

Letter to the Grand Duchess Christina of Tuscany

Galileo, 1615

[Text from the [Internet Modern History Sourcebook](#)]

1 *To The Most Serene Grand Duchess Mother:*

2 Some years ago, as Your Serene Highness well knows, I
3 discovered in the heavens many things that had not been seen
4 before our own age. The novelty of these things, as well as some
5 consequences which followed from them in contradiction to the
6 physical notions commonly held among academic philosophers,
7 stirred up against me no small number of professors-as if I had
8 placed these things in the sky with my own hands in order to upset
9 nature and overturn the sciences. They seemed to forget that the
10 increase of known truths stimulates the investigation,
11 establishment, and growth of the arts; not their diminution or
12 destruction.

13 Showing a greater fondness for their own opinions than for truth
14 they sought to deny and disprove the new things which, if they had
15 cared to look for themselves, their own senses would have
16 demonstrated to them. To this end they hurled various charges and
17 published numerous writings filled with vain arguments, and they
18 made the grave mistake of sprinkling these with passages taken
19 from places in the Bible which they had failed to understand
20 properly, and which were ill-suited to their purposes.

21 These men would perhaps not have fallen into such error had
22 they but paid attention to a most useful doctrine of St. Augustine's,
23 relative to our making positive statements about things which are
24 obscure and hard to understand by means of reason alone.
25 Speaking of a certain physical conclusion about the heavenly
26 bodies, he wrote: "Now keeping always our respect for moderation
27 in grave piety, we ought not to believe anything inadvisedly on a
28 dubious point, lest in favor to our error we conceive a prejudice
29 against something that truth hereafter may reveal to be not
30 contrary in any way to the sacred books of either the Old or the
31 New Testament."

32 Well, the passage of time has revealed to everyone the truths
33 that I previously set forth; and, together with the truth of the facts,
34 there has come to light the great difference in attitude between
35 those who simply and dispassionately refused to admit the
36 discoveries to be true, and those who combined with their
37 incredulity some reckless passion of their own. Men who were
38 well grounded in astronomical and physical science were
39 persuaded as soon as they received my first message. There were
40 others who denied them or remained in doubt only because of their
41 novel and unexpected character, and because they had not yet had
42 the opportunity to see for themselves. These men have by degrees
43 come to be satisfied. But some, besides allegiance to their original
44 error, possess I know not what fanciful interest in remaining
45 hostile not so much toward the things in question as toward their
46 discoverer. No longer being able to deny them, these men now
47 take refuge in obstinate silence, but being more than ever
48 exasperated by that which has pacified and quieted other men, they
49 divert their thoughts to other fancies and seek new ways to damage
50 me.

51 I should pay no more attention to them than to those who
52 previously contradicted me-at whom I always laugh, being assured
53 of the eventual outcome-were it not that in their new calumnies
54 and persecutions I perceive that they do not stop at proving
55 themselves more learned than I am (a claim which I scarcely
56 contest), but go so far as to cast against me the imputations of
57 crimes which must be, and are, more abhorrent to me than death
58 itself. I cannot remain satisfied merely to know that the injustice of
59 this is recognized by those who are acquainted with these men and
60 with me, as perhaps it is not known to others.

61 Persisting in their original resolve to destroy me and everything
62 mine by any means they can think of, these men are aware of my
63 views in astronomy and philosophy. They know that as to the
64 arrangement of the parts of the universe, I hold the sun to be
65 situated motionless in the center of the revolution of the celestial
66 orbs while the earth revolves about the sun. They know also that I
67 support this position not only by refuting the arguments of
68 Ptolemy and Aristotle, but by producing many counter-arguments;
69 in particular, some which relate to physical effects whose causes

70 can perhaps be assigned in no other way. In addition there are
71 astronomical arguments derived from many things in my new
72 celestial discoveries that plainly confute the Ptolemaic system
73 while admirably agreeing with and confirming the contrary
74 hypothesis. Possibly because they are disturbed by the known truth
75 of other propositions of mine which differ from those commonly
76 held, and therefore mistrusting their defense so long as they
77 confine themselves to the field of philosophy, these men have
78 resolved to fabricate a shield for their fallacies out of the mantle of
79 pretended religion and the authority of the Bible. These they apply
80 with little judgement to the refutation of arguments that they do
81 not understand and have not even listened to.

82 First they have endeavored to spread the opinion that such
83 propositions in general are contrary to the Bible and are
84 consequently damnable and heretical. They know that it is human
85 nature to take up causes whereby a man may oppress his neighbor,
86 no matter how unjustly, rather than those from which a man may
87 receive some just encouragement. Hence they have had no trouble
88 in finding men who would preach the damnability and heresy of
89 the new doctrine from their very pulpits with unwonted
90 confidence, thus doing impious and inconsiderate injury not only
91 to that doctrine and its followers but to all mathematics and
92 mathematicians in general. Next, becoming bolder, and hoping
93 (though vainly) that this seed which first took root in their
94 hypocritical minds would send out branches and ascend to heaven,
95 they began scattering rumors among the people that before long
96 this doctrine would be condemned by the supreme authority. They
97 know, too, that official condemnation would not only suppress the
98 two propositions which I have mentioned, but would render
99 damnable all other astronomical and physical statements and
100 observations that have any necessary relation or connection with
101 these.

