

GALILEO
versus
**THE GEOCENTRIC THEORY
OF THE UNIVERSE**

by

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Although this essay is self-contained, it is also to be the third part of a trilogy of which the other two parts are called *Sir Isaac Newton and Modern Astronomy* and *Einstein and Modern Physics*. In consequence, there are frequent cross-references between this essay and the other two, which make it, while certainly not necessary, nevertheless obviously desirable that all three parts of the trilogy be read in conjunction with each other. The cross-references do not affect the argument of the essay.

Very grateful acknowledgement indeed is given to the late Mr Arthur Koestler and to Professor James A. Coleman for their generous permission to quote extensively from their respective books *The Sleepwalkers* and *Relativity for the Layman*. Many others have helped in the preparation of this essay also, of which, for reasons which will be obvious from the essay itself, I mention an especial debt of acknowledgement to Mr Walter van der Kamp. And he too has allowed me to quote from his writings.

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A little background to
Galileo's Theory

1985

About eight years ago, one of the authors of these Letters, N.M. Gwynne [N.M.G.], was by chance¹ put on enquiry that the heliocentric theory of the solar system, which he had always “known” to be true, might be as devoid of solid evidence in support of it as is the theory of evolution. He pursued the enquiry and found, not only that this was so, but also that both the scientific and the Biblical evidence proved, independently of each other, that the earth was the non-orbiting, non-rotating, fixed centre of the universe.

Following this discovery and further researches, N.M.G. then wrote this paper, “Galileo Versus the Geocentric Theory of the Universe”. It sets out in detail the relevant scientific and Biblical evidence demolishing the heliocentric arguments and proving the geocentric position to be the correct one, gives a brief history of the process by which the heliocentric theory came to be accepted so completely that, unlike the theory of evolution, it was no longer even questioned, and also includes some of the more extraordinary, and less-known, highlights of the Galileo affair.

What is not included in the Galileo paper is a statement of the position of the Catholic Church on heliocentric theory. This is because, at the time he wrote the paper, N.M.G. did not realize that the Catholic Church had a position on heliocentric theory. He realized that, although virtually every author writing in the last hundred years or so in defence of the Catholic Church over the Galileo affair had volunteered that the Church's representatives had been factually in error, the Church herself had never officially admitted this; but he was not aware that she had gone any further than to refrain from admitting error on the stand taken by St. Robert Bellarmine and the Holy Office of the Inquisition. He thought that, as with many other questions which have been subjects of debate, such as, for instance, whether or not Hell is located in the centre of the earth, the Church left this particular question open, allowing the Faithful to strive to reach the right answer to it, not through submission to her dogmatic teaching, but by applying the correct principles of logic and evidence.

¹ We use the phrase “by chance” with reference only to the temporal plane, of course. It is a dogma of our Faith that, however fortuitous any event may seem, it has been carefully arranged by Divine Providence down to its finest details.

Fairly recently, further research has shown N.M.G.'s belief at that time to have been an error, and a serious one. It is a fact that, although the Magisterium (teaching authority) of the Church has not said a word about the geocentric and heliocentric theories of the universe for a long, long time, nevertheless she has in the past pronounced on the subject decisively, finally and irreformably. And unlike laws, which can fall into disuse, decisive, final and irreformable Church pronouncements on doctrine do not "wear out" through lapse of time, do not eventually become reformable through not being restated. Church pronouncements on doctrine remain true for as long as eternity endures.

And the Church's judgement on the subject in question is that:

(a) to hold that the earth is not the fixed centre of the universe, but orbits the sun, is contrary to a Divinely revealed truth and therefore definitively heretical;

(b) to hold that the earth rotates on its axis is also false and, while not definitely heretical (some authorities think that it is, while others dispute this), certainly a crime against ecclesiastical faith and thus mortally sinful.

One consequence of this new piece of information was that N.M.G. had to make an appropriate addition to the Galileo paper in order to convey this information to those who would be purchasing the paper from that time onwards, and, indeed, also to make the facts clear to such of those who had already purchased it as he could trace. This he did by adding an appendix to the paper – appendix 6 – which for Catholics is the most important part of the whole essay.

And it is this appendix which, without alteration (apart from these preliminary words), we are producing in this supplement. It is perhaps not the ideal method of introducing Catholics to what to most of them will be a new doctrine; possibly a document especially prepared for the purpose would have been better. But we thought we should give priority to presenting the facts before our readers as quickly as possible; and without question the authorities quoted in the appendix provide more than sufficient evidence, both ecclesiastical and Scriptural, to leave the faithful Catholic no alternative but to submit. Moreover, for anyone who requires further information on the subject, the full Galileo paper, containing we believe, all the information that could possibly be needed (including the scientific refutation of heliocentricity which complements the theological refutation contained in this appendix), is available. Hence our decision to publish the information in this form.

Galileo *versus* the Geocentric Theory of the Universe

1. Introduction

In this and the next two chapters I shall examine the three great architects of modern physics and astronomy, Galileo Galilei, Isaac Newton, and Albert Einstein, with particular reference to the contributions they have made to our understanding, or rather misunderstanding, of the cosmos.

“Not with me you won’t,” I can imagine some readers saying after reading the above paragraph. “I cannot distinguish an ether wind from a stellar aberration from a perihelion from a neutron from a quark; and I simply do not have the background knowledge that is needed for my participation in such an exercise to be useful. Moreover, not only are physics and astronomy beyond me; they are now beyond anyone without specialist education and qualifications. The rest of us know so little about the subjects that you are about to deal with that, however carefully we were to read what you had to say, we should be unable to form a judgement about who was right and who was wrong. All of which means that there is little point in our reading the next few chapters.” And so on.

An understandable attitude indeed; but, to the reader who is prepared nevertheless to read on, I promise a nice surprise and give some firm assurances. No specialized knowledge is required for an understanding of these three chapters; at the risk of occasionally irritating some readers who are familiar with the subjects under discussion, no technical words are used that are not explained; no scientific principles are involved which are not logical and easily-grasped by applying common sense or, in the case of false ones exposed, equally easily seen to be illogical; and in short, everything that follows, with the exception of five paragraphs included in chapter...(*Einstein and Modern Physics*) for light relief and of which no comprehension is required, can be readily understood by a layman. So please press on with me: I have had these chapters checked not only by people with sufficient competence in the subjects covered to ensure that the technical information given cannot be attacked even by those who dispute the conclusions I reach, but also by laymen with sufficient lack of technical competence to ensure that the assurances I have just given are justified.

Would that I could also tell the reader that he will find everything in these chapters easy; but this, I am afraid, I cannot promise. As I have mentioned before and as the reader will know from his own experience, new subjects are seldom easy at first, and this is especially true where the little that one has been taught

about them is wrong. Just as the learning of a new sport is partly a question of training the muscles of one's body to new habits, so the development of understanding of a new subject is a question of exercising along new grooves the equivalent of (to mix a metaphor) the muscles of one's intellect.

At first this needs concentration and effort and even so results are often difficult to attain; but with perseverance it gradually becomes easier, especially if the intellect is exercised in the new and unfamiliar field in a variety of different ways, such as by discussing it with others, or by reading simple expositions in books, newspaper articles and articles in Encyclopaedias. What I wish to affirm to the reader is that if other chapters that I have written are not beyond him the material in these is not beyond him either. If, therefore, as he reads them, he finds passages which cause his mind to go blank I beg him not to be disheartened, but instead to recall my assurance that, while I do not suggest that these chapters do not contain defects in quality of exposition, they have been read, criticized and understood by people of a wide range of intellect and learning; and I urge him, armed with this reassurance, to struggle on until he sees daylight.¹

“But why should I bother? If an effort is called for, why should I make the effort?” I give one more assurance. What is dealt with in these three chapters is of the very highest importance. What I am trying to expose here are cruel hoaxes; and, since the results of these particular hoaxes are that we are deceived as to the entire make up of the universe and the laws which govern it, the further consequences of them are enormous. If our ideas about so fundamental a part of total reality as the nature and make-up of our physical universe – which is the setting for all else that happens to us, are an illusion, nothing is more certain than that we shall fall victims to other illusions; for illusions hang together, just as do (though for the opposite reason) statements of truth. A lie will always need another to give it credibility, and the second lie yet another lie, and so on. And that, incidentally, is one reason why the exposure of lies is so important: if we can smash but one lie that is important and central, we make many others totter so that a relatively light

¹ In the hope that it may provide encouragement for a reader who at first finds difficulties with these three chapters I quote directly from a letter received from someone of no scientific qualifications (he is a lawyer by profession) to whom I submitted the chapters for criticism. His initial reaction when he first wrote was to say that in places he found difficulty in following the argument. Then a letter dated 17th April included the following. (He was commenting specifically on the chapters on Newton and Einstein, but the comments were pertinent to this chapter also.) “Upon a thorough re-examination I find that I am well able to follow it without problem. I found it intensely interesting and must credit any prior confusion concerning it to my own lack of concentration or failure to reread difficult passages... In summary I am somewhat embarrassed to report that, upon rereading, most of my previously experienced difficulties disappeared and that the fault was with the reader, not the writer.” (Mr. Jerry Anderson) I do not necessarily agree that the fault was with him, rather than with myself, but his letter does indicate that those finding difficulties who can face making the effort of reading this material a second time may well find that this is sufficient to remove many if not all of the difficulties.

push can bring them tumbling down in its wake.

So, those of you who are still with me, let us embark on our journey; and, by the way of taking the first few steps, let us have a brief introductory look at the first and greatest hero of the hoax surrounding the order and structure of the universe of which our planet and its contents, which include ourselves, form a part. "What Galileo did," writes Arthur Koestler in his superbly researched and enthralling book, *The Sleepwalkers*, "was to found the modern science of dynamics, which makes him rank among the men who shaped human destiny. He provided the indispensable complement to Kepler's laws for Newton's universe." Yes, but...

"Given what is taught about him, what Galileo did not do is scarcely less remarkable. Contrary to statements in even recent outlines of science, Galileo did not invent the telescope; nor the microscope; nor the thermometer; nor the pendulum clock. He did not discover the law of inertia; nor the parallelogram of forces or motions; nor the sun spots. He made no contribution to theoretical astronomy; he did not throw down weights from the leaning tower of Pisa, and did not prove the truth of the Copernican system. He was not tortured by the Inquisition, did not languish in its dungeons, did not say "eppur si muove" and he was not a martyr of science." (*The Sleepwalkers* by Arthur Koestler, p. 358)

2. "An Almost Unbelievable and Horrifying Possibility"

And now, step back please for the time being, Galileo and Mr. Koestler; I shall ask you to return later. Now that, with the help of a widely respected writer, I have raised grounds for suspicion that an examination of what is known to history as the Galileo episode may show the traditional version of the story to be not fully in accord with what really happened, let us, thus encouraged, plunge straight into an exposure of the most fundamental illusion to which his name is attached, the illusion which, paradoxically, is regarded as the discovery which is his greatest achievement.

What I am referring to, of course, is the abandonment, thanks more than anyone to Galileo, of the geocentric theory of the universe, after it had given many centuries of useful service - and, I must add, abandonment without necessity or even the slightest justification. For, startling - even ludicrous perhaps - though what I am about to say will be to most readers when they first read it, there is not a shred of scientific evidence either that the earth revolves round the sun, rather than vice versa, or that the earth rotates on its axis. Based solely on what can be observed or deduced, we can validly either hold the opinion that the sun is the centre around which the earth and planets move; or hold the opinion that the earth is the centre, with the sun moving round the earth and the planets moving round the sun; or, if we wish, even hold the opinion that the moon is the central fixed point of the universe, with the earth revolving around the moon, the sun round the earth and the planets round the sun; or choose any other point in space as our fixed point. Whichever fixed point we choose is

no more than an hypothesis, a proposition assumed for the purpose of discussion or for making calculations. Not one of the opinions just listed rests on any scientific ground which enables us to declare that it, rather than one of the others, is the absolute truth as logically deduced and proved by experiment.

Let me immediately say that if you do indeed find what I have just said startling and even ludicrous it will not be surprising. Although the view of the universe – founded by Copernicus, publicized by Galileo, developed by Newton and modified by Einstein – held almost unquestioned today is, as I shall show, not only not supported by any experimental proof but actually contradicted by experiments specifically constructed for the purpose of providing such proof, there is a remarkable fact about this view which, having no explanation to offer for it, I merely state. In contrast, for instance, with the books, running into many hundreds, which set out to expose the equally unsupported theory of evolution, there is not a single book in the English language, nor even a chapter of a book, which suggests that the usually held hypothesis that the earth goes round the sun might be wrong. There are many learned tomes containing material which, taken all together, demonstrates that each individual support put forward for heliocentric theory is fallacious, but the theory itself has been treated as inviolable.

No, not quite inviolable; for I must hasten to add that the fact that the theory has not been questioned, even by the most brutal iconoclast, between the covers of a book, does not mean that nothing has been written against it at all. Beginning very recently there has been some scholarship applied to the subject, and I think it is appropriate that I now give very briefly the history of the development of this scholarship.

After at least two thousand years in which the theory that the earth was the immobile (that is, neither orbiting nor rotating) centre of the universe had ruled without being seriously challenged, a number of determined assaults brought about the result that by the year 1700 A.D. the heliocentric view of the universe had achieved virtually complete victory. And, for over two hundred and fifty years after this victory, the assumption that Galileo was right and the Catholic Church wrong in the famous trial of Galileo seems to have been accepted without question. Then, in the 1960's, a headmaster of an independent school in Canada, Walter van der Kamp, cast his preconceptions aside and, as he describes in a passage which I shall shortly quote, started investigating the matter anew. Soon he started publishing his findings. In 1967 he wrote his first pamphlet, and in 1974 he produced the first issue, edited by him, of the *Bulletin of the Tychoonian Society*. The *Bulletin's* circulation never became more than tiny, but, being the only publication which allowed the issues to be aired, it swiftly became a forum through which professors and doctors of physics and related sciences and similarly qualified people from

all over the world exchanged views and voiced their misgivings and reservations, sometimes supported with highly technical and complex calculations, about Copernicanism, Newtonian physics and Einstein's theory of Relativity. I emphasize the fact that Van der Kamp's little publication became a catalyst which prompted many others to air and develop their thinking on these subjects, because I wish to make it clear that, although I shall reproduce in this chapter several quotations from the *Tychonian Society Bulletin*,² this does not mean that I shall be relying upon a series of statements by one man riding a hobby-horse by himself. On the contrary, what I shall be giving in support of what I assert will be a small selection taken from a large number of articles and essays by different people of high qualifications and varied background who have simply used the only medium available to them.

Before I open with the first quotation I should like in parentheses to answer in advance one accusation that has been levelled against me and against others who have raised this whole subject, and to make it clear that it is not my view, even by implication, that a theory can be regarded as sound almost without further thought simply because of its failure to appear in a book, coupled perhaps with the existence of a small periodical devoted to its propagation. There exists at the time of writing, for instance, an organization situated in Lancaster, California, called the Flat Earth Society, and this too issues a periodical covering a subject on which there are neither books nor chapters in books, and perhaps I shall disappoint the reader when I tell him that the arguments (which I have investigated) put forward in favour of a flat earth, while ingenious, are not credible. What governs whether a thing is true is neither how often nor how seldom it is said, nor yet who says it (unless we can be certain that the speaker is infallible), but rather what is said and the logic and evidence supporting what is said.

My preamble is over. Let Mr. van der Kamp now introduce the subject of which, in human terms, he was the original inspiration.

“...Reading Genesis-1 while banning all preconceived notions and brainwashing from my mind, I had to conclude not only that Genesis 1: 20-31 totally clashed with any evolutionary theory whatsoever, but that Genesis 1:1-19 emphatically implies and assumes a unique earth, just three days older than the Sun, Moon and stars. Now I “knew” of course, that Copernicus and Galileo had “proved” that the Earth goes round the sun, but slowly an almost unbelievable and horrifying possibility began to haunt me. What if the whole kit and caboodle of post-Copernican astronomy were not founded on fact at all but just on theory with zero probability. I decided to investigate the matter in depth and worked my way through stacks of highly touted books on the philosophy and history of science, on astronomy, on astrophysics. The results were staggering. Suffice it to say: I found that no one has ever directly proved the Earth to be in motion. Quite the opposite: a relativity theory more incredible than any Bible story had to be called upon for the purpose of

² The name is taken from the astronomer Tycho de Brahe for a reason which paragraph 71 will make clear.

saving the appearances.”³ (Walter van der Kamp in *Tychonian Bulletin* May 1980, p. 6)

That the earth is one of a group of planets which revolve around the sun is now an axiom so fundamental and unquestioned that to assert that there is no scientific evidence which disproves that the earth is the sole fixed point in space hardly fails to evoke a response as impatient or pitying as does another theory that I have just mentioned, namely that the earth is flat. The mind has become so accustomed to regard the sun as the central point of, at any rate, that part of the universe which contains the solar system that, as with any habit of thinking which has been firmly established, it is only with the greatest difficulty that a counter-proposition can be objectively considered.

The fact is, however, that if two objects appear to move in relation to each other, it is impossible to prove whether the first object is at rest and the second in motion, or the second at rest and the first in motion, or both in motion. The person seated in a stationary railway carriage can be misled, if he sees another train in motion and there is no background, into thinking that it is his train that is in motion and the train he is observing that is at rest. Or, as succinctly stated by Martin Gardiner in *The Relativity Explosion*, “Do the heavens revolve or does the earth rotate? The question is meaningless. The waitress might just as sensibly ask a customer if he wanted ice cream on top of his pie or the pie placed under his ice cream.” Perhaps I should add that when Gardiner describes the question as meaningless he is referring to its use for the purpose of making scientific assertions and calculations. In absolute terms and, above all, theologically, the question is by no means meaningless, as we shall see.

