was a friend of Galileo. As a philosopher he taught 'pure' Aristotle not Christian Aristotelianism. One difficulty with this is the implication that he believed in the mortality of the soul. After a paper he wrote about the Jesuits, they relayed their grievances to Rome. He was prosecuted in 1604 by the Inquisition for atheism. It was about this time (May 17, 1611) that "Cardinal Bellarmine wrote to the Inquisitor at Padua... 'See whether Galileo, professor of philosophy and mathematics is mentioned in the process* of Dr. Cesare Cremonini.'" [de Santillana, p. 27] So, Bellarmine was investigating Galileo that early on. Cremonini warned his friend Galileo that if he decided to move to Tuscany from Padua it would bring him under the Inquisition's watch. *According to Collins Italian-English dictionary, the first meaning of 'processo' is process, the second is a legal proceeding.



GALILEO PRESENTS THE TELESCOPE TO THE DOGE IN AUGUST 1609

He donated the telescope to the Republic of Venice and in return obtained a lifetime tenure as Professor of Mathematics at the University of Padua with more than double his previous salary.

A FEW OF THE ROMAN PROTAGONISTS

**CARDINAL BELLARMINE****GALILEO****THE TUSCAN MEDICIS**

Cardinal Bellarmine was the theological scholar and chief advisor of the Pope. Galileo secured the patronage of the powerful Medici family by representing his discoveries in a way that enhanced the image of the Duke's court. The four moons revolving around Jupiter; he named them the 'Medicean stars'.