102 In order to facilitate their designs, they seek so far as possible
103 (at least among the common people) to make this opinion seem
104 new and to belong to me alone. They pretend not to know that its
105 author, or rather its restorer and confirmer, was Nicholas
106 Copernicus; and that he was not only a Catholic, but a priest and a
107 canon. He was in fact so esteemed by the church that when the
108 Lateran Council under Leo X took up the correction of the church
109 calendar, Copernicus was called to Rome from the most remote

110 parts of Germany to undertake its reform. At that time the calendar
111 was defective because the true measures of the year and the lunar
112 month were not exactly known. The Bishop of Culm, then
113 superintendent of this matter, assigned Copernicus to seek more
114 light and greater certainty concerning the celestial motions by
115 means of constant study and labor. With Herculean toil he set his
116 admirable mind to this task, and he made such great progress in
117 this science and brought our knowledge of the heavenly motions to
118 such precision that he became celebrated as an astronomer. Since
119 that time not only has the calendar been regulated by his teachings,
120 but tables of all the motions of the planets have been calculated as
121 well.

122 Having reduced his system into six books, he published these at
123 the instance of the Cardinal of Capua and the Bishop of Culm. And
124 since he had assumed his laborious enterprise by order of the
125 supreme pontiff, he dedicated this book *On the celestial*
126 *revolutions* to Pope Paul III. When printed, the book was accepted
127 by the holy Church, and it has been read and studied by everyone
128 without the faintest hint of any objection ever being conceived
129 against its doctrines. Yet now that manifest experiences and
130 necessary proofs have shown them to be well grounded, persons
131 exist who would strip the author of his reward without so much as
132 looking at his book, and add the shame of having him pronounced
133 a heretic. All this they would do merely to satisfy their personal
134 displeasure conceived without any cause against another man, who
135 has no interest in Copernicus beyond approving his teachings.

136 Now as to the false aspersions which they so unjustly seek to
137 cast upon me, I have thought it necessary to justify myself in the
138 eyes of all men, whose judgment in matters of religion and of
139 reputation I must hold in great esteem. I shall therefore discourse
140 of the particulars which these men produce to make this opinion
141 detested and to have it condemned not merely as false but as
142 heretical. To this end they make a shield of their hypocritical zeal
143 for religion. They go about invoking the Bible, which they would
144 have minister to their deceitful purposes. Contrary to the sense of
145 the Bible and the intention of the holy Fathers, if I am not
146 mistaken, they would extend such authorities until even in purely
147 physical matters - where faith is not involved - they would have us
148 altogether abandon reason and the evidence of our senses in favor
149 of some biblical passage, though under the surface meaning of its

150 words this passage may contain a different sense.

151 I hope to show that I proceed with much greater piety than they
152 do, when I argue not against condemning this book, but against
153 condemning it in the way they suggest-that is, without under
154 standing it, weighing it, or so much as reading it. For Copernicus
155 never discusses matters of religion or faith, nor does he use
156 argument that depend in any way upon the authority of sacred
157 writings which he might have interpreted erroneously. He stands
158 always upon physical conclusions pertaining to the celestial
159 motions, and deals with them by astronomical and geometrical
160 demonstrations, founded primarily upon sense experiences and
161 very exact observations. He did not ignore the Bible, but he knew
162 very well that if his doctrine were proved, then it could not
163 contradict the Scriptures when they were rightly understood and
164 thus at the end of his letter of dedication. addressing the pope, he
165 said:

166 "If there should chance to be any exegetes ignorant of
167 mathematics who pretend to skill in that discipline, and dare
168 to condemn and censure this hypothesis of mine upon the
169 authority of some scriptural passage twisted to their
170 purpose, I value them not, but disdain their unconsidered
171 judgment. For it is known that Lactantius - a poor
172 mathematician though in other respects a worthy author -
173 writes very childishly about the shape of the earth when he
174 scoffs at those who affirm it to be a globe. Hence it should
175 not seem strange to the ingenious if people of that sort
176 should in turn deride me. But mathematics is written for
177 mathematicians, by whom, if I am not deceived, these
178 labors of mine will be recognized as contributing something
179 to their domain, as also to that of the Church over which
180 Your Holiness now reigns."

181 Such are the people who labor to persuade us that an author like
182 Copernicus may be condemned without being read, and who
183 produce various authorities from the Bible, from theologians, and
184 from Church Councils to make us believe that this is not only
185 lawful but commendable. Since I hold these to be of supreme
186 authority I consider it rank temerity for anyone to contradict
187 them-when employed according to the usage of the holy Church.
188 Yet I do not believe it is wrong to speak out when there is reason
189 to suspect that other men wish, for some personal motive, to

190 produce and employ such authorities for purposes quite different
191 from the sacred intention of the holy Church.