3. The Scientific Evidence Examined

To start off, I shall leave theology aside and look solely at scientific evidence. On the basis of no more than what we can observe and deduce it is certainly true that the heliocentric theory of the universe can be regarded as a possibility; it could well be that

³ The famous phrase “saving the appearances” will recur more than once during the course of this chapter and it is as well to explain it. This is best done by describing the origin of the phrase, of which the first recorded use was by the Greek philosopher, Plato. Prior to his time the motions of planets had been carefully charted, and not only by the Greeks but also by the Egyptians and Babylonians before them. All that the astronomers of those days possessed, however, were details of what was observed, and no unifying theory had been devised which revealed a plan underlying the apparent irregularity and incoherence of the planetary motions as compared with those of the other celestial bodies. Plato set his Academy the task of forming such a theory, in other words a mathematical scheme which fitted the disorderly movements into an orderly and systematic scheme. He described the problem as one of “saving appearances” and the phrase has been used ever since. In the event, this problem was solved by Eudoxus, one of Plato’s *pupils* and one of the foremost of the Greek mathematicians. His scheme, which the reader will find described in Morris Kline’s *Mathematics in Western Culture* and in many other books dealing with the history of astronomy, seems to be the first major astronomical theory in recorded history.

the sun is the fixed point of the universe, that the earth and the other planets revolve around the sun, that the moon revolves around the earth, and that the “fixed stars”, as they are usually called, revolve around the sun. There is however another hypothesis which, also based on what can be observed and scientifically tested, is equally rational and no less probable: that the earth is at rest; that the moon revolves around the earth in about one day and forty minutes; that the sun revolves around the earth in one day; that the planets, comets and meteorites revolve around the sun, the time taken to complete their revolution varying mainly according to their distance from the sun; and that the fixed stars revolve around the earth in approximately 363/366 of a day. Furthermore, as I have already mentioned, the truth need not even lie between these alternatives. It can be postulated equally validly that the moon is the fixed point, that the earth revolves around the moon, and the sun around the earth, and the other planets around the sun; or that any other point of the universe is the sole point fixed on the rest; or even that there is no fixed point at all, with everything on the move relative to everything else. The scientific revolution brought about by Copernicus, Galileo and improved astronomical instruments was a revolution not of science but of philosophical pre-supposition.⁴ Copernicus and Galileo did not reach their conclusions on the basis of observation. Even the invention of the telescope provided them with no support. The telescope did show that the satellites of Jupiter orbited around Jupiter; but, however often it is asserted that this fact demonstrates that the earth orbits around the sun, all that can be stated scientifically and with certainty is that analogies may be either true or false.

Once all this has been established, we find ourselves in a position to ask the crucial question. We accept that for purposes of making calculations, such as when forecasting the movements of stars and planets or when gauging the speed and

⁴ The Copernican revolution was not even an innovation. Seventeen centuries earlier Aristarchus of Samos, born in 310 B.C. and the last of the Pythagorean school of astronomers, proclaimed that the sun and not the earth was the centre round which all the planets revolved. The treatise in which he did this has been lost but ample testimony that it existed is provided by Archimedes, who was a contemporary of Aristarchus', and by Plutarch. Archimedes' and Plutarch's accounts of Aristarchus' theory, together with some comments by two twentieth century authors, J.L.E. Dreyer and C.E. Heath, are given in Appendix 1 to this chapter. Aristarchus does not, incidentally, appear to have gained many disciples, the only one mentioned in classical literature being Seleukus, a Babylonian who lived about a century later. On this subject, as on so many others,; modern science, far from discovering and illuminating ?a truth for the first time, has merely rehashed an error which had been out of date for over two thousand years. This is something that the occult forces manipulating society love to do and about which, as I often mention in this book, we are clearly warned in the *Bible*. “Nothing under the sun is new,” said King Solomon, “neither is any man able to say: Behold this is new: for it bath already gone before us.”(3] *Incidentally*, if King Solomon, writing under the inspiration of the Holy Ghost, could say this even in his day, some seven hundred years before Aristarchus lived, we may suppose it possible that Aristarchus himself was merely reintroducing a falsehood that dated from earlier times still.

trajectory at which missiles must be launched into space if they are to arrive at the chosen destinations, scientists must take a fixed point somewhere as a working assumption. We accept also that an assumption, purely arbitrary and made for the sake of convenience, is all that such a reference point is and that whatever point in the universe was taken the calculations,, after making the appropriate adjustment, would be identical. There remains, however, the certainty that somewhere among all the possibilities must lie a true answer. Of the propositions that the earth is at rest, or the sun is at rest, or some other point in the universe is at rest, or no point in the universe is at rest, one of them must be true. The great question, therefore, is this: is there, despite what has so far been said in this chapter to the contrary, any indication of where the one fixed point of the universe, if it exists, truly is?

I must pause before trying to answer this question, for the answer will be meaningless unless the reader has some background information on a subject of which a reasonable understanding is vital for much of what is contained in this chapter and in chapter... (“Einstein and Modern Physics”). This subject is the ether. With apologies to those who are already familiar with the concept of ether I shall now take up a few paragraphs in an examination of it.

The ether, which can neither be seen, tasted, smelled, touched nor weighed, is the substance of which all space beyond the atmosphere consists, or, as the *Oxford English Dictionary* defines it, “the medium filling the upper regions o space as the air fills the lower regions.” (The *Oxford English Dictionary* could validly have added “and as water fills the sea.”) It should be further noted that the ether is not limited to the upper regions of space, but is also present within the earth’s atmosphere. All of this is relevant for our investigation, because one of the ether’s principle functions is that of providing the medium by means of which light is transmitted; and of course light travels both inside and outside the atmosphere, and even through water, glass and other solid material substances.

Since it is of the utmost importance, in that the fact of ether’s existence is crucial to some of the argument that follows, that the reader is satisfied that there is no doubt whatever that there is such a substance, and since many scientists of recent times, including Albert Einstein, have denied its existence, I shall now summarize the most important evidence of its existence which includes an unanswerable philosophical proof advanced over two and a half thousand years ago by Aristotle.⁵

⁵ Someone to whom I submitted this chapter for comment suggested to me that, since today’s scientists and text books are virtually unanimous in their assumption that there is no such thing as ether, the assertion, and accompanying proof, that ether does indeed exist may be too big a pill for some to swallow so early in the chapter, causing a number of

That light propagates, or spreads from one place to another, is of course certain if only because light can be received in one place even though its source is in another. Given that propagation takes place, it is no less certain that for this to happen a medium is required. Sound, for instance, propagates through the air: first of all a source of sound acts, and subsequently the sound is received some distance away; and, during the period of time that the sound is between the source and the receiver, it exists as a disturbance in the- air. And what air is to sound is exactly what ether is in relation to other phenomena, which include not only light but also electricity, magnetism, radio waves, and (however it is caused) gravity, all of which exist independently of the atmosphere. The existence of ether is therefore certain.

The exact mechanics of movement (for instance by light) through ether from one point to another are less certain, however. Over the centuries two separate theories have been advanced, the wave theory and the ballistic theory, both of which have had many supporters. Let us consider each of them in turn.

According to the wave theory the ether is almost stationary throughout all space but is somewhat elastic, and the way in which a light source acts on it is to cause a ripple which travels through the ether until it reaches an obstacle, which of course is the recipient of the light. In other words, each particle of ether moves slightly out of position, just as each drop of water does (more or less) when a wave travels across the sea and as each particle of air does when sound travels across a room. It is hardly necessary to add that if this wave theory of the propagation of light be true the existence of ether must be equally true, because waves must be waves of something.

In the second theory, the ballistic or particle theory, light is likened to a stream of particles which are emitted from a light source and travel across space until they strike an object, such as the retina of an eye. This theory does not, as might at first seem

readers to abandon it at this point. I have retained paragraphs 22 and 23 unchanged, nevertheless, for in other respects this is very much the appropriate place to consider the ether. It is of great importance to many of the arguments presented in this chapter as will be seen in due course. Moreover, even twentieth century scientists have regarded the evidence for the existence of ether as sufficient to make it certain beyond reasonable doubt. For instance, Professor Zehnder of the University of Basle wrote in a work published between the two world wars called *The Ether and Meteorology*: "The reintroduction of ether into our classic physics is an absolute necessity. We need the ether to explain the propagation of light, of electricity and magnetism, across space, otherwise completely void, and already Maxwell required a vehicle (see paragraphs 157-159 – N.M.G.). It is inadmissible to suppress, as Einstein has done, the ether as a substance and to attribute, in return, the properties of ether to space without substance. That has almost the air of dialectic evasion, imagined for the sole purpose of eliminating the ether without giving the slightest proof... The ether must be a light, rarefied gas, existing in the free space of the world... It must possess weight, like all other substances." (Quoted in *The Case Against Einstein* by Arthur Lynch: p. 133)

possible, dispense with the need for the ether; for the essential difference between it and the wave theory is that, whereas in the wave theory waves are waves of the same material as the ether, in the ballistic theory the particles must be of different material from the ether through which they pass. And as Aristotle summarizes it, suppose if it be possible, that a particle be propagating through literally nothing, what can this mean? In saying that it is propagating, one means that at one time it is here and at a later time at some distance. But in an utter vacuum the two things would not differ, since more or less of nothing is still nothing. Hence where the particle was situated would differ not at all at the two times, and hence also it would not be propagating at all. Thus Aristotle proves the impossibility of a vacuum in nature.⁶

Which of the two theories is correct? The matter is not subject to direct proof, but it is my opinion that, subject to the reservations on the value of analogies that I expressed earlier, the wave theory is the more likely of the two theories because of the analogous behaviour of air and water. Whichever is true is of little importance, however. The fact of crucial importance is the existence of the ether.

Let us now return to the question I asked before digressing onto ether. Is there, despite what I have said so far, any identification of where one fixed point of the universe, if it exists, truly is?

There are two viewpoints from which the question can be examined. The first is the strictly scientific one, by which, as the reader will have already gathered, I mean that which can be learnt by observation and deduction; and the second is purely religious, by which I mean that which can be learnt from what God has seen fit to reveal to us directly. Let us start with the former.

Ever since the Copernican theory of heliocentricity was adopted as fact by the scientific community, attempts have been made to devise scientific experiments to prove it. Many of them have been ingenious and some of them should have worked. Remarkably, not only has not one of them produced the proof but the results of all of

⁶ Scientists do of course claim that vacuums or partial vacuums are possible, and they even create supposed vacuums and conduct experiments in them. In the true meaning of the word “vacuum” these claims are both unproven and, as just demonstrated, philosophically impossible. The nearest they can come to being true is by meaning that some or all of the air has been extracted from the containers being used by the scientist conducting the experiment. A critic of this chapter when it was in draft suggested that I omit Aristotle’s demonstration because most readers of the chapter will not have been trained in classical philosophy and will not accept the right of classical philosophy to trespass onto the territory which is now regarded as the exclusive domain of the physical sciences. The reasoning behind his suggestions is certainly valid: true philosophy, which was once regarded as the controller of the other sciences and a crucially important yardstick against which they, or any part of them, could be checked for accuracy, is now regarded as not scientific at all – with obvious advantages, as we shall see later in this and in the next two chapters, for those who do not wish their theories and “discoveries” to be tested at the bar of common sense. I have, as can be seen, retained Aristotle’s demonstration nevertheless. The demonstration is important and true, irrespective of how many acknowledge it.

them are consistent with the hypothesis that the earth is at rest. Three of these experiments are particularly worth mentioning.

The first is concerned with what is known as stellar parallax. This, assuming for the sake of argument that it does take place and that the earth really does orbit round a sun which is the centre of the universe, is the phenomenon by which the direction in which the stars are seen from the earth must vary very slightly during the earth's annual revolution, giving the result that a nearby star appears to change its position in relation to a star that is further away.⁷ All three of the great (great in the mind of the public if not in fact) revolutionary astronomers of the Renaissance period, Copernicus, Galileo and Kepler, knew very well that, lacking any other genuine evidence for the heliocentric system they were promoting, stellar parallax had to be found if they were to support their theory with anything more substantial than supposition without foundation. They sought in vain. No observations made at that time succeeded in measuring such parallaxes; and when Tycho de Brahe,⁸ a contemporary of Kepler's, concluded that the earth was clearly not in motion, for nearly two hundred years no one could gainsay him. Even the apparent (I shall justify the word "apparent" in the next chapter) discovery of Newton's laws were of no real help. Many felt (and feel) that they were aesthetically pleasing and that they provided a system of unprecedented simplicity – we shall see about that in the next chapter! – by which the workings of the universe could be understood and predicted; but the laws provided no more than a method of making reasonably accurate calculations, as had the system of Ptolemy. In neither case was the system proved.

In 1729, however, James Bradley, an English astronomer, although failing to find stellar parallax did discover a related phenomenon which has been named "stellar aberration of starlight". In order to understand what this means, make the assumption that it is raining on a completely windless day and that you pick up a section of pipe and hold it up towards the sky. If you wish the raindrops to fall straight through the pipe you must hold it vertical. If you wish to walk in a circle you will need to tilt the pipe slightly to obtain the free fall, and when you have completed your circle the top of the pipe will

⁷ Still hypothesizing that the sun was the central point of the universe, if we were positioned on the sun the phenomenon of stellar parallax naturally would not occur at all during the year. Parallax is of course a feature of every day life and one of the important means we use to assess where we are. Thus for instance, as we walk along a road, nearby trees on either side of us appear to move in relation to more distant ones.

⁸ Tycho de Brahe (1546-1601) was a devotee of astrology as well as astronomy and, like Kepler, became a court astrologer. He was, however, an astronomer of real genius and in contrast to most of the others of that era he revolutionized astronomical method with the unprecedented precision and continuity of his observations. (Copernicus, for instance, in the whole, massive *Book of Revolutions*, records only twenty-seven observations, relying for the rest on data accumulated many centuries earlier by Hipparchus, Ptolemy and others.) (See *The Sleepwalkers* by Arthur Koestler: pp. 291-300).

have swung through a small closed circle relative to the bottom of the pipe: Replace the rain with starlight, yourself with the earth, and the pipe with a telescope, and precisely the effect which Bradley observed is created; and from this it was deduced that the earth revolved around the sun. Copernicus, Galileo and Kepler are vindicated and heliocentricity has triumphed.

Not so. With a sigh of compassion, we must point out to the great scientists of the eighteenth century and even of the twentieth century – for most of them to this day will use stellar aberration as evidence against geocentric theory – that the deduction as drawn from the facts that Bradley presented is completely inadmissible. For if the earth were at rest and the stars in motion, rather than vice versa, the telescope would need to be moved in exactly the same way.⁹

In 1838 a German astronomer, F.W. Bessel,¹⁰ with the help of a vastly improved telescope really did observe stellar parallax. Once again, however, the purported proof is capable of an equally valid alternative explanation, which, since a certain amount of background information is needed, I shall give in a more convenient context in chapter... (“Sir Isaac Newton and Modern Astronomy”)

In 1871 the Astronomer Royal, Sir George Airy, performed the second of the important experiments I have mentioned; and if the earth really were in motion this one should have demonstrated it conclusively. Pointing two telescopes at the same star, he filled one of them with water, and reasoned that, since the speed of light is less through water than through air and therefore the light would need more time to travel through the water-filled tube than the air-filled tube, the former must be tilted more than the latter, the reason being that the telescopes, along with the earth which is carrying them, are moving through the rays¹¹ emitted from the stars. The result was startling. The water-filled telescope did not need to be tilted: the angle between the two telescopes was zero. The clear conclusion, inescapable except to those who refused to have their preconceptions disturbed, was that the earth was at rest and starry firmament was revolving around it.¹²

⁹ Another analysis of the fallacious logic applied in suggesting that Bradley’s experiment verifies Copernican theory is given in paragraphs 221 and 222.

¹⁰ F.W. Bessel can perhaps best be described as the nineteenth century Tycho de Brahe, for like the latter he revolutionised the techniques of astronomical observation. The *Encyclopaedia Britannica* says of him: “Bessel inaugurated the modern era of practical astronomy.” Paragraphs 125-128.

¹¹ Whether the rays are caused by waves or moving particles (see paragraphs 24 and 27) is of course immaterial.

¹² Possibly, as I have just described it, the result of the Airy experiment appears to contradict the result of the Bradley experiment. In other words, why does not the Airy experiment have the apparent effect, as with the Bradley

Sixteen years later, our third experiment, one of the most famous experiments in the history of physics and one which will be mentioned often during the course of this and the next two chapters, was performed – the costly and intricate Michelson-Morley experiment. Shortage of space precludes a comprehensive description of the experiment, which may be found in any basic text-book on astronomy; but briefly it can be summarized thus. On the assumption that the earth revolves round the sun, the speed of the earth through space can be calculated, taking its distance from the sun and the time it takes to circle round the sun, at approximately (the velocity varies slightly) thirty kilometres per second, while the earth's rotation on its axis gives a velocity at the surface, on any point on the equator, of about 465 metres per second. To measure the ether wind that should result from these two motions, but principally the former one, the two American physicists, A.A. Michelson and E.W. Morley, constructed an apparatus, called an interferometer,¹³ whose object was to send two beams of light from the same source along routes equal in length but such that one route was at right angles to the direction of the earth's motion and the other route was along the direction of the earth's motion. The light waves were reflected by mirrors and brought together at a single point, the elapse of time between arrival of the first beam and the second beam could be measured, and from this the ether wind could be measured.¹⁴

The reader, who I hope by now will be less certain that the earth revolves around the sun than were the scientists of that period, will probably not be surprised to learn that the beams arrived at their destination practically simultaneously!. The experiments were repeated, by Morley and Dayton Miller in 1904 and 1905, by Miller again in 1921, later by Professor Picard of Brussels, and on other occasions subsequently. They obstinately refused to provide any evidence of ether wind.¹⁵ On the evidence, therefore an

experiment, of showing the earth in motion even if it be not. To remove any possible misunderstanding I elaborate a little further with the help of Walter van der Kamp (*Bulletin of the Tychonian Society*, December 1981: p.11) “Logically Bradley’s analogical demonstration still needs to be verified by directly measuring the earth’s velocity through absolute space... Fr. Ruggiero Giuseppe Boscovich (1711-87) suggested an experiment which removed this logical fly in the ointment by means of a valid syllogism... that is: if a, then b, hence if no a, then no b. It took a century before Airy in 1871 performed the test proposed by Boscovich... To summarize his approach: since we are in motion and the speed of light in water is lower than that in air, a telescope filled with water will have to be tilted more and hence show a greater aberration than a normal one. This unhappily turned out not to be the case. It looked as if the stars are moving relative to us with the same velocity that our earth is supposed to have, the light travelling through the water with a reduced speed, but without change of direction. In other words the heavens revolve with, and very slowly (the procession of the equinoxes) around, the sun while the earth is standing still.” Naturally neither Airy nor anyone else was willing to accept this interpretation and many possibilities were suggested to explain the failure of the Airy experiment. Until Einstein discarded the existence of ether, the most usual justification given was Fresnel’s not unreasonable postulate that moving bodies dragged with them the omnipresent static ether through which they moved.

¹³ The reason for this name is explained in Appendix 1 (paragraphs 176 and 177).

¹⁴ A more elaborate explanation of this experiment is given in paragraphs 168-177.

¹⁵ The experiments could not be sufficiently precise to prove the ether wind to be absolutely zero, so that the results published stated that no ether wind was discovered above five kilometres a second (Michelson-Morley), three

innocent layman might think, the earth must be stationary in the ether.

Such a solution was not even considered. Instead the world was presented with another of the wonderful achievements of modern science. The Michelson-Morley experiment had left the heliocentric theory of the universe floundering and in a state from which – if it were not to be abandoned, which was unthinkable – it must be rescued; but so definite was the direction in which the Michelson-Morley experiment pointed that either heliocentricity had to go and geocentricity be allowed to return, or the whole of science had to go. I do not exaggerate. Books and newspaper articles of the period were full of such statements as “the whole of science must reprove itself.”¹⁶ What is more, since geocentricity could under no circumstances be allowed to return, the whole of science did go.

It was Albert Einstein who pronounced the sentence of dismissal on science and thus rescued heliocentricity. The rescue operation was performed by means of a purely metaphysical concept lifted directly from Professors Fitzgerald and Lorentz,¹⁷

and a half kilometres a second (Morley-Miller), one and a half kilometres a second (Piccard), etc. What is completely certain, however, is that none of the experiments came near to showing the required thirty kilometres per second, the maximum velocity that could possibly be asserted being less than ten kilometres per second. All modern textbooks and other accounts of the subject are agreed in stating that the experiment showed no ether wind whatever, a fact that their authors doubtless find comfortable to live with thanks to Einstein’s having in the meantime abolished the ether by personal decree (see chapter “Einstein and Modern Physics” paragraphs 127 and 127F). Given the fact that modern science is prepared to accept any theory other than that the earth is stationary in the centre of the universe, Einstein’s solution is of course logical: if there is no ether it is conveniently self-evident that no experiment will show ether wind.

¹⁶ A representative description of that period in standard works is the following from *Mathematics and Western Culture* by Morris Kline, first published in 1953 and still in print (Pelican). I include a few of the author’s words on the experiment itself because they illustrate it very well. “The principle on which the Michelson-Morley experiment was based was the one which makes it take longer to row a given distance down the river and then back if there is a current than if there is no current, the reason being that if a constant velocity, such as the velocity of the stream, hinders a motion for a longer time than it helps the motion the net result is a loss in time... But despite the use of a very ingenious and delicate testing device known as an interferometer, Michelson and Morley were unable to detect the increase in time. The motion of the earth through the ether was apparently not taking place. Physicists were faced with an inescapable dilemma. The ether that was needed to carry light had to be a fixed medium through which the earth moved. Yet this condition was inconsistent with the result of experimentation. The failure of theory to agree with such a fundamental experiment could not be ignored. By this time physicists were convinced that their science needed some overhauling.” [My emphasis – N.M.G.] See also paragraph 195.

¹⁷ Although the contributions by Fitzgerald, Lorentz and their co-physicists to a purportedly increased knowledge of physical reality properly belong to chapter (“Einstein and Modern Physics”), a brief introduction to them is appropriate here. After the publication in 1887 of the results of the Michelson-Morley experiment, scientists remained dumbfounded (the actual word used by scientific authors on this subject) until a possible solution was advanced by Professor G.F. Fitzgerald, an Irish physicist, in 1892. He suggested that the arm of the interferometer pointing at a right angle to the earth’s motion had expanded by, conveniently, exactly the right amount to compensate for the different velocities of the light traveling from and to each arm – if such an arm is expanded by its own motion then the light traveling it will seem to go correspondingly slower, the distances traveled by the two beams of light no longer being equal. (In parenthesis, almost all books on the subject, including that quoted in Appendix 1, refer to the Fitzgerald Contraction and maintain that he hypothesized a contraction of the interferometer arm pointing in the direction of the

who had also been trying to explain the results of the Michelson-Morley experiment, and renamed by him the Special Theory of Relativity. What was suggested was that if the dimensions of an object in motion were assumed to shrink exactly in proportion to the speed at which it was travelling by exactly the necessary amount, mathematical calculations could be made to show that the earth was in motion after all. No one has ever seen an object shrink as a result of being in motion, and indeed one of the world's leading authorities on relativity, Dr. Herbert Dingle,¹⁸ was later to dismiss the theory of relativity as metaphysical nonsense with no basis on what could be observed (*Science at the Crossroads* by Sir Herbert Dingle);¹⁹ but despite such drawbacks the theory

earth's motion. Professor Dingle, in pages 162-168 of his *Science at the Crossroads*, quotes the original source of the Fitzgerald theory to show that his explanation was by means of an expansion of the transverse arm rather than a contraction of the longitudinal arm, so that the almost invariable reference to the Fitzgerald Contraction is an example of the popular tendency of erroneous statements, when published but once, being repeated perpetually by subsequent writers.) Professor Fitzgerald's burst of genius certainly had one merit, which is that it explained everything – if it were true. It also had a defect, which is that the expression *ad hoc* applied to it perfectly – as was noted by scientists at the time. In 1904 a Dutch physicist, Professor H.A. Lorentz, produced a more comprehensive theory that achieved the same effect. He suggested that a contraction took place in the length of this longitudinal arm (pointing in the direction of the earth's motion), the explanation for which lay in the electromagnetic theory of matter that Professor J.C. Maxwell had launched in the 1860's. Moving charged particles, Professor Lorentz claimed, gives rise to a magnetic field, thus disturbing the equilibrium of the forces binding the particles together and causing the length of any moving object to be reduced. He produced mathematical equations for calculating what, if the theory be true, a rod length would be, or appear to be, if measured from the point of view of a relatively moving frame, and the equations (revised by the famous French mathematician and physicist Henry Poincaré) became known as the Lorentz Transformations. Unlike Fitzgerald, Lorentz did at least have a physical explanation for his theory, but for the unprejudiced reader it may be difficult to find anything more to be said for it. Immediately suspect in that its admitted purpose was to accommodate the Michelson-Morley experiment – Lorentz stated publicly that his method of arriving at the equations was one of “groping” (*The Einstein Myth* by Dr. Herbert E. Ives: p.56), which indicates that he had decided in advance the answer that he must reach – its improbability was increased by the fact that the conveniently exact contraction (i.e. exactly balancing the two effects, speed and contraction) must be identical whether the interferometer was made of steel, stone, wood, plastic, or any other material – for whatever material was used in an instrument the same nil result was obtained, rendering, of course, any attempt physically to measure, or even demonstrate, the contraction impossible. The expression *ad hoc* still applied, as Lorentz himself realized (see chapter “Einstein and Modern Physics”, paragraph 89[1]F7). It remains to add that the Lorentz Transformation theory, sometimes also known as the Fitzgerald-Lorentz Contractions, was a model of sanity compared to the development of it that Einstein introduced in 1904, as is shown in chapter “Einstein and Modern Physics”.

¹⁸ Dingle, who died in 1979, could in fact have credibly claimed to be the leading authority on Relativity. A list of his most important publications, amongst which was one of the first text-books (published in 1919) on the subject, is given in chapter... along with some further observations by him on the subject of Relativity.

¹⁹ The shrinkage of dimensions caused by motion was not the only purely metaphysical motion, untested by observation, which Einstein introduced under the guise of science. He also claimed that an object's velocity increased its weight, a now generally accepted hypothesis which is equally untested. Although there is no evidence to support them, these two postulates concerning shrinking dimensions and weights can at least be imagined by the human intelligence. Einstein's third postulate, however, that if object **A** moves away from object **B** the former grows old more quickly than the latter (the ultimate conclusion of which is the one, comforting to the atheist, that if a man can move fast enough he can live for ever), departs not only from observation, but also from reason and sanity; for time-shrinkage is a concept that is neither imaginable nor justifiable by logical reasoning process. Moreover, when set in the context of the whole theory of Special Relativity, all these postulates are put out of court by an irreconcilable internal contradiction; for another arm of the theory is that motion is not absolute but relative, so that if **A** is moving away from **B** it is equally true that **B** is moving from a stationary **A**. Thus **A** and **B** are each younger (and shorter and lighter) than the other.

of Special Relativity was accepted.

These are the means by which the theory that the earth was in motion was maintained in the teeth of many experimental results squarely contradicting it. Although “far more incredible”, as van der Kamp put it, “than a Bible story” – unlike the whole of science which had been told that it had to “reprove itself”, Relativity was not even required to prove itself – Relativity had “saved the appearances” and no greater justification than that was needed for the incredible theory to take on the status of scientific fact, and to be taught, as it now is, to students throughout the world from the earliest stages of their instruction in physics.²⁰

The three experiments that have just been described – those by Bradley, Airey and Michelson and Morley – were designed almost exclusively to establish that the earth orbited the sun. Also worth mentioning are three phenomena which do at first sight seem to prove that the earth is rotating on its axis. These are Foucault’s pendulum, the Coriolis effect, and the geosynchronous satellites.

Since Foucault’s pendulum and the Coriolis effect are closely related, they can be considered together. Foucault’s pendulum, which was constructed in Paris in 1851, was a pendulum consisting of a 200 foot long flexible wire on which a heavy iron weight was suspended so as to be free to oscillate in any direction. It was found that the oscillating pendulum never retraced its path but at each swing apparently deviated: if the experiment is conducted in the northern hemisphere it deviates to the right, and in the southern hemisphere it will deviate to the left. The so-called “Coriolis effect” is similar: a shell from a long range gun, aimed at a target to the south of it, will land to the right of the target in the northern hemisphere and to the left in the southern hemisphere. Although the apparently obvious conclusion to be drawn from these two experiments is that the earth is rotating anticlockwise when observed from a fixed point above the North Pole, on further examination the obviousness is seen to be an illusion and the quip by Martin Gardiner about the ice cream and the pie²¹ is as applicable here as there. It is at first not easy to grasp the fact that Foucault’s pendulum and the Coriolis effect only demonstrate

²⁰ Walter van der Kamp made the following valid comment on the so-called scientific reasoning of Lorentz, Fitzgerald and Einstein: “For Fitzgerald, and Lorentz...with their expanding and shrinking measuring rods, they already know that undoubtedly Mother Gea [the earth – N.M.G.] is in motion, and therefore reject or circumvent all evidence to the contrary and are begging the question. If the experiments of Airey etc., had confirmed their expectations then they would have considered their Copernicanism unassailable. And if Tychonians believing, and therefore knowing, the Universe to be geocentric, would have come forward with an *ad hoc* hypothesis invalidating that heliocentric conclusion, they would have been laughed out of court. ‘Tails we win, heads you lose.’” (*Bulletin of the Tychonian Society*: Dec. 1981)

²¹ See paragraph 17.

relative motion and do not demonstrate which, if either, of the two objects is at rest,²² but careful thought will show it to be true. All that the experiments show is that there are forces which act on bodies in motion relative to each other, and that either the earth is rotating, or the inertial field of the “rest of the universe” is rotating round the earth, or some combination of these movements is occurring. Certainly a rotating earth would account for the phenomenon equally well (in this case the fixed stars would be preventing the ether from going round the earth at the same speed as the latter rotated), but it does not account for it better. The phenomenon cannot therefore logically be used to prove any one of the alternatives.²³

The concept just mentioned is not at first easy to grasp, but perhaps it will become clearer when we consider the third and most difficult *phenomenon* to reconcile with a geocentric universe, that of the geosynchronous satellites, also known as stationary or “twenty-four hour” satellites. These are the satellites launched into space to a distance of twenty-six thousand miles from the earth’s surface and, according to heliocentric theory, set in such an orbit that they travel round the earth at exactly the same speed as that at which the earth rotates, giving the illusion, when viewed from the earth, that they are stationary in space. If the earth does rotate, there is no mystery about what holds them in place: the centrifugal force caused by their orbit and pushing them out is exactly balanced by the pull exerted by gravity. The question is: if the satellites are stationary – if in fact they are the only objects in the whole universe, apart from the earth itself, that are completely at rest! – what holds them up? For on the face of it they have the force of gravity pulling in one direction and no countervailing force pushing in the other and thus should fall swiftly to earth.

Probably the above is the most difficult objection to geocentric theory to refute, because what I am going to say next is not capable of physical demonstration as is centrifugal force, nor is it easily visualized by the imagination. The fact is, however, that it is perfectly possible, and certainly not an illogical concept, that the rotation of distant masses can generate a gravitational field that exactly equals the centrifugal field, in other words that distant masses rotating round an object in their midst produce a pulling effect

²² The mathematical calculations involved would of course be no different even if it were assumed that the object at rest in each experiment were respectively the iron weight of Foucault’s pendulum and the shell apparently in flight from Coriolis’ long range gun!

²³ On the Copernican system in general and Foucault’s pendulum in particular, Professor James Hanson, of the Computer Science Department of Cleveland State University, Ohio, has the following interesting comment. “The Copernican view of dynamics is an absurdity; e.g. it analyses the motion of the Foucault pendulum by only considering the mass of the Earth and the mass of the pendulum bob while throwing away the whole mass of the rest of the Universe, whereas the geocentric explanation acknowledges the masses of the earth, and the bob, and the rest of the Universe, and is thus the more comprehensive of the two models.. I submit that any theory that wilfully ignores the largest input is not correct.” (*Bulletin of Tychonian Society*: August 1980)

on the surface of that object which is exactly equal to what the pushing effect would be if the distant masses were stationary and the central object rotating.

Some readers will be tempted at this point to say that I am behaving like the scientists that I am criticizing: that I am introducing a metaphysical speculation with no evidence to support it and nothing to be said for it except that it “saves the appearances”. The criticism would not be justified, for I am not claiming that it is a fact that the rotation of distant masses produces a force. I am only saying that it is a possibility (and, given the harmony of the universe and the tendency of its laws to be reciprocal, it is a very reasonable possibility), and that until the possibility is ruled out it cannot be said that the stationary satellites disprove geocentricity. If the reader still finds this difficult to accept I can add that, although I hesitate to enlist modern scientists in my support, a top Viennese scientist, Professor Hans Thirring demonstrated satisfactorily in the early part of this century that “distant rotary masses cause forces to appear which are analogous to the centrifugal and Coriolis forces,”²⁴ and that many highly regarded scientists of the twentieth century are quite happy to agree that geocentricity provides a perfectly satisfactory explanation for all the observable data and have publicly said so.²⁵

Is the reader still having difficulty in accepting that the geosynchronous satellite, as also Foucault’s pendulum and the Coriolis effect can be reconciled with geocentricity? If so I refer him to Appendix 4 in which I reproduce a detailed explanation, written in a manner designed to be easily comprehensible to the layman, by Professor Hans Reichenbach (1891-1953), a well-known and highly respected philosopher of science and expert on Relativity, in his popular book *From Copernicus to Einstein*.

Meanwhile, I re-emphasize: geocentricity is not rejected, and other explanations are not sought, because of any incompatibility between geocentricity and experience but solely because geocentricity is philosophically untenable. If it were not for the need felt by some

²⁴ In other words, to quote one commentator on Thirring’s paper, “essentially the same equations of motions arise from the heavens rotating around the earth once every twenty-four hours as arise if the earth is assumed to rotate once every twenty-four hours within the fixed heavens.” (Professor James Hanson, in *Bulletin of the Tychonian Society*, August 1980). Professor Hans Thirring’s paper “The Effect of Distant Rotating Masses in Einstein’s Theory of Gravitation,” was published in the journal *Physikalische Zeitschrift*, 19, 33, 1918.

²⁵ An example is perhaps the most respected astronomerphysicist of all of the present day, Professor Sir Fred Hoyle. In his book *Frontiers, of Astronomy* he writes (p. 304): “We can talk with precision of a body as spinning around relative to something or other, but there is no such thing as an absolute spin: the Earth is not spinning to those of us who live on its surface and our point of view is as good as anyone else’s – but no better.” (My emphasis – N.M.G.) In his book *Nicholaus Copernicus* the same author writes (p.86): “So we come back full circle to what was said at the beginning of this book. Today we cannot say that the Copernican theory is “right” and the Ptolemaic theory “wrong” in any meaningful physical sense. The two theories, when improved by adding terms involving the square and higher powers of the eccentricities of the planetary orbits, are physically equivalent to one another. (My emphasis – N.M.G.)

scientists to rebel against the Bible and for the preconceptions, so carefully instilled by modern education, of other scientists that a document as primitive as the *Old Testament* could not possibly be right, attempts by intelligent men to look beyond geocentric cosmology would, in the light of the experiments of the last century and a half, almost certainly never have occurred.

There is one last question that provides an interesting subject for speculation before we leave the realms of physical science. If we allow ourselves to assume, for the purpose of asking the question, that the earth is the sole motionless material object in the universe and lies in the exact centre of the universe, what keeps it there? What serves as its anchor, and what, in a universe where all else is in motion, is it anchored to?

Unless it be denied that the supernatural can exist, it is not impossible that the earth is held in place solely through the agency – whether exercised indirectly, through one of His angels, or directly – of the will of God. I hope it is not irreverent, however, to suggest that such a method would not be typical of God's ways. It is an essential part of Christian theology that the continued existence of every particle in the universe depends on God's continuing, for every second of time, to sustain it, and it is equally part of the Christian faith that God makes direct supernatural interventions in the working of the physical universe whenever He deems it appropriate to demonstrate His power. For the day to day running of the universe, however, all the evidence suggests that He has set up certain natural principles (known in modern terminology as Laws of Nature) and delegated to those principles, so to speak, every physical phenomenon that takes place. Thus, in much the same way that the continuance (as opposed to the original creation) of human life depends at the material level on such things as air, food, water and warmth, it is not unreasonable to suppose that there might exist a similarly natural reason for the continuance (as opposed to the original positioning) of the immobile earth in the centre of the universe.

Doubtless a number of plausible theories could be produced; but one that has been suggested by Mr. van der Kamp would demonstrate so exquisitely the minuteness of detail and calculation with which God's wisdom and omnipotence order the most colossal and complicated operations and events of the material world that it is perhaps permissible to hope that it is the correct one.

This theory is that the various gravitational forces in the universe (however caused)²⁶ are continually in exact balance at the point at which the earth rests and

²⁶ I say "however caused" because limitations of the accepted notions as to the cause of the effect known as

that nothing more solid or specific keeps the earth in place than – to use verbal shorthand for want of a better term – mathematical calculation. How this works can best be described by an analogy. Imagine a room which contains a revolving circular platform. At a point on the circumference of the platform a second platform revolving in the opposite direction is placed, on the second platform a third is placed, and so on, adding, say, a further seven more revolving platforms. It is perfectly possible that the revolution of the top platform will be exactly balanced by the total of the revolutions of all the other platforms so that with reference to the floor on which the bottom platform is placed the top platform is stationary, thus creating an illusion that some external force is holding it in place. It is no less possible that the sum total of the revolutions, ellipses and perturbations of the sun moving in relation to the so-called “fixed” stars,²⁷ and of the earth moving in relation to the sun should result in the earth’s being at rest.

Other hypotheses could be put forward about how the geocentric system works if it is the true system, but for the purpose of the chapter there is no need. What has already been said has achieved all that can be expected of it, having provided explanations of the universe which are coherent, rational and in accordance with what is observed. They neither require the results of experiments to be ignored, as does the heliocentric theory and the everything-in-motion theory, nor do they require that concepts which are contradicted by the senses be assumed to be true, nor do they, in the words of M. Pierre Bricout concerning Einstein’s theory about the velocity of light,²⁸ “wound our philosophic conception of the universe.” In short they have the great merit that they are scientific.