192 Therefore I declare (and my sincerity will make itself manifest)
193 not only that I mean to submit myself freely and renounce any
194 errors into which I may fall in this discourse through ignorance of
195 matters pertaining to religion, but that I do not desire in these
196 matters to engage in disputes with anyone, even on points that are
197 disputable. My goal is this alone; that if, among errors that may
198 abound in these considerations of a subject remote from my
199 profession, there is anything that may be serviceable to the holy
200 Church in making a decision concerning the Copernican system, it
201 may be taken and utilized as seems best to the superiors. And if
202 not, let my book be torn and burnt, as I neither intend nor pretend
203 to gain from it any fruit that is not pious and Catholic. And though
204 many of the things I shall reprove have been heard by my own
205 ears, I shall freely grant to those who have spoken them that they
206 never said them, if that is what they wish, and I shall confess
207 myself to have been mistaken. Hence let whatever I reply be
208 addressed not to them, but to whoever may have held such
209 opinions.

210 The reason produced for condemning the opinion that the earth
211 moves and the sun stands still in many places in the Bible one may
212 read that the sun moves and the earth stands still. Since the Bible
213 cannot err; it follows as a necessary consequence that anyone takes
214 a erroneous and heretical position who maintains that the sun is
215 inherently motionless and the earth movable.

216 With regard to this argument, I think in the first place that it is
217 very pious to say and prudent to affirm that the holy Bible can
218 never speak untruth-whenver its true meaning is understood. But
219 I believe nobody will deny that it is often very abstruse, and may
220 say things which are quite different from what its bare words
221 signify. Hence in expounding the Bible if one were always to
222 confine oneself to the unadorned grammatical meaning, one might;
223 fall into error. Not only contradictions and propositions far from
224 true might thus be made to appear in the Bible, but even grave
225 heresies and follies. Thus it would be necessary to assign to God
226 feet, hands and eyes, as well as corporeal and human affections,
227 such as anger, repentance, hatred, and sometimes even the
228 forgetting of things past and ignorance of those to come. These

229 propositions uttered by the Holy Ghost were set down in that
230 manner by the sacred scribes in order to accommodate them to the
231 capacities of the common people, who are rude and unlearned. For
232 the sake of those who deserve to be separated from the herd, it is
233 necessary that wise expositors should produce the true senses of
234 such passages, together with the special reasons for which they
235 were set down in these words. This doctrine is so widespread and
236 so definite with all theologians that it would be superfluous to
237 adduce evidence for it.

238 Hence I think that I may reasonably conclude that whenever the
239 Bible has occasion to speak of any physical conclusion (especially
240 those which are very abstruse and hard to understand), the rule has
241 been observed of avoiding confusion in the minds of the common
242 people which would render them contumacious toward the higher
243 mysteries. Now the Bible, merely to condescend to popular
244 capacity, has not hesitated to obscure some very important
245 pronouncements, attributing to God himself some qualities
246 extremely remote from (and even contrary to) His essence. Who,
247 then, would positively declare that this principle has been set aside,
248 and the Bible has confined itself rigorously to the bare and
249 restricted sense of its words, when speaking but casually of the
250 earth, of water, of the sun, or of any other created thing?
251 Especially in view of the fact that these things in no way concern
252 the primary purpose of the sacred writings, which is the service of
253 God and the salvation of souls - matters infinitely beyond the
254 comprehension of the common people.

255 This being granted, I think that in discussions of physical
256 problems we ought to begin not from the authority of scriptural
257 passages but from sense—experiences and necessary
258 demonstrations; for the holy Bible and the phenomena of nature
259 proceed alike from the divine Word the former as the dictate of the
260 Holy Ghost and the latter as the observant executrix of God's
261 commands. It is necessary for the Bible, in order to be
262 accommodated to the understanding of every man, to speak many
263 things which appear to differ from the absolute truth so far as the
264 bare meaning of the words is concerned. But Nature, on the other
265 hand, is inexorable and immutable; she never transgresses the laws
266 imposed upon her, or cares a whit whether her abstruse reasons
267 and methods of operation are understandable to men. For that
268 reason it appears that nothing physical which sense—experience

269 sets before our eyes, or which necessary demonstrations prove to
270 us, ought to be called in question (much less condemned) upon the
271 testimony of biblical passages which may have some different
272 meaning beneath their words. For the Bible is not chained in every
273 expression to conditions as strict as those which govern all
274 physical effects; nor is God any less excellently revealed in
275 Nature's actions than in the sacred statements of the Bible. Perhaps
276 this is what Tertullian meant by these words:

277 "We conclude that God is known first through Nature, and
278 then again, more particularly, by doctrine, by Nature in His
279 works, and by doctrine in His revealed word."

280 From this I do not mean to infer that we need not have an
281 extraordinary esteem for the passages of holy Scripture. On the
282 contrary, having arrived at any certainties in physics, we ought to
283 utilize these as the most appropriate aids in the true exposition of
284 the Bible and in the investigation of those meanings which are
285 necessarily contained therein, for these must be concordant with
286 demonstrated truths. I should judge that the authority of the Bible
287 was designed to persuade men of those articles and propositions
288 which, surpassing all human reasoning could not be made credible
289 by science, or by any other means than through the very mouth of
290 the Holy Spirit.