4. The Biblical Evidence Examined

Having looked at cosmology from the purely scientific angle it is now time to approach it from the religious angle. And at once it can be said that if scientific observation, when objectively interpreted, lends probability to geocentricity, an objective reading of the *Bible*, for those who accept that it speaks with authority,²⁹ makes the

gravity are discussed in the next chapter.

²⁷ In chapter “Sir Isaac Newton and Modern Astronomy” I show that the scientific evidence against the fixedness of the fixed stars is not as strong as we are led to believe. Whether, however, the fixed stars do or do not move in relation to each other has no bearing on the validity of van der Kamp’s suggestion.

²⁸ See chapter “Einstein and Modern Physics”, paragraph 88 [19].

²⁹ Whether or not the Bible does in fact speak with authority is discussed elsewhere in this book. (See chapter... “Is Christianity True?”)

probability overwhelming. In another chapter³⁰ it was observed that it is illogical to accept as authoritative and infallible what Holy Scripture reveals about life after death while rejecting its revelations about the origins of life in this world and of the world itself; and it is equally illogical to accept the *Bible*'s revelation about the origins of the world while rejecting what is revealed by the same source about the world's location.³¹ To elaborate on this further I return to Walter van der Kamp and the passage from which I quoted in paragraph 15, this time starting a few sentences earlier.

Darwin's theory of evolution, it seemed to me, was only a last logical and consequent step in the theories about origin and evolvment which gradually and inevitably followed in the chain of events set in motion by Galileo's victory. It being once accepted that human science has legitimate authority in questions of how to interpret the revealed text of Scripture, the fences were down, and the modern world picture could not but grow up and conquer... I found it significant that Creationists concentrated their defense of *Genesis* 1:1-19 on the age of Planet Earth, but not on its place. Yet where in the text of *Genesis*, or for that matter in the whole Bible, is there even the faintest hint that God, having created the Earth in the beginning, demoted it on the fourth day to one spinning, whirling and cork-screwing lump of matter out of many?... There were, to be sure, the thoughts of the wise, who get round this obstacle by positing phenomenal language, accommodating to the simple understanding of Adam, and whatnot.³² But why were the use of these clever devices restricted to *Genesis* 1:1-19, not to the rest of the chapter the story of the Fall, the Flood, the Tower of Babel and more of those scientifically indigestible fairy tales... Reading *Genesis* 1, while banning all pre-conceived notions and brain washing from my mind, I had to conclude not only that *Genesis* 1:20-31 totally clashed with any evolutionary theory whatever but that *Genesis* 1:1-19 emphatically implies and assumes a unique Earth, just three days older than the Sun, Moon and Stars. Now I "knew" of course that Copernicus and Galileo had proved that the Earth goes around the Sun.... (Walter van der Kamp in *Bulletin of the Tychonian Society*, May 1980: p.5)

Does the *Bible* specifically deny that the earth is in motion? There are indeed many passages in Holy Scripture to which Copernicus does violence.

First, van der Kamp rightly draws attention to *Genesis* 1:1-19. Earth was created on

³⁰ See chapter "Evolution or ...?", paragraphs 109-112.

³¹ Moreover, Jesus Christ by implication specifically condemns the notion that the *Bible* be considered accurate about the afterlife but not accurate about scientific matters pertaining to this world: "If I have spoken to you earthly things and you believe not, how will you believe if I speak to you heavenly things." (*John* 3:12)

³² On this attitude to the *Bible*, the words of another writer in the *Tychonian Bulletin* are worth quoting: "The notion that Truth itself can be distorted in Scripture to accommodate to human ignorance is mere blasphemy: it makes the Holy Spirit accomplice to a pious fraud. As for poetic license, it is allowable up to a point, but not nearly so far as to permit the ascription of immobility (e.g. *Psalms* 92:1, or 93:1 in KJV) to an object that is not only spinning but orbiting at perhaps dizzying speeds." (T. Robert Ingram in *Bulletin of the Tychonian Society*: Dec. 1981) In the same issue van der Kamp too makes a telling remark about scholars who try to "re-interpret" the *Bible* while continuing to profess Christianity: "That the Creator of language may consider it an insult to assume that He Himself cannot make it sufficiently clear what He intends to say does not apparently occur to these scholars."

the first day, the sun not until the fourth. A puzzle arises from the statement that light also appeared on the first day, three days earlier than the sun and moon which are now the main sources of light; but it is not irreconcilable, for whatever given source it may appear from is only a state or “affection” of the ether. God could have created luminiferous (lightbearing) ether on the first day, and until the third day supplied in some other way the influence on the ether which is now supplied by sources of light; and indeed this possibility is rendered even less offensive to reason when it is remembered that the Bible states that none of the organisms partly dependant on the sun for survival, such as animals and plants, existed on earth until they were created on the fourth, fifth and sixth days. Far harder to accept than this is the notion, which has no scriptural support, that for four days the earth circled around a theoretical point unoccupied by the non-existent sun.

Secondly, *Job* 38:4-6 clearly implies that the earth is at rest. “Where wast thou when I laid the foundations of the earth? Upon what are its bases grounded? Or who laid the corner stone thereof.” So also do *Job* 26:7 – “He...hangeeth the earth upon nothing” – and *Psalms* 92:1 (*Psalms* 93:1 in King James Version) – “For he hath established the world which shall not be moved” – and *Psalms* 103:5 (*Psalms* 104:5 in King James Version) – “Who hath founded the earth upon its own bases: it shall not be moved for ever and ever.” Possibly also *Isaiah* 66:1 – “Thus said the Lord: Heaven is my throne and the earth my footstool.” – for, as Dr. John Bloom wrote in the *Bulletin for the Tychoonian Society* (June, 1981), “it might be reasonable to anyone that one would not expect God’s footstool to go zipping through space while His Throne is stationary in the heavens.”

Then there is the uncompromisingly definite picture given in *Ecclesiastes* 1:5,6: “The sun riseth and goeth down and returneth to his place: and there rising again, maketh his round by the south, and turneth again to the north.” And finally, the most difficult scriptural passage of all to reconcile with Copernicanism must surely be *Josue* (*Joshua*) 10:12-14. “Josue...said before them (the children of Israel): Move not, O sun, toward Gabaon, nor thou, O moon, toward the valley of Agalon. And the sun and the moon stood still, till the people revenged themselves on their enemies... The sun stood still in the midst of heaven, and hasted not to go down the space of one day. There was not before or after so long a day.” For a start there is a physical difficulty in interpreting the passage heliocentrically caused by the fact that, if it were the earth’s rotation, rather than the sun’s revolution around the earth, which ceased, this would not be sufficient to halt the motion of the moon around the earth, which ceased, this would not be sufficient to halt the motion of the moon around the earth,³³ while if the moon too stood still it would

³³ Immanuel Velikovsky, in *Worlds in Collision*, postulated a view which has found some favour, even among Christians, that this event can be reconciled with an instantaneous deflection of the earth’s axis of rotation due to a planetary encounter. His theory can be safely discarded, as he did not

be left behind while the earth continued, not rotating, on its orbit. Much the most fundamental question, however, is this: is it conceivable that a God capable of creating the universe and its contents and a God who claims to be the Truth should be unable to have had recorded in His book of Revelation exactly what occurred? As Martin Luther said: “Joshua commanded the sun to stand still, not the earth.”³⁴

5. The Significance of the Revolution

How much does it all matter? Even if, as appears to be the case, science and Christian Revelation do combine to suggest that the earth is at rest at the centre of the universe, does very much hang on it?

To get a clear picture of what hangs on it we must try to place ourselves in the minds of those who were first faced with the new cosmology. The fact is that there is probably no parallel in the whole of history to the revolution in thinking that was necessitated by the abandonment of the geocentric theory of the universe. Men felt, not without justification, that it involved a parting with order and sanity. In the first place the new theory seemed, to both laymen and scientists alike, ludicrous and offensive to common sense. If it were true, they reasoned, the wind would constantly blow from the east; the buildings and the ground itself would fly off with such a rapid motion that only firm holds would keep it clamped upon the earth; and the earth would fall into the sun; and if the earth moved, why did they not feel its movement? Above all, the sun looked as though it rose and set. It is true that answers to these objections, valid or not, were to be gradually put together over the ensuing centuries, but a gap which could never be filled, and as far as those who organized this revolution were concerned was not meant to be filled, was created by man's loss of his picture of the universe, a universe functioning entirely for his benefit, with the earth, as the home of man, positioned fittingly at the centre around which the universe revolved; a universe which was orderly, rational and coherent. John Donne (1572-1631), when confronted with the theory of the “new cosmogony” of Copernicus, cried out, and there is suffering in every word: “Tis all in pieces, all coherence gone!” Nor was it only the earth's position and immovability in the universe which changed. Equally without foundation – as will be explained in chapter – the calculations of the

demonstrate how a planet large enough and sufficiently influential to affect the earth could fail also to affect the sun and the moon.

³⁴ Another major obstacle provided by both physics and logic in reconciling the story in Joshua to Copernicanism is described in paragraph 105.

vast distances of the stars from the earth are based on assumptions about the speed of light through the universe which are entirely untested – and equally contrary to man’s mental habit, the comfortable and reassuring bounded universe of tradition was replaced by a universe allegedly infinite in size. Even the revolutionary Kepler³⁵ was frightened by the perspective opened up by Galileo’s spyglass. “The infinite is unthinkable”, he repeatedly exclaimed in anguish. (*The Sleepwalkers* by Arthur Koestler: p.372) Goethe (1749-1832) summarized it all when he wrote some two hundred years later: “But among all the discoveries and corrections possibly none has resulted in a deeper influence on the human spirit than the doctrine of Copernicus... Possibly mankind has never been demanded to do more, for consider all that went up into smoke as a result of realizing the change: a second Paradise, a world of innocence, poetry and piety; the witness of the senses, the conviction of a poetical and religious faith.” And all this was abandoned with not a particle of evidence to sustain the usurping theory.

Earlier in this chapter I stated that in absolute terms the question of the place in the universe was far from being meaningless. We can now see clearly that this is true. What was involved in wrenching away the geocentric view of the universe was at one and the same time a direct assault on the Catholic Church, on the *Bible*, on philosophic tradition and on human mental composure.

6. Cosmology Before Galileo

It is now time to bring Galileo, whom I have so far hardly mentioned, onto the centre of the stage; for nothing was more influential in bringing about this cataclysmic revolution than what is known to history as the Galileo episode. Indeed although, as will be shown, Galileo’s position was untenable, and his arguments were patently bare and illogical, and his behaviour was repulsive and even dishonest, the long term effects of the episode were so wide ranging and great – not only in establishing the heliocentric theory but also in creating an image of the Catholic Church as tyrannical, cruel and a permanent foe of scientific discovery³⁶ and knowledge – that is difficult to believe that it was not carefully preplanned and co-ordinated.³⁷ There is,

³⁵ Some of Kepler’s contributions to science are discussed in paragraph 69.

³⁶ Despite the fact that no other example of the Church’s having tried to suppress scientific discovery or innovation is ever given.

³⁷ It is an interesting fact that although Francis Bacon (see chapter...) was acquainted with Galileo, few of his biographers mention the fact. If the Galileo episode was deliberately organized it is tempting to wonder if Bacon might have had some involvement in the organization. The fact that in all his known writings, in his own name and under pseudonyms, he adhered to the geocentric cosmogony is some evidence against

an addition, one other reason for examining the Galileo episode. The generally accepted version of it is one more example, of which so many are given in this book, of outrageous historical falsification with the most far-reaching consequences.

The story is brilliantly told in *The Sleepwalkers* by Arthur Koestler from which I have already quoted in this chapter. While the extracts from this book that I shall now give cannot come near to giving the detailed picture of what occurred that Koestler's book as a whole gives, they do indicate clearly the character of Galileo, the quality of his arguments, the attitude of the Catholic Church towards science and the heroic patience and forbearance of the Church hierarchy. Apart from the fact that Koestler is a careful and meticulous scholar we have excellent reason to trust the accuracy of his account. Not only are the most important of the facts he presents confirmed in other works such as the *Encyclopaedia Britannica*, but it could never be suggested that Koestler was biased in favour of the Catholic Church. Firstly, he believes in the Newtonian rather than the geocentric view of the universe, and secondly he is a Jew and has not shaken off the prejudices which are generally held by the Jews – to quote his own words (p.431): “Among my earliest and most vivid impressions of history was the wholesale roasting alive of heretics by the Spanish Inquisition, which could hardly inspire tender feelings toward that establishment (the Catholic Church).”

In view of the erroneously but widely held opinion that until the voyages of Columbus and the discoveries of Copernicus and Galileo mankind had thought the world to be flat, some introduction to the history of astronomy is necessary before I let Koestler begin. That the world was a sphere was well-known to the ancient Greeks as early as Pythagoras, Philolaus, a pupil of Pythagoras, having even held that the apparent daily revolution of the entire sky could more easily be explained by the earth's own motion, and Aristarchus, as already mentioned, having proclaimed that the sun and not the earth was the centre around which the planets revolved. Aristotle retained the earth's spherical shape and restored our planet to the centre of the universe, his opinion, which was perfectly logical and in accordance with observation, being that the world was surrounded by nine concentric transparent spheres, enclosing each other like the skins of an onion, the innermost sphere being that of the moon and the others being those of the planets and stars (the very outer sphere being that of the Prime Mover, or God). To account for the irregularities of the lunar, solar and planetary motions, each sphere consisted in turn of a nest of spheres within spheres, of which, while only a single sphere was needed for

the proposition but not conclusive. Above all he wanted to have his writings read and by putting forward such an offensive theory he would have risked rejection.

the entire multitude of the fixed stars, a total of fifty-four spheres was necessary to account for the celestial movements that could be observed. The system was kept in motion by fifty-five “independent intelligences”, the immaterial substances whose existence was found necessary by Aristotelian logic and which foreshadowed the angels of Jewish and Christian revelation.

Aristotle’s model enabled reasonably accurate astronomical calculations and predictions to be made, but a giant improvement in this field was made in the second century A.D. by Ptolemy of Alexandria whose system of cycles and epicycles – wheels, on the periphery of which were more wheels, on the periphery of which were yet more wheels - was to remain the dominant system in astronomy until Copernicus. There was no logical reason why Ptolemy’s wheels, which totalled forty, should have had any lesser reality than Newton’s mysterious attracting force allegedly possessed by massive objects, and they did all that was required of them: they accounted not only for the orbits which took place within orbits but also for orbits which were not circular but elliptic, and they enabled predictions to be made with a precision upon which it was difficult to improve. In short, they were as hypothetical as Newtonian physics, but, allowing for the fact that some improvements could be made with the help of the increased precision of modern instruments, they gave the right answers no less effectively.³⁸ As Koestler says:

“Alexandrian astronomers can hardly be accused of ignorance. They had more precise instruments for observing the universe than Copernicus had. Copernicus himself hardly bothered with star-gazing; he relied on the observations of Hipparchus and Ptolemy. He knew no more about the actual motions of the stars than they did. Hipparchus’ Catalogue of the fixed stars and Ptolemy’s Tables for calculating planetary motions were so reliable and precise that they served, with insignificant corrections, as navigational aids to Columbus and Vasco da Gama. Eratosthenes, another Alexandrian, compiled the diameter of the earth as 7,850 miles with an error of only 1 per cent. Hipparchus calculated

³⁸ In fact they still do give the right answers no less effectively, for it is not even really true to say that the system of cycles and epicycles has been dropped. The astronomers have merely changed their names! Oh, the wonders of modern science! Read carefully, dear reader, this sensational admission by the late Professor Charles Lane Poor, Professor of Celestial Mechanics at Columbia University and author of a number of standard textbooks on astronomy. In *Gravitation versus Relativity*, p. 32: “The deviations from the ‘ideal’ in the elements of a planet’s orbit are called ‘perturbations’ or ‘variations’. In calculating the perturbation the mathematician is forced to adopt the old device of Hipparchus and Ptolemy, the discredited and discarded epicycle. It is true that the name, epicycle, is no longer used, and that one may hunt in vain through astronomical textbooks for the slightest hint of the present day use of this device, which in the popular mind is connected with absurd and fantastic theories. The physicist and the mathematician now speak of ‘harmonic motion’, of Fourier’s series, of the development of a function into a series of Sines and Cosines. The name has been changed, but the essentials of the device remain. And the essential, the fundamental point of the device, under whatever name it may be concealed, is the representation of an irregular motion as the combination of a number of simple, uniform, circular motions.” (My emphases added – N.M.C.) And, lest it be thought that there could be any justification whatever for the view of “the popular mind” that the theories of Hipparchus and Ptolemy were “absurd and fantastic,” from the same book, page 139: “Hipparchus did not believe that the bodies of the solar system were attached to the radial arms of his epicycles; his was a mere mathematical or graphical device for presenting irregular, complicated motions.”

the distance of the moon as 30 1/4 earth diameters – with an error of only 0.3 per cent.³⁹
(*The Sleepwalkers* by Arthur Koestler: p.73)

While it is unlikely that the Ptolemaic system was ever entirely abandoned in that part of Christendom centred on Constantinople, the early centuries of Christianity in Europe were dominated, as is related elsewhere,⁴⁰ by the philosophical system known as Neo-Platonism, which looked upon science with contempt and led to astronomy, along with many other fields of scholarship, being largely ignored. During this period, which from an intellectual point of view (but probably none other whatsoever) can be called the Dark Ages with some justification,⁴¹ ignorance was prevalent and fanciful theories were advanced which did indeed include the notion that the earth was flat.⁴² As early as the eighth century A.D., however, an English monk, St. Bede of Jarrow,⁴³ stated unequivocally that the earth was a sphere, and from the beginning of the eleventh century onwards belief in a spherical earth in the centre of a universe acting in accordance with Ptolemaic system was universal among Christian scholars.

Beginning at the end of the fifteenth century, three major attempts were made, prior to that of Galileo, to alter this view. The first was that of Copernicus with his *Book of the Revolutions of the Heavenly Spheres*, described by Koestler as unique among books which made history in that it was and is an all-time worst seller,⁴⁴ mainly because of its supreme

³⁹ Before the the invention of the telescope an accurate calculation of the distance of the sun from the earth could not be approached and Ptolemy's estimate of 610 earth diameters was far from the true distance of 11,500 earth diameters. It was, nevertheless, closer than Copernicus' estimate of 571.(Information taken from *History of the Planetary Systems from Thales to Kepler* by J.L.E. Dreyer.)

⁴⁰ See chapter . . .

⁴¹ The term could almost certainly be applied to our own age with considerably more justification.

⁴² It must be firmly emphasized that the *Bible* makes no such mistake, however. In *Isaias* 40:22, the only passage in the *Bible* in which the shape of the world is clearly described, the Douay Version says: "It is he that sitteth upon the globe of the earth;" and the King James Version confirms with: "It is he that sitteth on the circle of the earth." (The Latin is *gyrus*) Also worth mentioning is *Psalms* 92:1 (93:1 in KJV): "He shall establish the world which shall not be moved," where the Latin of the Vulgate uses *orbem terrae* for "world". Classical scholars could dispute this because *orbem terrae* does not necessarily mean a sphere, some classical authors, such as Tacitus, having believed that the roundness of the earth was that of a disk. In fact there is no need to assume that this was what St. Jerome thought when he was translating the *Bible* in the fourth century, because other classical authors were well aware that it was a sphere – for instance, Book 2 of *Pliny the Elder's Natural History* written in the first century A.D. describes its spherical shape as though it were so obvious that no one could doubt it – but it is not of great significance either way because *Isaias* 40:22 (quoted above) is completely unambiguous.

⁴³ Popularly known as Venerable Bede, "Venerable" having been his ecclesiastical title prior to his comparatively recent canonization. (He was declared a Doctor of the Church by Pope Leo XIII in 1899.)

⁴⁴ Koestler shows that even the most conscientious modern scholars who claim to have read *The Revolutions* betray themselves in their writings as having not in fact done so! The give-away is in the number of epicycles in the Copernican system. In his *Commentariolus*, written full of optimism prior to his worst-seller, Copernicus announced

unreadability. The system was complex and irrational – contrary to popular belief he did not teach that the earth and planets moved around the sun but that they moved on epicycles of epicycles whose centre was the centre of the earth's orbit which in turn was distant from the sun by some three times the sun's diameter. The system was subject to many theoretical objections and, although it contained the advantage of eliminating the retrograde motions that the planets appear to perform when viewed from the earth, it fitted observed data no better than that of Ptolemy. Interesting, in the light of most people's view of the respective attitudes of the Protestant and Catholic Church's to new scientific theories, on behalf of the Protestants Martin Luther roundly condemned the theory, while, by contrast, the position of the Catholic Church, "the adversary of science", was one of initial encouragement followed by indifference until, seventy-three years later, the Galileo episode resulted in *The Revolutions* being put on the Index for a grand total of four years.⁴⁵

The second innovator, Johannes Kepler, lived a century later. He too tried to establish the sun as the centre of the universe and during the three years that he worked as an assistant to Tycho de Brahe (at the end of which he stole all Tycho's observation records) he tried, in vain, to find direct confirmation of the earth's orbit round the sun by proving the existence of stellar parallax, which, as already mentioned, is the shift in the apparent position of one fixed star in relation to another fixed star that must take place if and as the earth proceeds on its journey around the sun.⁴⁶ His interest in astronomy was coupled with an interest in alchemy and astrology – he ended his career as court astrologer to the Duke of Wallenstein with duties that included the casting of horoscopes for distinguished visitors – and perhaps as a consequence some of what he thought to be his most important discoveries have more connection with occult fantasy than logical reasoning. At the beginning of his career, for instance, he decided that the universe consisted of the five Pythagorean solids⁴⁷ into which the orbits of the planets neatly fitted

that his new system, no longer earth-centred, required only thirty-four circles, as opposed to Ptolemy's forty which Copernicus exaggerated and claimed to be not forty but eighty. In fact Copernicus' system used forty-eight epicycles (which he, presumably carefully, omits to summarize in his book) making it even more complicated than Ptolemy's. The former Astronomer Royal, Sir Harold Spencer Jones, adopts both mis-statements in *Chambers Encyclopaedia*, stating that Kepler reduced the number of epicycles from eighty to thirty-four, as does almost every other apparently scholarly work on the history of science written in this century.

⁴⁵ See paragraph 125.

⁴⁶ In his *Mysterium Cosmographicum* Kepler expressly stated that he was converted to the Copernican view of the universe not by what he discovered from his astronomical researches but by "physical, or if you prefer, metaphysical reasons." "The gist of them is that the Sun must be the centre of the world because he is the symbol of God the Father, the source of light and heat, the generator of the force which drives the planets in their orbits, and because a Sun-centred universe is geometrically simpler and more satisfactory." (*The Sleepwalkers* by Arthur Koestler: p. 263)

⁴⁷ Pythagoras discovered that although any number of regular (equal-sided) two-dimensional polygons can be constructed, it is only possible to construct five kinds of three dimensional solid of which all the faces are identical.

(a theory spoilt by the facts that the orbits do not fit and that there are nine planets); while at the end of his career he wrote *Harmony of the World* which, in addition to containing his third planetary law⁴⁸ which contains the essence of the Law of Gravity and provided the final clue for Newton,⁴⁹ recorded his conviction that the entire universe and everything in it, from metaphysics, epistemology, politics, down to distance and movement corresponded to musical intervals only audible to the soul situated in the centre of the sun. Not only is this latter view, which he regarded as a crowning achievement, madness, but it lands him firmly in the realms of the occult which, as is also discussed in paragraphs... of chapter..., always eventually seeks to interpret the world in numbers and mathematics.⁵⁰ Koestler, incidentally, shows himself to be well aware of the occult connection. “Kepler’s obsession with a cosmos built around the Pythagorean solids and and musical harmonies... was in keeping with the traditions of Neoplatonism, with the revival of Pythagoreanism,⁵¹ with the teaching of the Paracelsians, Rosicrucians, astrologers, alchemists, cabbalists and hermetists who were still conspicuously in evidence in the early seventeenth century... The Keplerian cosmos is the crowning achievement of a type of cosmic architecture which began with the Babylonians and ends with Kepler himself.” The implication that Kepler was a secret society initiate could hardly be spelt out more clearly.⁵² Mad though the purported

These are the tetrahedron (pyramid, or four equilateral triangular faces), the cube (six squares), the octahedron (eight triangles), the dodecahedron (twelve pentagons) and the icosahedron (twenty triangles). Later, Euclid proved that the construction of no other regular solid whatever was possible.

⁴⁸ Put into modern terms the law says that the squares of the periods of evolution of any two planets are as the cubes of their mean distances from the Sun. (See *The Sleepwalkers* by Arthur Koestler: p. 399)

⁴⁹ Kepler did not consider his three laws as important as his other more fantastic “discoveries” and scattered them among his various writings. In Koestler’s opinion “not the least achievement of Newton was to spot the three laws in Kepler’s writings, hidden away as they were like forget-me-knots in a tropical flowerbed.” (*The Sleepwalkers* by Arthur Koestler: p.40)

⁵⁰ A typical statement unmistakably denoting an occultist is the following off-quoted passage written by Galileo in *The Assayer*: “Philosophy is written in this grand book, the universe, which stands continuously open to our gaze. But the book cannot be understood unless one first learns to comprehend the language and read the letters in which it is composed. It is written in the language of mathematics, and its characters are triangles, circles and other geometric figures without which it is humanly impossible to understand a single word of it; without these, one wonders about in a dark labyrinth.” In other words it is not Christ who is the illuminating Truth, but mathematics. It is pure Gnosticism: knowledge is only for the initiates and the “wise”.

⁵¹ Pythagoras’ place in occult tradition is discussed in chapter...

⁵² As is shown from time to time in this book, the writings of secret society initiates are normally not the innovations they appear to be but the reproduction, at what is deemed to be an opportune moment, of traditional occult lore which has been used in the past. Much so-called modern science is of this nature. (As quoted earlier, “Nothing under the sun is new, neither is any man able to say: Behold, this is new: for it hath already gone before in the ages that were before us.” (*Ecclesiastes* 1:10) It is at least possible, therefore – and many well-versed in the occult would deem it likely – that Kepler’s three laws were not his own discovery, but were deliberately scattered amongst his works for the benefit of future initiates; and that Newton – the evidence that he was a secret society initiate is overwhelming and is acknowledged by many writers on the occult (see chapter...) – did not need painstaking research

discoveries to which he attached the greatest importance may have been, Kepler's real influence was in the long run far greater than that of Copernicus or Galileo. Copernicanism was a theory with no scientific justification which provided a convenient pad from which to launch the scientific and anti-ecclesiastical revolution a century later – one begins to wonder whether the unreadability of his *Revolutions* was deliberate policy for it is not easy to attack a book which no-one is prepared to read – and Galileo was little more than a blunt instrument to bring Copernicanism into the limelight and on which to hang a host of libels on the Church. Kepler, by contrast, not only provided, with his theory that each planet was subject to the two conflicting forces of the sun and the planet in question and with his three laws,⁵³ the source of Newton's Law of Gravitation, but also founded the two new sciences of instrumental optics and physical astronomy. (It is worth adding that although the Lutheran Church to which Kepler nominally adhered persecuted and even excommunicated him, the Catholic Church, and particularly the Jesuits, both protected and encouraged him. Possibly this was a mistake, but it was not consistent with intolerance or enmity towards scientific innovation.)

The third major influence on the astronomy of that period, and since, was Tycho de Brahe, born (in 1546) eighteen years earlier than Galileo and twenty-five years earlier than Kepler. Like Kepler he had leanings towards alchemy and astrology but unlike Kepler these leanings, according to Koestler, were never fused with his science. That his name is today hardly known is perhaps explained by the fact that he was by far the outstanding astronomer of the day, possessing a genius for precise observation and recording. Indeed he is the true founder of modern observational astronomy, for it was he who first propounded the truism, which now seems so obvious that it is hard to believe, that it was then unknown that astronomy needs observational data which is both precise and continuous.⁵⁴ He corrected almost every astronomical

in order to locate and see the significance of Kepler's laws but was directed to them by other initiates.

⁵³ The proposition contained in his first two laws was that the planets travelled round the sun in elliptical orbits and at speeds which varied with their distance from the sun and that a line drawn from a planet to the sun always swept over equal areas in equal times.

⁵⁴ Although it is today accepted as being so obvious that only a madman would question it, it is in fact a matter of great doubt that there really is any necessity for precise and continuous recording. It is all a question of what the purpose of astronomy really is. According to Aristotelian tradition the important search was for the nature and qualities of things rather than for their quantities, and it was not considered appropriate or a justifiable expenditure of time to interest oneself in quantities other than as was necessary for practical use. Much of the most important use of the astronomy was of course navigation, and for that purpose existing planetary tables in conjunction with up to date calendars were certainly sufficiently precise. The only justification for any further precision, therefore, seemed to be precision for precision's sake and the satisfaction of idle curiosity; and to the mediaeval mind such an interest, in addition to being condemned in the *Bible* ("Seek not the things that are too high for thee, and search not into things above thy ability... In unnecessary matters be not over curious, and in many of his works thou shalt not be inquisitive" (*Ecclesiasticus* 3:23), could only belong to a crank. Besides, as Koestler says, "a geometry of the skies consisting of cycles and epicycles did not require many, or very precise, observational data, for the simple reason that a circle is defined when

quantity that was on record in his day (most of the recorded qualities were those of Ptolemy) and produced a revised map of the heavens, comprising one thousand fixed stars. He also discovered a new star and a new comet and greatly improved the approximations of the sun's and moon's orbits.

Tycho's most glorious achievement, however, was that he undertook a survey of the solar system and produced a theory as to its structure and internal movement which, if the contents of the *Bible* are accepted as true and are reconciled with the genuine and incontrovertible data observed and recorded by astronomy, must surely be the correct one. According to this theory, the earth was the immobile, non-rotating centre of the universe, the planets orbited around the sun, and the sun, taking with it its cortege of planets, revolved around the earth, around which the sphere of fixed stars also performed its daily revolution. It was the first time in recorded history this solution had been proposed by a leading astronomer,⁵⁵ and it was also, until the present day, the last time.

7. Galileo

Thus the background to the revolution. Onto the stage of astronomical history, the Ptolemaic scenery of which had so far hardly been altered despite the strenuous efforts of Copernicus and Kepler, and onto the stage also of ecclesiastical history, now stepped the majestic figure of Galileo Galilei, intrepid fighter for and beacon of truth in a world of barbarism, oppression, cruelty and ignorance. Koestler introduces him thus:

Galileo is a second generation intellectual, a second generation rebel against authority; in a nineteenth century setting he would have been the Socialist son of a Liberal father. His early portraits show a ginger-haired, short-necked, beefy young man of rather coarse features, a thick nose and conceited stare. He went to the excellent Jesuit school at the Monastery of Vallombrosa, near Florence ... and at seventeen to the local university to study medicine.... Although there were no less than forty scholarships for poor students available in Pisa, Galileo failed to obtain one and was compelled to leave the university without a degree. (*The Sleepwalkers* by Arthur Koestler: p.359)

its centre and single point in its circumference are known, or, if the centre is unknown, by three points on its circumference alone. Hence it was, by and large, sufficient to determine the positions of a planet at a few characteristic points on its orbit and then arrange one's epicycle and deferents in the way most favourable to 'save the phenomena'. (*The Sleepwalkers* by Arthur Koestler: p.289) [A deferent is the circular orbit of the centre of the epicycle; i.e., circle with its centre on the circumference of another, larger circle, in which a planet is conceived to move. – N.M.G.]

⁵⁵ The fourth century B.C. astronomer Herakleides had come close to the same solution but had thought that the earth rotated and that only the "inner" two planets, Mercury and Venus (whose distance from the Sun is less than the distance between the Sun and earth), revolved round the Sun while the others (whose distance from the Sun is greater than that between Sun and earth) revolved round the earth.

Although Koestler does not mention it, in view of the fact that Galileo has subsequently been raised virtually to the status of holy martyr it is worth mentioning that Galileo scandalised many of his contemporaries, including some of his scientific allies, by keeping a mistress by whom he had two illegitimate daughters (both of whom became nuns).



The first contact between Galileo and Kepler took place in 1597... In a letter to Kepler, Galileo wrote “I indeed congratulate myself in having an associate in the study of Truth who is a friend of Truth... I adopted the teachings of Copernicus many years ago... I have written many arguments in support of him and in refutation of the opposite view – which however I have not dared to bring into the public light, frightened by the fate of Copernicus himself, our teacher, who although he acquired immortal fame with some is yet to an infinite multitude of others (for such is the number of fools) an object of ridicule and derision. I would certainly dare to publish my reflection at once if more people like you existed; as they don’t I shall refrain from doing so.”

The letter is important for several reasons. Firstly, it provided conclusive evidence that Galileo had become a convinced Copernican in his early years. He was thirty-three when he wrote the letter; and the phrase “many years ago” indicates that his conversion took place in his twenties. Yet his first explicit public pronouncement in favour of the Copernican system was only made in 1613, a full sixteen years after his letter to Kepler, when Galileo was forty-nine years of age. Through all these years he not only taught, in his lectures, the old astronomy according to Ptolemy, but expressly repudiated Copernicus.

But the letter is also interesting for other reasons. In a single breath, Galileo four times evokes Truth: friend of Truth, investigating Truth, pursuit of Truth, proof of Truth; then, apparently without awareness of the paradox, he calmly announces his intention to suppress Truth. One wonders at the motives of his secrecy.

Why in contrast to Kepler, was he so afraid of publishing his opinions? He had, at that time, no more reason to fear religious persecution than Copernicus had. The Lutherans, not the Catholics, had been the first to attack the Copernican system. The Catholics, on the other hand, were uncommitted. In Copernicus’ own day, they were favourably inclined towards him – it will be remembered how Cardinal Schoenberg and Bishop Giese had urged him to publish his book. Twenty years after its publication, the Council of Trent re-defined Church doctrine and policy in all its aspects, but it had nothing to say against the heliocentric system of the universe. Galileo himself, as we shall see, enjoyed the active support of a galaxy of Cardinals, including the future Urban VIII, and of the leading astronomers among the Jesuits. Up to the fateful year 1616, discussion of the Copernican system was not only permitted, but encouraged by them – under the one proviso, that it should be confined to the language of science, and should not impinge on the theological matters.

Thus legend and hindsight combined to distort the picture, and gave rise to the erroneous belief that to defend the Copernican system as a working hypothesis entailed the risk of ecclesiastical disfavour or persecution. During the first fifty years of Galileo’s lifetime, no such risk existed; and the thought did not even occur to Galileo. What he feared is clearly stated in his letter: to share the fate of Copernicus, to be mocked and derided; **((print lost from last line at very bottom page – cutoff during photocopy – PE))** stage” – are his exact words. Like Copernicus, he was afraid of the ridicule both of the unlearned and the learned asses, but particularly of the latter: his fellow professors at Pisa and Padua, the stuffed shirts of the peripatetic school, who still considered Aristotle and Ptolemy as

absolute authority. And this fear, as will be seen, was fully justified. (*Ibid.* p. 361)

Incidentally, the famous experiment of dropping canon balls from the leaning Tower of Pisa was carried out not by Galileo but by his opponent, Coressio, and not in refutation, but in an attempt to confirm the Aristotelian view that larger bodies must fall quicker than smaller ones. (*Ibid.* p. 435. See also *Aristotle, Galileo and The Tower of Pisa* by Lane Cooper)

The telescope was, as already mentioned, not invented by Galileo. In September 1608, a man at the annual Frankfurt fair offered a telescope for sale which had a convex and a concave lens, and magnified seven times. On 2 October 1608, the Dutch spectacle-maker Johan Lippershey of Middelburg claimed a licence for thirty years from the Estates General of the Netherlands for manufacturing telescopes with single and double lenses. In April 1609, telescopes could be bought in spectacle-makers' shops in Paris. In the summer of 1609, Thomas Harriot in England made telescopic observations of the moon, and drew maps of the lunar surface. In the same year, several of the Dutch telescopes found their way to Italy and were copied there.

Galileo himself claimed in the *Messenger from the Stars* that he had merely read reports of the Dutch invention, and that these had stimulated him to construct an instrument on the same principle, which he succeeded in doing "through deep study of the theory of refraction". Whether he actually saw and handled one of the Dutch instruments brought to Italy is a question without importance, for once the principle was known, lesser minds than Galileo's could and did construct similar gadgets. On 8 August 1609, he invited the Venetian Senate to examine his spy glass from the tower of St. Marco, with spectacular success; three days later, he made a present of it to the Senate, accompanied by a letter in which he explained that the instrument, which magnified objects nine times, would prove of utmost importance in war.

The grateful Senate of Venice promptly doubled Galileo's salary to a thousand scudi per year, and made his professorship at Padua (which belonged to the Republic of Venice) a lifelong one. It did not take the local spectacle-makers long to produce telescopes of the same magnifying power, and to sell in the streets for a few scudi an article which Galileo had sold the Senate for a thousand a year – to the great amusement of all good Venetians.

Incidentally also:

The correct law for the Pendulum was discovered not by Galileo but by Huygens. The Candellabra still shown at the Cathedral of Pisa, whose oscillations are alleged to have given Galileo his idea, was only installed several years after the discovery. (*Ibid.* p. 593)



Attributing capital importance to the discovery of the four moons of Jupiter, Galileo explained:

"Moreover, we have an excellent and exceedingly clear argument to put at rest the scruples of those who can tolerate the revolution of the planets about the sun in the Copernican system, but are so disturbed by the revolution of the single moon around the earth while both of them describe an annual orbit round the sun, that they consider this theory of the universe to be impossible."