291 Yet even in those propositions which are not matters of faith,
292 this authority ought to be preferred over that of all human writings
293 which are supported only by bare assertions or probable
294 arguments, and not set forth in a demonstrative way. This I hold to
295 be necessary and proper to the same extent that divine wisdom
296 surpasses all human judgment and conjecture.

297 But I do not feel obliged to believe that the same God who
298 has endowed us with senses, reason and intellect has intended us to
299 forego their use and by some other means to give us knowledge
300 which we can attain by them. He would not require us to deny
301 sense and reason in physical matters which are set before our eyes
302 and minds by direct experience or necessary demonstrations. This
303 must be especially true in those sciences of which but the faintest
304 trace (and that consisting of conclusions) is to be found in the
305 Bible. Of astronomy; for instance, so little is found that none of the
306 planets except Venus are so much as mentioned, and this only
307 once or twice under the name of "Lucifer." If the sacred scribes
308 had had any intention of teaching people certain arrangements and

309 motions of the heavenly bodies, or had they wished us to derive
310 such knowledge from the Bible, then in my opinion they would not
311 have spoken of these matters so sparingly in comparison with the
312 infinite number of admirable conclusions which are demonstrated
313 in that science. Far from pretending to teach us the constitution
314 and motions of the heavens and other stars, with their shapes,
315 magnitudes, and distances, the authors of the Bible intentionally
316 forbore to speak of these things, though all were quite well known
317 to them. Such is the opinion of the holiest and most learned
318 Fathers, and in St. Augustine we find the following words :

319 "It is likewise commonly asked what we may believe about
320 the form and shape of the heavens according to the
321 Scriptures, for many contend much about these matters. But
322 with superior prudence our authors have forbore to speak
323 of this, as in no way furthering the student with respect to a
324 blessed life-and, more important still, as taking up much of
325 that time which should be spent in holy exercises. What is it
326 to me whether heaven, like a sphere surrounds the earth on
327 all sides as a mass balanced in the center of the universe, or
328 whether like a dish it merely covers and overcasts the earth?
329 Belief in Scripture is urged rather for the reason we have
330 often mentioned; that is, in order that no one, through
331 ignorance of divine passages, finding anything in our Bibles
332 or hearing anything cited from them of such a nature as may
333 seem to oppose manifest conclusions, should be induced to
334 suspect their truth when they teach, relate, and deliver more
335 profitable matters. Hence let it be said briefly, touching the
336 form of heaven, that our authors knew the truth but the Holy
337 Spirit did not desire that men should learn things that are
338 useful to no one for salvation."

339 The same disregard of these sacred authors toward beliefs about
340 the phenomena of the celestial bodies is repeated to us by St.
341 Augustine in his next chapter. On the question whether we are to
342 believe that the heaven moves or stands still, he writes thus:

343 "Some of the brethren raise a question concerning the
344 motion of heaven, whether it is fixed or moved. If it is
345 moved, they say, how is it a firmament? If it stands still,
346 how do these stars which are held fixed in it go round from
347 east to west, the more northerly performing shorter circuits
348 near the pole, so that the heaven (if there is another pole
349 unknown to us) may seem to revolve upon some axis, or (if

350 there is no other pole) may be thought to move as a discus?
351 To these men I reply that it would require many subtle and
352 profound reasonings to find out which of these things is
353 actually so; but to undertake this and discuss it is consistent
354 neither with my leisure nor with the duty of those whom I
355 desire to instruct in essential matters more directly
356 conducing to their salvation and to the benefit of the holy
357 Church."

358 From these things it follows as a necessary consequence that,
359 since the Holy Ghost did not intend to teach us whether heaven
360 moves or stands still, whether its shape is spherical or like a discus
361 or extended in a plane, nor whether the earth is located at its center
362 or off to one side, then so much the less was it intended to settle
363 for us any other conclusion of the same kind. And the motion or
364 rest of the earth and the sun is so closely linked with the things just
365 named, that without a determination of the one, neither side can be
366 taken in the other matters. Now if the Holy Spirit has purposely
367 neglected to teach us propositions of this sort as irrelevant to the
368 highest goal (that is, to our salvation), how can anyone affirm that
369 it is obligatory to take sides on them, that one belief is required by
370 faith, while the other side is erroneous? Can an opinion be
371 heretical and yet have no concern with the salvation of souls? Can
372 the Holy Ghost be asserted not to have intended teaching us
373 something that does concern our salvation? I would say here
374 something that was heard from an ecclesiastic of the most eminent
375 degree: "That the intention of the Holy Ghost is to teach us how
376 one goes to heaven. not how heaven goes."

377 But let us again consider the degree to which necessary
378 demonstrations and sense experiences ought to be respected in
379 physical conclusions, and the authority they have enjoyed at the
380 hands of holy and learned theologians. From among a hundred
381 attestations I have selected the following:

382 "We must also take heed, in handling the doctrine of Moses.
383 that we altogether avoid saying positively and confidently
384 anything which contradicts manifest experiences and the
385 reasoning of philosophy or the other sciences. For since
386 every truth is in agreement with all other truth, the truth of
387 Holy Writ cannot be contrary to the solid reasons and
388 experiences of human knowledge."