In other words, Galileo thought the main argument of the anti-Copernicans to be the impossibility of the moon's composite motion around the earth, and with the earth around the sun; and further believed that this argument would be invalidated by the composite motion of the four Jupiter moons. Moreover, it ignored the fact that in the Tychonic system all the planets describe a composite motion around the sun and with the sun around the earth; and that even in

the more limited “Egyptian” system at least the two inner planets do this.

Thus Galileo’s observations with the telescope produced no important arguments in favour of Copernicus, nor any clear committal on his part. Besides, the discoveries announced in the Star Messenger were not quite as original as they pretended to be. He was neither the first nor the only scientist who had turned a telescope at the sky and discovered new wonders with it. Thomas Harriot made systematic telescopic observations and snaps of the moon in the summer of 1609, before Galileo, but he did not publish them. Even the Emperor Rudolph had watched the moon through a telescope before he had heard of Galileo. Galileo’s star maps were so inaccurate that the Pleiades group can only be identified on them with difficulty, the Orion group not at all; and the huge dark spot under the moon’s equator, surrounded by mountains, which Galileo compared to Bohemia, simply does not exist.

Yet when all this is said, and the holes are picked in Galileo’s first published text, its impact and significance still remain tremendous. He was the first to publish what he saw, and to describe it in a language which made everybody sit up. It was not this or that particular detail, but the total contents of the *Messenger from the Stars* which created the dramatic effect.

The booklet aroused immediate and passionate controversy. It is curious to note that Copernicus’ *Book of Revolutions* had created little stir for half a century, and Kepler’s Laws even less at their time, while the *Star Messenger*, which had only an indirect bearing on the issue, caused such an outburst of emotions. The main reason was, no doubt, its immense readability. To digest Kepler’s *magnum opus* required, as one of his colleagues remarked, “nearly a lifetime”; but the *Star Messenger* could be read in an hour, and its effect was like a punch in the solar plexus on those grown up in the traditional view of the bounded universe. (*Ibid.* p. 371)

Galileo spent the spring of 1611 in Rome... The visit was a triumph... Pope Paul V received him in friendly audience and the Jesuit Roman College honoured him with various ceremonies. The venerable Father Clavius, principal author of the Gregorian Calendar reform, who had at first laughed at the *Star Messenger*, was now entirely converted. So were the other astronomers at the College. They not only accepted Galileo’s discoveries, but improved on his observations, particularly of Saturn and the phases of Venus. (*Ibid.* p. 432)



His Letter to Castelli, enlarged a year later into a letter to the Grand Duchess Christina was a kind of theological atom bomb, whose radioactive fall-out is still being felt. It was intended to be widely circulated and indeed it was. Its purpose was to silence all theological objections to Copernicus... As a work of polemical literature the “Letter” is a masterpiece... He developed the argument which Kepler had constantly used, namely that certain statements in the *Bible* should not be taken literally because they were couched in language “according to the capacity of the common people who are rude and unlearned.”

In a breathtaking passage he queried the title and authority of theology as queen of the sciences and grossly misrepresented the attitude of the Church to propositions which contradict the apparent meaning of passages in the *Bible* as follows:

“And as to the propositions which are stated but not rigorously demonstrated, anything contrary to the *Bible* involved by them must be held undoubtedly false and should be proved so by every possible means.”

Now this was demonstrably not the attitude of the Church. “Propositions which are stated but not rigorously demonstrated,” such as the Copernican system itself, were not condemned outright, if they seemed to contradict Holy Scripture; they were merely relegated to the rank of “working hypotheses” (where they rightly belong), with an implied: “wait and see; if you bring proof, then, but only then, we shall have to reinterpret Scripture in the light of this necessity.” But Galileo did not want to bear the burden of proof: for the crux of the matter is, as will be seen, that he had no proof. Therefore, firstly, he conjured up an artificial black-or-white alternative, by pretending that a proposition must either be accepted or outright condemned. The purpose of this sleight of hand becomes evident from the next sentence:

“Now if truly demonstrated physical conclusions need not be subordinated to biblical passages, but the latter must rather be shown not to interfere with the former, then before a physical proposition is condemned it must be shown to be not rigorously demonstrated – and this is to be done not by those who hold the proposition to be true, but by those who judge it to be false. This seems very reasonable and natural, for those who believe an argument to be false may much more easily find the fallacies in it than men who consider it to be true and conclusive...”

The burden of proof has been shifted. The crucial words are those underlined by me. It is no longer Galileo’s task to prove the Copernican system, but the theologians’ task to disprove it. If they don’t, their case will go by default, and Scripture must be reinterpreted.

Assuming that Galileo really was responsible for the discoveries that remain attributed to him even after those falsely attributed to him are discarded,⁵⁶ – an assumption on which, knowing the possibilities of historical manipulation, I should hesitate to place much weight – it seems probable that Galileo genuinely was a genius in the field of physics. Whether he was or not, however, there is one area in which the term genius can be attached to him with no hesitation whatever: that of polemics and debate. Koestler is apparently⁵⁷ the first writer to have pointed out the slick and brilliant trick in the passage just quoted. Here is his perceptive analysis of it.

In fact, however, there had never been any question of condemning the Copernican system as a working hypothesis. The biblical objections were only raised against the claim that it was more than a hypothesis, that it was rigorously proven, that it was in fact equivalent to gospel truth. The subtlety in Galileo’s manoeuvre is that he does not explicitly raise the claim. He cannot do so, for he had not produced a single argument in support of it. Now we understand why he needed his black-or-white alternative as a first move: to distract attention from the true status of the Copernican system as an officially tolerated working hypothesis awaiting proof. Instead, by slipping in the ambiguous words “physical proposition” at the beginning of the italicized passage, followed by the demand that “it must be shown to be not rigorously demonstrated,” he implied (though he did not dare to state it explicitly) that the truth of the system was rigorously demonstrated. It is all so subtly done that the trick is almost imperceptible to the reader, and as far as I know, has escaped the attention of students to this day. Yet it decided the strategy he was to follow in coming years.

Throughout the document Galileo completely evaded any astronomical or physical discussion of the

⁵⁶ According to Koestler, Galileo genuinely did found the modern science of dynamics:

⁵⁷ According to Walter van der Kamp in *Bulletin of the Tychonian Society*: May 1979.

Copernican system; he simply gave the impression that it was proven beyond doubt. If he had talked to the point, instead of around it, he would have had to admit that Copernicus' forty-odd epicycles and eccentrics were not only not proven but a physical impossibility, a geometrical device and nothing else; that the absence of an annual parallax, i.e. of the apparent shift in the position of the fixed stars, in spite of the new telescopic precision, weighed heavily against Copernicus; that the phases of Venus disproved Ptolemy, but not Herakleides or Tycho; and that all he could claim for the Copernican hypothesis was that it described certain phenomena (the retrogression) more economically than Ptolemy; as against this, the above-mentioned physical objections would have carried the day.

What was the motive behind it? For almost fifty years of his life, he had held his tongue about Copernicus, not out of fear to be burnt at the stake, but to avoid academic unpopularity. When, carried away by sudden fame, he had at last committed himself, it became at once a matter of prestige to him. He had said that Copernicus was right, and whosoever said otherwise was belittling his authority as the foremost scholar of this time. That was the central motivation of Galileo's fight as will become increasingly evident.

The final section of the Letter to the Grand Duchess is devoted to the miracle of Joshua. Galileo first explains that the sun's rotation around its axis is the cause of all planetary motion, assuming also, with no trace of "rigorous proof", not only the annual revolutions of the planets, but also their daily rotation round their axes to be caused by the sun. He then concludes that when Joshua cried: "Sun stand thou still," the sun stopped rotating, and the earth in consequence stopped both its annual and daily motion. Koestler now draws attention to one more obstacle (additional to those that I mentioned in paragraph 58) against any attempt to reconcile the story in Josue (Joshua) with Copernicanism.

But Galileo, who came so close to discovering the law of inertia, knew better than anybody that if the earth suddenly stopped dead in its track, mountains and cities would collapse like match-boxes; and even the most ignorant monk, who knew nothing about impetus, knew what happened when the horses reared and the mail-coach came to a sudden halt, or when a ship ran against a rock. If the *Bible* was interpreted according to Ptolemy, the sudden stand-still of the sun would have no appreciable physical effect, and the miracle remained credible as miracles go; if it was interpreted according to Galileo, Joshua would have destroyed not only the Philistines, but the whole earth. That Galileo hoped to get away with this kind of painful nonsense showed his contempt for the intelligence of his opponents.

In the Letter to the Grand Duchess Christina the whole tragedy of Galileo is epitomized. Passages which are classics of didactic prose, superb formulations in defence of the freedom of thought, alternate with sophistry, evasion, and plain dishonesty.



For the next eighteen years Galileo lived honoured and unmolested, befriended by Pope Urban VIII and an impressive array of cardinals.

In 1615 a Neapolitan monk published a book in defence of Galileo and Copernicus, as a result of which Cardinal Bellarmine, Consultor of the Holy Office, a brilliant controversialist who had lectured in astronomy, eventually canonized and, according to Koestler, not a man who could be described as an ignorant fanatic, produced an unofficial definition of the Church's attitude to Copernicus. It included the following:

“For to say that the assumption that the Earth moves and the Sun stands still saves all the celestial appearances better than do eccentrics and epicycles is to speak with excellent good sense and to run no risk whatever. Such a manner of speaking suffices for a mathematician. But to want to affirm that the Sun, in very truth, is at the centre of the universe and only rotates on its axis without travelling from east to west, and that the Earth is situated in the third sphere and revolves very swiftly around the Sun, is a very dangerous attitude. If there were a real proof that the Sun is in the centre of the universe, that the Earth is in the third sphere, and that the Sun does not go round the Earth but the Earth round the Sun, then we should have to proceed with great circumspection in explaining passages of Scripture which appear to teach the contrary, and we should rather have to say that we did not understand them than to declare an opinion to be false which is proved to be true. But I do not think there is any such proof since none has been shown to me. To demonstrate that the appearances are saved by assuming the Sun at the centre and the earth in the heavens is not the same thing as to demonstrate that in fact the Sun is in the centre and the earth is in the heavens. I believe that the first demonstration may exist, but I have grave doubts about the second; and in case of doubt one may not abandon the Holy Scriptures as expounded by the holy Fathers...”

The italicized passage under the first heading states clearly that it is admissible not only to expound the Copernican system, but also to say that as a hypothesis it is superior to Ptolemy’s. This is “to speak with excellent good sense” so long as we remain in the domain of hypothesis.

Bellarmino had placed the burden of proof for the Copernican system back where it belonged: on the advocates of the system. There were only two possibilities left to Galileo: either to supply the required proof, or to agree that the Copernican system should be treated, for the time being, as a working hypothesis.

How could Galileo manage to refuse to produce proof and at the same time demand that the matter should be treated as if proven? The solution of the dilemma was to pretend that he had the proof, but to refuse to produce it, on the grounds that his opponents were too stupid, anyway, to understand. His answer to Bellarmine was contained in a letter written at some date in May to Cardinal Dini (my emphasis):

“To me, the surest and swiftest way to prove that the position of Copernicus is not contrary to Scripture would be to give a host of proofs that it is true and that the contrary cannot be maintained at all; thus, since no truths can contradict one another, this and the Bible must be perfectly harmonious. But how can I do this, and not be merely wasting my time, when those Peripatetics who must be convinced show themselves incapable of following even the simplest and easiest of arguments?...”

The truly staggering thing in this passage is not its contemptuous arrogance, but the fact that while talking of “Peripatetics” it is in fact aimed at Bellarmine; for it is on him and not on the back-woodsmen, that the decision depends, and it was Bellarmine who had challenged him to produce proof.



We come to the last episode before the blow fell. Galileo had repeatedly hinted that he had discovered a decisive physical proof of the Copernican theory, but had so far refused to disclose it. When he began to feel that arguing about the miracle of Joshua and the ludicrousness of Ptolemy was no longer of avail, and that his position was becoming impossible, he produced, as a last card, his “conclusive physical proof”. It was his theory of the tides. It contradicted Galileo’s own researches into motion, was a relapse into crude Aristotelian physics, and postulated that there ought to be only one high tide a day, precisely at noon – whereas everybody knew that there were two, and that

they were shifting around the clock. The whole idea was in such glaring contradiction to fact, and so absurd as a mechanical theory – the field of Galileo’s own immortal achievements – that its conception can only be explained in psychological terms. It was not a mistake but a delusion.

Armed with his new “secret weapon” he now decided to make a direct assault on the Pope... He did everything in his power to provoke a showdown.

Thus it came about that on 23rd February, 1616, the Qualifiers (Theological Experts) of the Holy Office met to give their opinion on the two following propositions submitted to them:

1. The sun is the centre of the world and wholly immovable of local motion.
2. The earth is not the centre of the world nor immovable but moves as a whole, also with a diurnal motion.

The Qualifiers unanimously declared the first proposition to be:

“...foolish and absurd, philosophically and formally heretical inasmuch as it expressly contradicts the doctrine of Holy Scripture in many passages, both in their literal meaning and according to the general interpretation of the Fathers and Doctors.”

The second proposition was declared “to deserve the like censure in philosophy, and as regards theological truth, to be at least erroneous in faith.”

But the Qualifiers’ verdict was, for the time being, overruled under pressure of the more enlightened Cardinals; it was only published a full seventeen years later. Instead of it, on 5 March, the General Congregation of the Index issued a more moderate decree, in which the fatal word “heresy” did not appear.

The document had consequences which are still felt today. It represents, as it were, the crack in the wall which led to the falling apart of Science and Faith. It is therefore important to examine its exact meaning and intent, as distinct from its psychological effect and its historical consequences.

In the first place it must be repeated that the Qualifiers talked of heresy, the decree did not. The Qualifiers’ Opinion became known to the public only in 1633, when Galileo forced a second showdown, and the Opinion was quoted in the verdict of his trial. Even then, it remained a judicial opinion, without endorsement by Papal authority, and therefore not binding on the members of the Church.⁵⁸ Accordingly, the immobility of earth never became an article of faith, nor the immobility of the sun a heresy.

Similar considerations of a judicial nature apply to the decree itself. It was issued by the Congregation of the Index, but not confirmed by papal declaration *ex cathedra* or by Œcumenical Council, and its contents therefore never became infallible dogma.

A quite different question is how the decree affected the freedom of scientific discussion... Canon Koppemigk’s (Copernicus’) book remained on the Index for exactly four years. In 1620 the corrections were published and turned out to be of a trifling nature. Nine sentences, by which the heliocentric system was represented as certain, had to be either omitted or changed... From then onward, any Catholic publisher was free to reprint the *Book of Revolutions* – but no Catholic, or Protestant, publisher felt moved to do so for another three hundred years. The book itself had become, apart from being unreadable, a mere curiosity and completely out of date. Copernicanism

⁵⁸ Here and in the next paragraph Koestler shows an excellent understanding of Catholic doctrine on the subject of when pronouncements by various bodies of the Church are and are not infallible.

was a slogan, but not a defensible system of astronomy. The temporary suspension of Copernicus' book had no ill effects on the progress of science.



Galileo had been admonished not thenceforth to “hold, teach or defend” the condemned doctrine.

Six days after the decree Galileo was received by the Pope in an audience which lasted three quarters of an hour. But while everything was done to spare him public humiliation he had been confidentially but firmly enjoined to keep within the prescribed limits... On 26 May 1616, at Galileo's request, Bellarmine issued a certificate which seems to indicate that Galileo was under no absolute prohibition... For the next seven years he published nothing... He could mutter about the “ignorance, malice and impiety of my opponents who had won the day;” but he must have known, without admitting it to himself, that his defeat was really due to the fact that he had been unable to deliver the required proof. (*Ibid.* pp. 440-471)

When Maffeo Barberini was installed as Pope Urban VIII there began a kind of second honeymoon between the repository of Faith and the foremost representative of science in Italy... Galileo had six long audiences with Urban in the course of six weeks. It has been established that during one of the audiences Urban himself made a suggestion how to get around the difficulty of arguing in favour of the Copernican system without asserting it to be true. The suggestion was this: assuming that a hypothesis explains satisfactorily certain phenomena, this does not necessarily mean that it is true, for God is all-powerful and may have produced the said phenomena by some entirely different means which are not understood by the human mind. The Pope showered favours on him – a pension for Galileo's son, a precious painting, a gold and silver medal, and also a glowing testimonial to the new Grand Duke...

How the Roman Catholic Church could have been accused of being the enemy of science in the light of such an endorsement of science and of Galileo's contribution in particular defies reasonable explanation.

Encouraged and in the full sunshine of Papal favour, Galileo, now past 60, felt the road at last free to embark on his great apologia for Copernicans... It took him four years to write... In January 1630 *The Dialogue on the Flux and Reflux of the Tides* was completed...

The Dialogue is carried on by three characters... At the very end of it, Simplicio, the good natural simpleton, defender of Aristotle and Ptolemy, and who fulfils the role of the clown who is kicked in the pants and is shown up as an ass over and over again, trots out Pope Urban's argument as “coming from a most eminent and learned person, and before whom one must fall silent;” whereupon the other two declare themselves silenced by “this admirable and angelic doctrine” and decide “to go and enjoy an hour of the refreshment in the gondola that awaits us.” Thus the *Dialogue* ends with what can only be described as a rude noise at the Pope – with the consequences that one may expect.

Not, I suggest, with the consequences that most people would expect. The patience, gentleness and considerateness displayed up to the end by the Church authorities to a man both so gross in his manners and so dishonest almost surpasses belief. To set it in its correct context one need only imagine how a twentieth century Communist

regime would react under a fraction of .the provocation.

When, in the *Dialogue*, he is concerned with the astronomical arguments for and against Copernicus, Galileo is downright dishonest... He breathes not a word that Copernicus, as well as Ptolemy, needs a whole workshop full of epicycles... Moreover he keeps silent about the fact that the Tychonic system fits the phenomena equally well. There can be no doubt that Galileo's theory of the tides was based on unconscious self-deception; but in the light of the above there can also be little doubt that the sunspot argument was a deliberate attempt to confuse and mislead. To represent the constant tilt of a rotating body as a new and inconceivable hypothesis, when every student since Pythagoras knew that this was the reason why summer followed winter; to obscure this simple issue by the novelty of curving sunspots, while making the complexities of Copernicus appear -deceptively simple, was part of a deliberate strategy, based on Galileo's contempt for the intelligence of his contemporaries. We have seen that scholars have always been prone to manias and obsessions, and inclined to cheat about details; but impostures like Galileo's are rare in the annals of science.