389 And in St. Augustine we read:

390 "If anyone shall set the authority of Holy Writ against clear
391 and manifest reason, he who does this knows not what he
392 has undertaken; for he opposes to the truth not the meaning
393 of the Bible, which is beyond his comprehension, but rather
394 his own interpretation, not what is in the Bible, but what he
395 has found in himself and imagines to be there."

396 This granted, and it being true that two truths cannot contradict
397 one another, it is the function of expositors to seek out the true
398 senses of scriptural texts. These will unquestionably accord with
399 the physical conclusions which manifest sense and necessary
400 demonstrations have previously made certain to us. Now the Bible,
401 as has been remarked, admits in many places expositions that are
402 remote from the signification of the words for reasons we have
403 already given. Moreover, we are unable to affirm that all
404 interpreters of the Bible speak by Divine inspiration for if that
405 were so there would exist no differences among them about the
406 sense of a given passage. Hence I should think it would be the part
407 of prudence not to permit anyone to usurp scriptural texts and
408 force them in some way to maintain any physical conclusion to be
409 true, when at some future time the senses and demonstrative or
410 necessary reasons may show the contrary. Who indeed will set
411 bounds to human ingenuity? Who will assert that everything in the
412 universe capable of being perceived is already discovered and
413 known? Let us rather confess quite truly that "Those truths which
414 we know are very few in comparison with those which we do not
415 know."

416 We have it from the very mouth of the Holy Ghost that God
417 delivered up the world to disputations, so that man cannot find out
418 the work that God hath done from the beginning even to the end.
419 In my opinion no one, in contradiction to that dictum, should close
420 the road to free philosophizing about mundane and physical things,
421 as if everything had already been discovered and revealed with
422 certainty. Nor should it be considered rash not to be satisfied with
423 those opinions which have become common. No one should be
424 scorned in physical disputes for not holding to the opinions which
425 happen to please other people best, especially concerning problems
426 which have been debated among the greatest philosophers for
427 thousands of years. One of these is the stability of the sun mobility
428 of the earth, a doctrine believed by Pythagoras and all his
429 followers, by Heracleides of Pontus (who was one of them), by

430 Philolaus, the teacher of Plato, and by Plato himself according to
431 Aristotle. Plutarch writes in his Life of Numa that Plato, when he
432 had grown old, said it was absurd to believe otherwise. The same
433 doctrine was held by Aristarchus of Samos, as Archimedes tells us;
434 by Seleucus the mathematician, by Nicetas the philosopher (on the
435 testimony of Cicero), and by many others. Finally this opinion has
436 been amplified and confirmed with many observations and
437 demonstrations by Nicholas Copernicus. And Seneca, a most
438 eminent philosopher, advises us in his book on comets that we
439 should more diligently seek to ascertain whether it is in the sky or
440 in the earth that the diurnal rotation resides.

441 Hence it would probably be wise and useful counsel if, beyond
442 articles which concern salvation and the establishment of our
443 Faith, against the stability of which there is no danger whatever
444 that any valid and effective doctrine can ever arise, men would not
445 aggregate further articles unnecessarily. And it would certainly be
446 preposterous to introduce them at the request of persons, who,
447 besides not being known to speak by inspiration of divine grace,
448 are clearly seen to lack that understanding which is necessary in
449 order to comprehend, let alone discuss, the demonstrations by
450 which such conclusions are supported in the subtler sciences. If I
451 may speak my opinion freely, I should say further that it would
452 perhaps fit in better with the decorum and majesty of the sacred
453 writings to take measures for preventing every shallow and vulgar
454 writer from giving to his compositions (often grounded upon
455 foolish fancies) an air of authority by inserting in them passages
456 from the Bible, interpreted (or rather distorted) into senses as far
457 from the right meaning of Scripture as those authors are near to
458 absurdity who thus ostentatiously adorn their writings. Of such
459 abuses many examples might be produced, but for the present I
460 shall confine myself to two which are germane to these
461 astronomical matters. The first concerns those writings which were
462 published against the existence of the Medicean planets recently
463 discovered by me, in which many passages of holy Scripture were
464 cited. Now that everyone has seen these planets, I should like to
465 know what new interpretations those same antagonists employ in
466 expounding the Scripture and excusing their own simplicity. My
467 other example is that of a man who has lately published, in
468 defiance of astronomers and philosophers, the opinion that the
469 moon does not receive its light from the sun but is brilliant by its
470 own nature. He supports this fancy (or rather thinks he does) by

471 sundry texts of Scripture which he believes cannot be explained
472 unless his theory is true; yet that the moon is inherently dark is
473 surely as plain as daylight.

474 It is obvious that such authors, not having penetrated the true
475 senses of Scripture, would impose upon others an obligation to
476 subscribe to conclusions that are repugnant to manifest reason and
477 sense, if they had any authority to do so. God forbid that this sort
478 of abuse should gain countenance and authority, for then in a short
479 time it would be necessary to proscribe all the contemplative
480 sciences. People who are unable to understand perfectly both the
481 Bible and the science far outnumber those who do understand
482 them. The former, glancing superficially through the Bible, would
483 arrogate to themselves the authority to decree upon every question
484 of physics on the strength of some word which they have
485 misunderstood, and which was employed by the sacred authors for
486 some different purpose. And the smaller number of understanding
487 men could not dam up the furious torrent of such people, who
488 would gain the majority of followers simply because it is much
489 more pleasant to gain a reputation for wisdom without effort or
490 study than to consume oneself tirelessly in the most laborious
491 disciplines. Let us therefore render thanks to Almighty God, who
492 in His beneficence protects us from this danger by depriving such
493 persons of all authority, reposing the power of consultation,
494 decision, and decree on such important matters in the high wisdom
495 and benevolence of most prudent Fathers, and in the supreme
496 authority of those who cannot fail to order matters properly under
497 the guidance of the Holy Ghost. Hence we need not concern
498 ourselves with the shallowness of those men whom grave and holy
499 authors rightly reproach, and of whom in particular St. Jerome
500 said, in reference to the Bible:

501 "This is ventured upon, lacerated, and taught by the
502 garrulous old woman, the doting old man, and the prattling
503 sophist before they have learned it. Others, led on by pride,
504 weigh heavy words and philosophize amongst women
505 concerning holy Scripture. Others- oh shame!-learn from
506 women what they teach to men, and (as if that were not
507 enough) glibly expound to others that which they
508 themselves do not understand. I forebear to speak of those
509 of my own profession who, attaining a knowledge of the
510 holy Scriptures after mundane learning, tickle the ears of the
511 people with affected and studied expressions, and declare

512 that everything they say is to be taken as the law of God.
513 Not bothering to learn what the prophets and the apostles
514 have maintained, they wrest incongruous testimonies into
515 their own senses-as if distorting passages and twisting the
516 Bible to their individual and contradictory whims were the
517 genuine way of teaching, and not a corrupt one."

518 I do not wish to place in the number of such lay writers some
519 theologians whom I consider men of profound learning and devout
520 behavior, and who are therefore held by me in great esteem and
521 veneration Yet I cannot deny that I feel some discomfort which I
522 should like to have removed, when I hear them pretend to the
523 power of constraining others by scriptural authority to follow in a
524 physical dispute that opinion which they think best agrees with the
525 Bible, and then believe themselves not bound to answer the
526 opposing reasons and experiences. In explanation and support of
527 this opinion they say that since theology is queen of all the
528 sciences, she need not bend in any way to accommodate herself to
529 the teachings of less worthy sciences which are subordinate to her;
530 these others must rather be referred to her as their supreme
531 empress, changing and altering their conclusions according to her
532 statutes and decrees. They add further that if in the inferior
533 sciences any conclusion should be taken as certain in virtue of
534 demonstrations or experiences, while in the Bible another
535 conclusion is found repugnant to this, then the professors of that
536 science should themselves undertake to undo their proofs and
537 discover the fallacies in their own experiences, without bothering
538 the theologians and exegetes. For, they say, it does not become the
539 dignity of theology to stoop to the investigation of fallacies in the
540 subordinate sciences; it is sufficient for her merely to determine
541 the truth of a given conclusion with absolute authority, secure in
542 her inability to err.

543 Now the physical conclusions in which they say we ought to be
544 satisfied by Scripture, without glossing or expounding it in senses
545 different from the literal, are those concerning which the Bible
546 always speaks in the same manner and which the holy Fathers all
547 receive and expound in the same way. But with regard to these
548 judgments I have had occasion to consider several things, and I
549 shall set them forth in order that I may be corrected by those who
550 understand more than I do in these matters-for to their decisions I
551 submit at all times.

552 First I question whether there is not some equivocation in failing
553 to specify the virtues which entitle sacred theology to the title of
554 "queen." It might deserve that name by reason of including
555 everything that is included from all the other sciences and
556 establishing everything by better methods and with profounder
557 learning. It is thus, for example, that the rules for measuring fields
558 and keeping accounts are much more excellently contained in
559 arithmetic and in the geometry of Euclid than in the practices of
560 surveyors and accountants. Or theology might be queen because of
561 being occupied with a subject which excels in dignity all the
562 subjects which compose the other sciences, and because her
563 teachings are divulged in more sublime ways.

564 That the title and authority of queen belongs to theology in the
565 first sense, I think, will not be affirmed by theologians who have
566 any skill in the other sciences. None of these, I think, will say that
567 geometry, astronomy, music, and medicine are much more
568 excellently contained in the Bible than they are in the books of
569 Archimedes, Ptolemy, Boethius, and Galen. Hence it seems likely
570 that regal preeminence is given to theology in the second sense;
571 that is, by reason of its subject and the miraculous communication
572 of divine revelation of conclusions which could not be conceived
573 by men in any other way, concerning chiefly the attainment of
574 eternal blessedness.

575 Let us grant then that theology is conversant with the loftiest
576 divine contemplation, and occupies the regal throne among
577 sciences by dignity. But acquiring the highest authority in this way,
578 If she does not descend to the lower and humbler speculations of
579 the subordinate sciences and has no regard for them because they
580 are not concerned with blessedness, then her professors should not
581 arrogate to them-selves the authority to decide on controversies in
582 professions which they have neither studied nor practiced. Why,
583 this would be as if an absolute despot, being neither a physician
584 nor an architect but knowing himself free to command, should
585 undertake to administer medicines and erect buildings according to
586 his whim-at grave peril of his poor patients' lives, and the speedy
587 collapse of his edifices.