At the first hearing, Galileo stated that he had neither "maintained nor defended in the book the opinion that the earth moves and that the sun is stationary, but have rather demonstrated the opposite of the Copernican opinion and shown that the arguments of Copernicus are weak and not conclusive." To pretend, in the teeth of the evidence of the printed pages of his book, that it said the opposite of what it did, was suicidal folly. Yet Galileo had had several months in which to prepare his defence... The pretence that the *Dialogue* was written in refutation of Copernicus was so patently dishonest that his case would have been lost in any court. The next, unexpected turn of events... was a confession by Galileo (which ended with the following words): "My error, then, has been – and I confess it – one of inglorious ambition and of pure ignorance and inadvertance." He then returned and volunteered a supplementary statement in which he confirmed that "I have not held and do not hold as true the opinion which has been condemned, of the motion of the earth and the stability of the sun."

Well, well, well!

The remainder of the trial was now expected to be a mere formality. Throughout the proceedings Galileo had been treated with great consideration and courtesy. Against all precedent he was not confined to the dungeons of the Inquisition, but was allowed to stay as the Tuscan Ambassador's guest at the Villa Medici until after his first examination. Then he had to surrender formally to the Inquisition, but instead of being put into a cell, he was assigned a five-roomed flat in the Holy Office itself, overlooking St. Peter's and the Vatican gardens, with his own personal valet and Niccolini's major domo to look after his food and wine. Here he stayed from 12 April to the third examination on 10 May. Then, before his trial was concluded, he was allowed to return to the Tuscan Embassy, a procedure quite unheard of, not only in the annals of the Inquisition but of any other judiciary. Contrary to legend, Galileo never spent a day of his life in a prison cell.⁵⁹



⁵⁹ *Encyclopaedia Britannica* says in confirmation: "While he was detained in the palace of the Inquisition he occupied the best apartments and was treated with unexampled indulgence."

At his third and last examination he was questioned, under oath about his real conviction concerning the two cosmological systems.

Three times he was admonished to tell the truth. Three times he denied that he had held the condemned opinion.

When he was for the last time bidden to speak the truth, under threat of torture, Galileo repeated, “I am here to obey and I have not held this opinion since the decision was pronounced, as I have stated.”

If it had been the Inquisition’s intention to break Galileo, this obviously was the moment to confront him with the copious extracts from his book – which were in the files in front of the judge – to quote to him what he had said about the sub-human morons and pygmies who were opposing Copernicus, and to convict him of perjury. Instead, immediately following Galileo’s last answer, the minutes of the trial say:

“And as nothing further could be done in execution of the decree, his signature was obtained to his deposition and he was sent back.”

Both the judges and the defendant knew that he was lying; both the judges and he knew that the threat of torture (*territio verbalis*) was merely a ritual formula which could not be carried out,⁶⁰ and that the hearing was a pure formality. Galileo was led back to his five-room apartment, and on the next day the sentence was read out to him. It was signed by only seven of the ten judges. Among the three who abstained was Cardinal Francesco Barberini, Urban’s brother. The *Dialogue* was prohibited; Galileo was to abjure the Copernican opinion, was sentenced to “formal prison during the Holy Office’s pleasure”; and for three years to come was to repeat once a week the seven penitential psalms. He was then presented with the formula of abjuration, which he read out. And that was the end of it.

The “formal prison” took the form of a sojourn at the Grand Duke’s villa at Trinita del Monte, followed by a sojourn in the palace of Archbishop Piccolomini in Siena, where according to a French visitor, Galileo worked “in an apartment covered in silk and mostly richly furnished.” Then he returned to his farm at Arcetri, and later to his house in Florence, where he spent the remaining years of his life. The recital of the penitential psalms was delegated, with ecclesiastical consent, to his daughter, Sister Marie Celeste, a Carmelite nun.

The judgement hushes up the incriminating contents of the book by stating that Galileo had represented the Copernican system as merely “probable” – which is a whale of an understatement. It also hushes up the fact that Galileo had been lying and perjuring himself before his judges by pretending that he had written the book in refutation of Copernicus, that he had “neither maintained nor defended the opinion that the earth moves,” and so forth. The gist of the matter is that Galileo could not be legally

⁶⁰ That the threat of ritual torture was an empty formula is undoubtedly true. It is confirmed by a multitude of competent authorities, although in view of the prejudice against the Catholic Church instilled into Koestler by his upbringing (see paragraph 63), the fact that his researches led him to this conclusion is probably sufficient evidence for most readers. The *Encyclopaedia Britannica*, which also contains no hint of bias in favour of the Catholic Church, is equally emphatic: “Since the publication of the documents relating to this memorable trial, there can no longer be any doubt, not only that the threat of torture was not carried into execution, but that it was never intended that it should be.”

convicted without completely destroying him – which was not the intention of the Pope or the Holy Office. Instead, they resorted to a legally shaky concoction. The intention was, clearly, to treat the famous scholar with consideration and leniency, but at the same time to hurt his pride, to prove that not even a Galileo was allowed to mock Jesuits, Dominicans, Pope, and Holy Office; and lastly, to prove that, in spite of his pose as a fearless crusader, he was not of the stuff of which martyrs are made.

The only real penalty inflicted on Galileo was that he had to abjure his conviction.

This penalty may be thought to be less than draconian when it is remembered that up to the age of fifty Galileo had been hiding that conviction for no better reason than for fear of the ridicule that a ridiculously argued theory deserves.

Our noble and heroic martyr for science died at the age of 78 in 1642, the year Isaac Newton was born.

His epitaph was written for him by posterity: *eppur si muove* – the famous words which he never uttered at his trial. (*Ibid.* pp. 478-503)

And now, scientifically and historically, we have seen all the evidence of any importance which purports to deny the possibility of a geocentric universe.



APPENDIX 1

More Background Information on Ether and on the Events Leading up to the Theories of Relativity

I am conscious that, despite such efforts that I have made to explain carefully everything that needs explaining, this chapter will be difficult to grasp for some readers simply because they will be so unfamiliar with the subject that to try and tackle it will at first be like learning a new language. I am also conscious of the fact that among those who have not previously studied the subject there will be some who simply will not believe some of the things that I have said. They may doubt for example, such assertions that I have made as that the Michelson-Morley experiment was epoch making, that it caused scientists to doubt science itself, and that Einstein's Theory of Relativity was literally necessary in order to rescue the scientific world from being driven back to the "impossible" notion of a geocentric universe.

It is in an attempt to deal with both these problems that I now reproduce, with much

gratitude to the author for his permission to do so,⁶¹ a chapter from a standard work on Relativity, *Relativity for the Layman* by James A. Coleman, Professor of Physics and Chairman of the Department of Physics at the American International College, Springfield, Massachusetts. For our purposes the chapter is ideal for the following reasons: the author is learned; his writing is non-technical, clear and readable; he is a complete believer in and enthusiastic proponent of relativity and therefore cannot be accused of bias in favour of anything I have written in my chapter; and at the same time, since he accurately describes the events leading up to Relativity, he lets slip many revelations which confirm my assertions.

This Appendix will be helpful, incidentally, for an understanding not only of the foregoing chapter but also of chapter, “Einstein and Modern Physics”.

Light waves, radio waves, ultra violet waves, infra red rays, etc., are all part of a general group called electromagnetic waves, and all members of the group travel with the velocity of light. We shall deal mainly with light waves, since these are the only ones that are visible.

The Stationary Ether Postulated

With proof afforded by many excellent experiments that light travels with a finite velocity of about 186,000 miles a second, scientists next turned their attention to the consideration of the medium which carried or propagated the light waves. This prelude to the theory of relativity took place during the period from 1800, by which time the finite velocity of light was firmly established, to 1905, when Einstein introduced his Special Theory of relativity.

It was known that sound waves are propagated by setting the air (or other material through which they travel) into vibration. This vibration, or wave, is in this way pushed forward. It was further found that sound waves could not travel through a vacuum – some material substance was necessary for their propagation. Then, too, water waves needed water in which to travel; a water wave without water to carry it could not exist. Such was the reasoning used. As a result, it was believed that light waves also had to have a carrier or tangible substance in which they could push themselves forward.

However, it also was known that out in the vast reaches of space between the planets and stars there was no air or other medium – most of space was vacuum. But, nevertheless, no one could doubt that light did travel the 93,000,000 miles from the Sun to us through this vacuum. Not wanting to believe that light travelled through nothing – which carried the implication that no medium of any kind was necessary for its propagation – scientists created a special word for the hypothetical carrier of light waves. They called it the lumeniferous ether, or just plain ether.⁶² The

⁶¹ I emphasise that the fact that Professor Coleman granted permission to be quoted in no way implies that he agrees with the conclusions I have drawn in this chapter or in the next two. In quoting Professor Coleman I am implying no more than that we are making use of the same facts.

⁶² Possibly Professor Coleman's wording here conveys the suggestion that the concept of the ether is a creation of modern science. It is of course not so: even as far back . . . [**Note by person who scanned this paper into electronic format: “Lost remainder of this footnote via photocopy cutoff at bottom of European size paper.”**]

ether, then, was the material that existed everywhere that light waves travelled, and these light waves moved through it at a velocity of 186,000 miles a second. The ether filled the vast emptiness of the universe and was present in all substances in greater or lesser degree. The idea of the existence of the ether seemed so logical that it quickly gained widespread acceptance as one of the materials in the universe. And some scientists even went so far as to determine its density theoretically!

Further Confirmation of the Ether

Additional confirmation 'for the existence of the ether came unexpectedly from the realm of electric and magnetic phenomena (or, more strictly, electromagnetic theory). In 1864 Maxwell published the results of a mathematical investigation he had undertaken on electrical vibrations. He showed that certain electrical vibrations would cause electrical waves to be formed which would travel outward through space. Furthermore, he calculated the velocity with which these waves would propagate and found it to be 186,000 miles a second – the same speed earlier scientists had determined for the velocity of light! Maxwell then correctly concluded that light waves were nothing more than a particular tupe of his electric waves or, as we call them today, electromagnetic waves. And in 1887, Maxwell's prediction of the existence of the electromagnetic waves was verified when Hertz succeeded in generating them in the laboratory.

With Maxwell's discovery that light waves were electromagnetic in nature, the necessity for the existence of the ether was further strengthened, since it was believed that electric and magnetic fields must have a substance in which to reside, it being inconceivable that they existed in a vacuum. Electromagnetic waves as a group, then, certainly had to have a medium to carry them, and the ether was the only logical medium.

After the idea of the existence of the ether had become firmly entrenched, effort was directed to the detection of the ether; and it was here that science met its nemesis, as we shall see. (my emphasis. – N.M.G.)

If the ether existed, then, since it permeated all space, it was reasoned that the ether was the one thing which remained fixed in the universe and did not move. It was known that the earth and other planets were not stationary with respect to the sun; in particular, the earth was known to revolve about the sun with a velocity of about nineteen miles to a second. It was not known just how stationary the Sun was with respect to the other stars, but it was believed that the ether alone remained motionless in the background of the moving heavenly bodies in much the same way water in a goldfish bowl remains motionless while the fish swim about in it.

Scientists asked themselves: if all the heavenly bodies are moving with respect to one another, how can we tell if they are moving about in the ether, which itself remains motionless? If you find yourself on a ship out at sea and want to know whether or not you are moving, you look to see if water is moving by the ship. It is easy to decide – you can see the bow wave, or you can put your hand into the water, and if the water flows around it you conclude that you are roving through the water. This is precisely how scientists proceeded to detect the ether – by attempting to discover the ether drift or ether wind, as it was called. If the ether wind could be found, it would be proof not only that the earth moved through the ether but, what was more important, that the ether existed as it was believed. Unfortunately, the ether wind could not be detected merely by sticking one's hand out into space and feeling for it.

An Expected Ether Effect

There were several effects that should exist if the ether wind existed, and these were looked for eagerly. We will now discuss one of these effects, duplicating the reasoning used at the time it was looked for. Assume we have a telescope set up on the earth. We focus it on a star which is in the direction the earth is travelling in its orbit. The light from the star is travelling at 186,000 miles a second through the assumed stationary ether between the star and the earth. Two of the light beams from the star have just entered the telescope. These beams have been bent by the telescope lens so that they will come to a focus at point **P**, which is a point in the space within the telescope. Now since the telescope and observer are moving to the right with a velocity of 19 miles a second, the observer's eye will arrive at point **P** at the same time the light beams do, and the observer will see the star in focus.

But now suppose the astronomer looks at the same star six months later and does not change the focus. The situation will be entirely different, since the earth will be on the other side of its orbit. Whereas before it was travelling towards the star, or to the right with respect to the ether, with a velocity of 19 miles a second, it will now be travelling away from it, or to the left with respect to the ether, with the same velocity. What was expected to happen was that since the telescope and observer are now running away from the incoming light wave, the observer's eye will no longer be at point **P** when the light beams arrive there, and as a consequence the observer will now see the star out of focus. If this reasoning were correct, then a telescope which was originally in focus on a distant star would be out of focus six months later. This effect was looked for but was never observed. (Emphasis added. – N.M.G.)

Fresnel's Ether Drag

A possible explanation for the failure to detect this effect was contained in a theory advanced by Fresnel in 1818. He believed that the ether was thicker in material bodies than it was a vacuum or outer space and that, as a result, when a transparent object such as a telescope lens moved through the ether, it dragged some of the ether along with it in much the same way a moving ship drags some water behind it. On the basis of this assumption, Fresnel computed the amount of the ether drag as a certain fraction of the velocity of the moving object, in this case the telescope lens. This fraction came to be known as the Fresnel drag coefficient.

The net effect would be that whether the telescope was travelling towards the incoming light waves or away from them, the ether would be dragged along with the telescope; it would be impossible to detect the effect, since to do so it would be necessary for the ether to stay put while the telescope moved through it. This is similar to hanging a fish from a pole and tying it to a running dog so that it dangles in front of him: the dog never catches the fish because it moves whenever he moves.

Since the Fresnel drag coefficient was only theoretical and had no direct experimental proof to support it (except the indirect evidence presented by the inability to detect the effect), an experiment was needed which would measure the velocity of light in a fairly dense material which was itself moving. This was done by Fizeau in 1859. He used moving water and measured the velocity of a light beam travelling through the water in the same direction as water movement, and then again in the direction opposite to the water movement. He found that the water was moving, i.e., the result was as if the water dragged the ether along with it by the same amount given by the

Fresnel drag coefficient.⁶³

The reader should not believe that as a consequence of all this it was proved that the ether really existed and that it was dragged along with a moving object so that it escaped detection. The Fresnel ether-drag theory was a possible explanation if, and only if, the ether existed and behaved as outlined.

The Michelson-Morley Experiment

When it was found that the ether's existence could not be detected by changing the focus of a telescope over a six-month period, as well as by other similar effects, the ether's existence was by no means doubted. What was needed, it was said, was a much more sensitive experiment – one which would definitely show up the ether's presence. Such an experiment was devised and carried out by Michelson and Morley in 1881.

Before going into the details of the Michelson-Morley experiment to detect the ether wind, we will first consider an analogy whose fundamental reasoning is that used in their experiment. We will assume we are going to race two identical planes, Mike and Ike, against each other, starting both at the same time from the same place, Photown. We will have Mike go due east to Nucletown and back while Ike goes due north to Messontown and back. We will assume that both Nucletown and Messontown are exactly 500 miles from Photown. Now, if the top speed of both Mike and Ike is 1,000 miles an hour and if there is no wind at the time of the race, the reader would expect the race to end in a dead heat in an hour – which, of course, it would.

But suppose that all during the race there was a 100 mile-an-hour east wind blowing: the race would not end in a tie because Ike would win. The reason is that while Mike is travelling east towards Nucletown, the 100-mile-an-hour wind is permitting him to make only 900 miles an hour over the ground. (The 1,000-mile-an-hour maximum speed of the planes is with respect to still air.) Returning, however, Mike is aided by the east wind and does 1,100 miles an hour over the ground. But since he travelled a longer time at the slower speed while going, his average speed for the trip is less than 1,000 miles an hour. Although it is true that Ike had a side wind of 100 miles an hour both going and coming and had to turn into the wind slightly to compensate for it, the wind did not slow him down as much as it did Mike. Ike also averages slightly under 1,000 miles and hour, but still higher than Mike.

This reasoning can be verified algebraically if the reader is so inclined. It turns out that for the

⁶³ Professor Coleman's description of this experiment is so compressed that it is not easy to follow. Therefore, for the sake of those who wish to understand it, I reproduce below a rather fuller account given by Dr. Arthur Lynch in his excellent book, *The Case Against Einstein*, which features prominently in chapter "Einstein and Modern Physics". On page 47 Dr. Lynch writes: "There exists a classic experiment, due originally to Fizeau, and devised to put to the test the question whether the ether could be carried along by water. Fizeau passed a current of water, at a velocity of 7 metres a second, through a tube bent in such a way that one part was parallel to the other; and the flow of water in the second was consequently in a direction opposite to that of the flow of the same stream in the first part of the tube. A beam of light was sent, by an ingenious arrangement, along the course of the water in the direction of its flow, and another beam in the opposite direction. As the distance travelled, apart from the effect of the water, was the same in both, the concord of the phases would not be found altered when the beams were at length brought together. There was, however, a distinct alteration of phase observed, and Fizeau came to the conclusion that the ether was in part carried along by the stream of water. Fizeau's experiment was reproduced with even greater care by Michelson and Morley in 1889, and the conclusion of Fizeau was confirmed."

particular values used it will take Ike eighteen seconds over the hour to go to Messontown and back, but it takes Mike thirty-six seconds over an hour to go to Nucletown and back. Hence, Mike will return eighteen seconds later than Ike, and Ike always wins.

So far we have not connected the race between Mike and Ike with the Michelson-Morley experiment. The connexion is this: if the velocity and direction of the wind were unknown on the day of the race, it could be determined by the finishing position of Mike and Ike on their return to Photown. If they both returned simultaneously at the end of an hour, you would conclude that there was no wind. But if Ike came back in an hour and eighteen seconds and Mike in an hour and thirty-six seconds, it would indicate there was a 100-mile-an-hour wind in the east-west direction. (It could not be determined whether it was an east wind or a west wind, but this is unimportant here.) And if Mike and Ike were to interchange courses, then Mike would be back in an hour and eighteen seconds while it would take an hour and thirty-six seconds for Ike.

Thus, one way to detect the wind would be to have Mike and Ike race, then interchange courses and race again. If there is a shift in their finishing positions, a wind is present, and the greater the shift the stronger the wind. This, in effect, is what Michelson and Morely did. They raced two light waves at right angles to each other; then interchanged their course, raced them again, and looked for a shift in their finishing positions. Such a shift would conclusively prove the existence of the ether wind.