588 Again, to command that the very professors of astronomy
589 themselves see to the refutation of their own observations and
590 proofs as mere fallacies and sophisms is to enjoin something that

591 lies beyond any possibility of accomplishment. For this would
592 amount to commanding that they must not see what they see and
593 must not understand what they know, and that in searching they
594 must find the opposite of what they actually encounter. Before this
595 could be done they would have to be taught how to make one
596 mental faculty command another, and the inferior powers the
597 superior, so that the imagination and the will might be forced to
598 believe the opposite of what the intellect understands. I am
599 referring at all times to merely physical propositions, and not to
600 supernatural things which are matters of faith.

601 I entreat those wise and prudent Fathers to consider with great
602 care the difference that exists between doctrines subject to proof
603 and those subject to opinion. Considering the force exerted by
604 logical deductions, they may ascertain that it is not in the power
605 of the professors of demonstrative sciences to change their
606 opinions at will and apply themselves first to one side and then to
607 the other. There is a great difference between commanding a
608 mathematician or a philosopher and influencing a lawyer or a
609 merchant, for demonstrated conclusions about things in nature or
610 in the heavens cannot be changed with the same facility as
611 opinions about what is or is not lawful in a contract, bargain, or
612 bill of exchange. This difference was well understood by the
613 learned and holy Fathers, as proven by their having taken great
614 pains in refuting philosophical fallacies. This may be found
615 expressly in some of them; in particular, we find the following
616 words of St. Augustine:

617 "It is to be held as an unquestionable truth that whatever the
618 sages of this world have demonstrated concerning physical
619 matters is in no way contrary to our Bibles, hence whatever
620 the sages teach in their books that is contrary to the holy
621 Scriptures may be concluded without any hesitation to be
622 quite false. And according to our ability let us make this
623 evident, and let us keep the faith of our Lord, in whom are
624 hidden all the treasures of wisdom so that we neither
625 become seduced by the verbiage of false philosophy nor
626 frightened by the superstition of counterfeit religion."

627 From the above words I conceive that I may deduce this
628 doctrine. That in the books of the sages of this world there are
629 contained some physical truths which are soundly demonstrated,
630 and others that are merely stated; as to the former, it is the office of

631 wise divines to show that they do not contradict the holy Scriptures
632 And as to the propositions which are stated but not rigorously
633 demonstrated, anything contrary to the Bible involved by them
634 must be held undoubtedly false and should be proved so by every
635 possible means.

636 Now if truly demonstrated physical conclusions need not be
637 subordinated to biblical passages, but the latter must rather be
638 shown not to interfere with the former, then before a physical
639 proposition is condemned it must be shown to be not rigorously
640 demonstrated-and this is to be done not by those who hold the
641 proposition to be true, but by those who judge it to be false. This
642 seems very reasonable and natural, for those who believe an
643 argument to be false may much more easily find the fallacies in it
644 than men who consider it to be true and conclusive. Indeed, in the
645 latter case it will happen that the more the adherents of an opinion
646 turn over their pages, examine the arguments, repeat the
647 observations, and compare the experiences, the more they will be
648 confirmed in that belief. And Your Highness knows what
649 happened to the late mathematician of the University of Pisa who
650 undertook in his old age to look into the Copernican doctrine in the
651 hope of shaking its foundations and refuting it, since he
652 considered it false only because he had never studied it. As it fell
653 out, no sooner had he understood its grounds, procedures, and
654 demonstrations than he found himself persuaded, and from an
655 opponent he became a very staunch defender of it. I might also
656 name other mathematicians who, moved by my latest discoveries,
657 have confessed it necessary to alter the previously accepted system
658 of the world, as this is simply unable to subsist any longer.

659 If in order to banish the opinion in question from the world it
660 were sufficient to stop the mouth of a single man-as perhaps those
661 men persuade themselves who, measuring the minds of others by
662 their own, think it impossible that this doctrine should be able to
663 continue to find adherents-then that would be very easily done. But
664 things stand otherwise. To carry out such a decision it would be
665 necessary not only to prohibit the book of Copernicus and the
666 writings of other authors who follow the same opinion, but to ban
667 the whole science of astronomy. Furthermore, it would be
668 necessary to forbid men to look at the heavens, in order that they
669 might not see Mars and Venus sometimes quite near the earth and
670 sometimes very distant, the variation being so great that Venus is

671 forty times and Mars sixty times as large at one time as at another.
672 And it would be necessary to prevent Venus being seen round at
673 one time and forked at another, with very thin horns; as well as
674 many other sensory observations which can never be reconciled
675 with the Ptolemaic system in any way, but are very strong
676 arguments for the Copernican. And to ban Copernicus now that his
677 doctrine is daily reinforced by many new observations and by the
678 learned applying themselves to the reading of his book, after this
679 opinion has been allowed and tolerated for these many years
680 during which it was less followed and less confirmed, would seem
681 in my judgment to be a contravention of truth, and an attempt to
682 hide and suppress her the more as she revealed herself the more
683 clearly and plainly. Not to abolish and censure his whole book, but
684 only to condemn as erroneous this particular proposition, would (if
685 I am not mistaken) be a still greater detriment to the minds of men,
686 since it would afford them occasion to see a proposition proved
687 that it was heresy to believe. And to prohibit the whole science
688 would be to censure a hundred passages of holy Scripture which
689 teach us that the glory and greatness of Almighty God are
690 marvelously discerned in all his works and divinely read in the
691 open book of heaven. For let no one believe that reading the lofty
692 concepts written in that book leads to nothing further than the mere
693 seeing of the splendor of the sun and the stars and their rising and
694 setting, which is as far as the eyes of brutes and of the vulgar can
695 penetrate. Within its pages are couched mysteries so profound and
696 concepts so sublime that the vigils, labors, and studies of hundreds
697 upon hundreds of the most acute minds have still not pierced them,
698 even after the continual investigations for thousands of years. The
699 eyes of an idiot perceive little by beholding the external
700 appearance of a human body, as compared with the wonderful
701 contrivances which a careful and practiced anatomist or
702 philosopher discovers in that same body when he seeks out the use
703 of all those muscles, tendons, nerves, and bones; or when
704 examining the functions of the heart and the other principal
705 organs, he seeks the seat of the vital faculties, notes and observes
706 the admirable structure of the sense organs, and (without ever
707 ceasing in his amazement and delight) contemplates the
708 receptacles of the imagination, the memory, and the understanding.
709 Likewise, that which presents itself to mere sight is as nothing in
710 comparison with the high marvels that the ingenuity of learned
711 men discovers in the heavens by long and accurate observation....

712 Your Highness may thus see how irregularly those persons
713 proceed who in physical disputes arrange scriptural passages (and
714 often those ill—understood by them) in the front rank of their
715 arguments. If these men really believe themselves to have the true
716 sense of a given passage, it necessarily follows that they believe
717 they have in hand the absolute truth of the conclusion they intend
718 to debate. Hence they must know that they enjoy a great advantage
719 over their opponents, whose lot it is to defend the false position;
720 and he who maintains the truth will have many sense—experiences
721 and rigorous proofs on his side, whereas his antagonist cannot
722 make use of anything but illusory appearances, quibbles, and
723 fallacies. Now if these men know they have such advantages over
724 the enemy even when they stay within proper bounds and produce
725 no weapons other than those proper to philosophy, why do they, in
726 the thick of the battle, betake themselves to a dreadful weapon
727 which cannot be turned aside, and seek to vanquish the opponent
728 by merely exhibiting it? If I may speak frankly, I believe they have
729 themselves been vanquished, and, feeling unable to stand up
730 against the assaults of the adversary, they seek ways of holding
731 him off. To that end they would forbid him the use of reason,
732 divine gift of Providence, and would abuse the just authority of
733 holy Scripture- which, in the general opinion of theologians, can
734 never oppose manifest experiences and necessary demonstrations
735 when rightly understood and applied. If I am correct, it will stand
736 them in no stead to go running to the Bible to cover up their
737 inability to understand (let alone resolve) their opponents'
738 arguments, for the opinion which they fight has never been
739 condemned by the holy Church. If they wish to proceed in
740 sincerity, they should by silence confess themselves unable to deal
741 with such matters. Let them freely admit that although they may
742 argue that a position is false, it is not in their power to censure a
743 position as erroneous - or in the power of any—one except the
744 Supreme Pontiff, or the Church Councils. Reflecting upon this,
745 and knowing that a proposition cannot be both true and heretical,
746 let them employ themselves in the business which is proper to
747 them; namely, demonstrating its falsity. And when that is revealed,
748 either there will no longer be any necessity to prohibit it (since it
749 will have no followers), or else it may safely be prohibited without
750 the risk of any scandal.

751 Therefore let these men begin to apply themselves to an
752 examination of the arguments of Copernicus and others, leaving

753 condemnation of the doctrine as erroneous and heretical ' to the
754 proper authorities. Among the circumspect and most wise Fathers,
755 and in the absolute wisdom of one who cannot err, they may never
756 hope to find the rash decisions into which they allow them selves
757 to be hurried by some particular passion or personal interest. With
758 regard to this opinion, and others which are not directly matters of
759 faith, certainly no one doubts that the Supreme Pontiff has always
760 an absolute power to approve or condemn; but it is not in the
761 power: of any created being to make things true or false, for this
762 belongs to their own nature and to the fact. Therefore in my
763 judgment one should first be assured of the necessary and
764 immutable truth of the fact, over which no man has power. This is
765 wiser counsel than to condemn either side in the absence of such
766 certainty, thus depriving oneself of continued authority and ability
767 to choose by determining things which are now undetermined and
768 open and still lodged in the will of supreme authority. And in brief,
769 if it is impossible for a conclusion to be declared heretical while
770 we remain in doubt as to its truth, then these men are wasting their
771 time clamoring for condemnation of the motion of the earth and
772 stability of the sun, which they have not yet demonstrated to be
773 impossible or false