If the earth is moving to the right with respect to the ether, we would experience an ether wind in the direction indicated. A light wave from the light source strikes the half-silvered mirror which splits the light wave into two equally intense waves, **A** and **B**. The **A** wave goes through the half-silvered mirror and on to mirror **A**, while the **B** wave is reflected at the half-silvered mirror to mirror **B**. These two individual light waves correspond to Mike and Ike. The **A** wave will be reflected by mirror **A**, will return to the half-silvered mirror, and half of it is reflected to the microscope where the observer views it. (The other half of the **A** wave goes back to the source, but this is unimportant to the experiment.) Similarly, the **B** wave is reflected at mirror **B** to the half-silvered mirror, and then half of it also goes to the observer's microscope. The observer then sees both waves in his microscope and notes their "finishing position".

He then interchanges the course of the **A** and **B** waves by rotating everything through 90° , either clockwise or counterclockwise. The **A** wave will now travel in the north-south direction while the **B** wave travels in the east-west direction. The observer again notes their finishing position and compares it with the previous "race" to note if it has shifted.

To determine whether or not the finishing position has shifted, the observer uses a phenomenon of wave motion called interference. To illustrate, if the two waves enter the microscope so that the hills and valleys of each are lined up, or are in phase, the waves tend to reinforce each other, i.e. the viewer sees the resultant light wave brighter than either individual wave. The result is called constructive interference. If one wave is slightly behind or ahead of the other, they do not reinforce each other quite so much, and the viewer sees the resultant light dimmer than it was before. But if the waves are sufficiently out of phase so that a valley of one is lined up with a hill of the other, the hills and valleys interfere, cancelling each other out so that darkness results. This is referred to as destructive interference.

Since the device used by Michelson and Morley employs interference phenomena, it is called an interferometer. Now when the observer rotates the interferometer through 90° if there is an ether wind present, it should cause the relative finishing positions of the waves to change, i.e., one wave should shift with respect to the other. And this shift will cause the light in the microscope to change, becoming brighter or dimmer as the case may be.

When Michelson and Morley performed the experiment they did not detect any change

whatsoever in the light intensity in the microscope upon rotation, which meant that they did not detect any ether wind. They repeated the experiment at different times of the day and during various times of the year, but the results were always the same – they did not detect an ether wind. The Michelson-Morley experiment has been repeated a number of times with increasing accuracy. The most recent, and by far the most accurate, search for the ether was reported in 1960 by Professor Charles H. Townes of Columbia University, the inventor of the maser, with the help of physicist John Cedarholm. The main feature of the maser of importance here is that when certain molecules are excited electrically they emit microwaves⁶⁴ of very stable and accurately known frequency. In fact, two ammonia masers can be made so stable in frequency that they would not vary by as much as one second for at least 200,000 years!

Two ammonia masers were set up so that the beams they emitted were oppositely directed and in the east-west direction. After about one minute the two masers were interchanged. This was done a number of times throughout a 24-hour period so that any changes due to the earth's rotation could be noted. The experiment was repeated for a number of days at intervals of three months throughout a year.

The basic theory was that any effect due to the motion of the earth through the ether would be indicated by a change in the frequency of one or both masers. The frequencies of the masers were thus recorded continuously so that they could be compared throughout the experiments. Computation showed that the effect of an ether, if it existed, would be to produce a difference in frequency between the two masers of about 20 cycles per second. But no such frequency change was noted. In fact, the experiment was so precise that if any ether effects were present they would have been detected even if the earth's orbital velocity were only one one-thousandth of what it actually is.

Modern science has thus overwhelmingly verified the conclusion of Michelson and Morley, and it is now universally accepted that the ether cannot be detected.

Possible Explanations for Michelson and Morley's Results

The failure to detect the ether could be explained, of course, if the ether did not exist; but the necessity of the ether's existence was too firmly entrenched to be discarded. Instead, four reasons were advanced as possible explanations of the inability of scientists to detect the ether. The easiest explanation was that the earth was fixed in the ether and that everything else in the universe moved with respect to the earth and the ether. Then we on earth would not experience an ether wind, thus making the detection of the ether impossible. Such an idea was not considered seriously, since it would mean in effect that our earth occupied the omnipotent position in the universe, with all the other heavenly bodies paying homage by moving around it. The fact that the earth was only one of several planets revolving around the Sun was enough to dispel any notion that, as a planet, it occupied any kind of godly post. (My emphasis added - N.M.G.)

Of course. Scientists could allow themselves to consider any possibility, no matter how farfetched and unscientific, apart from any possibility which involves acceptance of the existence of God or the accuracy of the *Bible*.

⁶⁴ Microwaves are radio waves at frequencies in the region from infra-red to short-wave radio, that is from wavelengths of one millimetre to one metre. – N.M.G.

It was also thought possible that the earth dragged the ether next to it along with it. This, too, would make an ether wind impossible. But there were two insurmountable objections to this explanation: if the ether were dragged along with the earth, then light waves coming into the earth's vicinity would also be dragged along, since they travel in the ether. But if so, we would always see light waves from a distant star coming from the same direction, and we would not observe the aberration phenomenon discovered by Bradley.

It will be recalled that the apparent direction of a star changes over a six-month period, since the earth has a velocity of 19 miles a second in its orbit with respect to the incoming light from the star. If the ether were moving along with the earth, the light from the star also would be swept along with it and the star always would appear to be in the same direction. But since we know that the star's direction does change, i.e., that aberration does exist, we know that the ether cannot be dragged along with the earth.

The other objection to this possibility is concerned with the Fresnel drag coefficient. As we mentioned earlier in this chapter, it was found that some materials did act as if they dragged the ether along with them, but this was only a partial drag, i.e., the ether appeared to come along with only a fraction of the velocity of the moving object. Here, however, it would be required that the ether be dragged along at the full velocity of the moving earth. Furthermore, it was not known whether an object as large as our earth would conform to the Fresnel drag coefficient, since Fizeau's verification of the drag effect was made on a laboratory scale only.

The third possible explanation for the inability of the Michelson-Morley experiment to detect the ether assumed that the velocity of light was always constant with respect to the source which emitted it. This would mean that light always travelled at 186, 000 miles a second with respect to the interferometer, regardless of how fast or slow it was moving with the earth through the ether. As a result, the velocity of light would vary with respect to the ether. The ether would not be detected because both light beams would always have the same velocity with respect to the interferometer, and, any race between them would always end in a dead heat. Going back to the analogy of Nike and Ike, it would be as if they both always had the same velocity with respect to the ground, regardless of whether or not a wind was blowing.

The main objection to this third explanation was that it required the velocity of light to vary with respect to the ether. This was contrary to the generally accepted notion of wave motion: that the velocity of the wave must be constant in the material *which* carried the wave. Sound waves travelling through the air were used as the classic example. It was well established that the velocity of sound waves was independent of whether or not the source of the sound was moving. It was thus difficult for anyone really to believe that the velocity of light through the ether was influenced by the velocity of the source. Indeed, the ether had originally been postulated as the carrier of the waves, and one of the reasons for so doing was to create a medium with respect to which light would always have a constant velocity.

There were also various astronomical observations which indicated that the velocity of light was independent of the velocity of the source. One of these was in connexion with double stars. Double stars are two stars which are approximately the same size and are relatively close together. They rotate about each other with a fairly high velocity in somewhat the same way as would the ends of a dumb-bell if the dumb-bell were thrown into the air so as to rotate end over end. Now, some of these double stars rotate so that we are looking edgewise at the plane of rotation, i.e., we see one star coming towards us while the other is going away, and vice versa. If we assume that the velocity of the light waves leaving the star is increased or decreased by the velocity with which the star is approaching or receding from us, then the star approaching us would appear to be rotating much faster than the receding one. And when their positions are reversed, the situation would also reverse. The overall effect would be as if the stars were alternately speeding up and slowing down in their rotation

about each other. Actual observation shows that this is not the case, however, and that the stars actually rotate about each other with uniform velocities. We conclude that it is entirely unlikely that the velocity of light through the ether is influenced by the velocity of its source, or that it is constant with respect to the source.

The explanation which had the most appeal in accounting for the negative result of the Michelson-Morley experiment was one that was literally dreamed up for the purpose.⁶⁵ It is the so-called Fitzgerald-Lorentz contraction. In 1893 Fitzgerald suggested that all objects contracted in the direction of their motion through the ether.⁶⁶ He reasoned that if ordinary objects flattened out upon impact with other objects – a rubber ball hitting a wall or a ripe tomato dropped on the floor, for example – then why would it not be possible for objects that move through the ether to have the force of the ether push them in, or contract them? This would adequately explain the results of the Michelson-Morley experiment. The arm of the interferometer moving against the ether would be shortened so that, even though the light wave travelling in that particular arm might be slowed down by the ether wind, this would be compensated for by having its path shortened. Going back to Mike and Ike, it would be as if whoever has to buck the wind would have his course shortened the exact amount necessary to compensate for the wind so that he still runs his course in the same time as his opponent, with the race always ending in a dead heat. Fitzgerald obtained the equation giving the amount of contraction necessary and, as is to be expected, it showed that the faster the ether wind, or speed of the the earth through the ether, the greater was the contraction of the interferometer arm in the direction of motion. Objects moving in a direction perpendicular to the ether wind were not foreshortened, however.

The reader will immediately ask, why not just measure the lengths of the arms several times during the experiment to see if they do change? This would be impossible, since all objects moving with the same velocity with respect to the ether would shrink by the same fractional amount and the length of the object would always remain the same according to the measuring-tape or other length-measuring device. Nor is there any other way by which the supposed contraction can be detected.

Objections to the Fitzgerald-Lorentz contraction hypothesis were rampant, as was to be expected, not only because there was no evidence to prove that such an effect took place, but particularly because Fitzgerald could not explain why objects would contract due to motion through the ether. The contraction hypothesis was originally advanced only as a possible explanation for Michelson and Morley's results, providing such an effect existed. Then, too, the theory said that all materials travelling with the same velocity with respect to the ether would contract the same fractional amount. Since iron is much heavier and stronger than wood, for example, one would expect a greater contraction for wood than for iron, but this, too, went unanswered.

⁶⁵ My emphasis – N.M.G. The admissions that scientists let slip about their own profession are as dramatic as any accusations made against them by laymen such as myself.

⁶⁶ Although I am reluctant to quarrel with a distinguished professor in an area where he really ought to know best, it is necessary to point out that here Professor Coleman is wrong and that what Fitzgerald suggested in 1893 was the reciprocal of what is asserted here, in other words that all objects expanded at right angles to the direction of their motion through the ether. The theory that objects contract in the direction of their motion was introduced by Professor Lorentz some years later. See paragraph 39(1)F2 and Dingle's *Science at the Crossroads* pages 162-168.

The Great Dilemma

We thus see what the great dilemma was. The ether was firmly believed to exist, but all efforts to detect it not only failed but the reasons advanced for the failure were contradictory and insecure. So, did the ether exist or didn't it? If it did, why couldn't we detect it? And if it didn't exist, why didn't it?

It was at this stage of scientific frustration and confusion that the soul-satisfying answer was given, with such a simple explanation that it took a genius to see it – Albert Einstein. And with him the Theory of Relativity was born.



The dilemma just outlined meant that a revolution was to take place in scientific thought⁶⁷ if the difficulties were to be successfully surmounted. The problem was solved by what is called the theory of relativity.

Yes, the problem had indeed been solved – by abandoning Science's last hold on reality.

APPENDIX 2

The Retrial of Galileo

At the time of writing there are plans afoot, announced by the satanic impostors who have usurped the buildings and administrative structure of the Catholic Church,⁶⁸ to hold a retrial of the Galileo Case with a view to putting the final seal on his

⁶⁷ My emphasis added – N.M.G. See paragraphs 38 and 38F.

⁶⁸ My justification for the phrase “satanic impostors who have usurped the buildings and administrative structure of the Catholic Church” can be found in chapter, “Under the Laws of the Catholic Church the Holy See is Vacant.” Lest there be any misunderstanding, I do not suggest or imply that the capture of the administrative structure of the Catholic church means that the Church has ceased to exist and thus that Christ's promise (“The gates of Hell shall not prevail against the Church”) – *Matthew* 16:19 – has failed. The Church is a society consisting, according to its own definition, of everyone who believes in the entirety of what was revealed by Jesus to the Apostles and has been handed down unchanged since then; and the Church will no longer exist only when there is not one such believer left on earth. According to Christ's promise the world will have come to an end before that can happen – though not necessarily very long before. He did also say, “Yet the Son of man, when he cometh, shall he find, think you, faith on earth?” (*Luke* 18:8), and St Paul prophesied that the last times would be preceded by a “revolt” or apostasy (*2 Thessalonians* 2:3). Moreover the very words “shall not prevail”, from the passage in *Matthew* 16:19 just quoted, imply that the survival of the Church will be only just ... It is as well to remember that today's defection of the hierarchy, although far more complete than ever previously, has nevertheless had near precedents. Perhaps the nearest parallel was the period of the Arian heresy in the 4th century A.D. when, in the words of St. Jerome, “the world woke up groaning to find itself Arian,” and it is estimated that eighty percent, including most of the hierarchy, defected. The seriousness of the crisis at that period is encapsulated in the famous words of St. Athanasius: “They have the buildings, but, please God, we have the Faith.”

rehabilitation.

We need not concern ourselves with the fact that the trial will be a fraud and a farce and that the only charge that could validly be levelled against the Catholic Church as regards her conduct during the Galileo episode is that she was far too lenient, for these things have been amply demonstrated in this chapter. It is however worth asking ourselves: why is the retrial being held; what purpose could it serve? After all, it is not as though the geocentric theory is taken seriously now (wrong though this is!), and outside a very few people who have taken the trouble to investigate properly, the world is united in thinking that Galileo was a heroic and cruelly treated martyr for the truth. What can there be to gain by the proposed reopening of the subject, especially when there must be many pressing matters relevant to the present day which many people might think a greater priority?

It seems to me that the answer must lie in the fact that Galileo was one of the most important of Satan's human agents that have ever lived and that the Jewish/Masonic/occult powers who are now so close to victory in their plan to rule the whole world wish to recognize his contribution in an appropriate manner. Such a desire would be nothing new – in chapter “War: Part 2”. I relate how on two occasions during the last seventy years the Communist rulers of Russia in effect officially canonized Judas Iscariot – and the evidence is very good that Galileo was a most important and influential agent. Certainly no one seems to have had more influence than he in weakening the authority of the Church; and without his preliminary work it would have been impossible for Darwin to destroy the authority of the Bible and for Marx, Freud and Einstein to achieve their destructive purposes on the political and economic order, on morals, and on human reason respectively. Above all Galileo was a Catholic, as none of his just-mentioned successors were, and it must be especially delicious for the agents of Satan to create the illusion that the Catholic Church is having her nose rubbed in the dirt, is humbly and contritely admitting to the world that in respect of this man (who as we have seen was one of the more unpleasant and evil persons that have walked across the stage of history) she was wrong, and is publicly begging his pardon.

If all this be so it is good evidence that the occult powers believe, as I also believe, the Galileo episode to have been perhaps the great watershed in the near two thousand year history of Christianity: more so in fact than the Reformation, for such as was left of the Catholic Church after the Reformation was left intact, whereas in the aftermath of the Galileo episode an inevitable weakening, which was from then on to increase, was experienced in the Catholic Church itself. The faith of those who believed Galileo could

never be-as simple, trusting and strong as the faith of those who did not.

At all events there is every indication that the occult powers have been working towards the total destruction of anything that could oppose the revolutionary view of the cosmos for a long time, indeed for centuries, and to show this is the main purpose of this Appendix. Although Mr. Walter van der Kamp is not a Catholic we are indebted to him for an excellent, well researched account of these manoeuvings in the December 1981 issue of the *Bulletin for the Tychoonian Society*. I reproduce a few extracts which the reader may find of considerable interest, especially where van der Kamp by implication shows how the Popes, who if not on their guard are as capable of being victims of propaganda and subjected to occult control (other than on the occasions when they exercise their role as teachers) as anyone else, have been gradually led, through a series of retreats so minute that each one is almost imperceptible, to sell the pass. Especially if he is prepared to read between the lines, I think the reader will find in what follows much that is revealing.

Anno Domini 1983 it will be three hundred and fifty years ago that, as lopsided popular history has it, those black-frocked bigots, of the Inquisition compelled Galileo on pain of torture to deny the truth about the way the heavens go.

Apparently Pope John Paul II plans the record to be set straight during the next two years, with all misunderstandings removed. To quote from his address to the Pontifical Science Academy on November 10, 1979:

“I want theologians, scientists and historians, moved by a spirit of sincere collaboration, to get to the bottom of the Galileo case and, in frank recognition of wrongs wherever they originate, to dispel the mistrust that this affair still arouses in many minds, preventing fruitful concord between science and faith, between the Church and the world.”

Judged by the many articles and viewpoints since that November day, added to the countless books and comments, pro and contra, which have been published from 1633 onward, one can only agree with the Rev. William A. Wallace, professor of history at the Catholic University, Washington, D.C., that the two congregations handling the now re-opened case “have been tossed a hot potato.”

There are, it is clear, two aspects of the “greatest scandal in Christendom,” which should, and will be, I suppose, separately considered; to wit the legal and the scientific one.

Undoubtedly it is the scientific aspect of the Inquisition’s sentence that will steal the show. To quote Archbishop Paul Poupard, Pro-president of the Vatican’s Secretariat for Non-Believers: the re-examination of the case against Galileo will be one aspect of a broader attempt by the Roman Catholic Church to come to terms with “a particular kind of atheism – atheism with a scientific matrix.”

At first sight one would predict such an attempt to become a failure. If there is one fact about which worldly agreement is universal it is certainly this: Galileo’s defense of the Copernican hypothesis has led to a warfare between science and theology, in which science now may declare that it has been *winning* hands down. Yet I dare to suggest: seems to have been *winning*. For in 1896 the late Andrew Dickson White may have shouted victory and have pronounced the struggle practically over[231 - during the last forty years the firm foundation of Baconian induction, upon which Galileo and three centuries of his disciples have erected those proud structures of physical and astronomical

certainties, has begun to show cracks. More and more we realize what this foundation is and always has been: an assumption built on the quicksand of unavoidable probability, far away from rockbottom truth.



The Galileo affair and its aftermath, as all historians of whatever aspect of human action and thought acknowledge, has wrought a change in our attitude towards the world not equalled by anything since Our Lord was among us. That, at least, is the thesis of this paper, and the outcome of the re-trial will have even more important consequences. Fatal or felicitic – depending on which view the verdict will espouse.

What this outcome will be cannot be foretold with certainty. Yet straws already in the wind and the Vatican's tactical retreats from 1822 onwards presage a conciliatory course and a compromise whereby the give is on Rome's side and the take on that of Scientism. For unless the Catholic Church surrenders the claim, hushed up but never yet openly and completely abandoned, that the Earth according to Holy Writ is the unmoved centre of the observable Universe, and hence is that centre - is there anyone who thinks that secular science will sign a peace treaty?

Paring down the issue to its essentials I would like to quote from a well-known letter written by Cardinal Bellarmine. In 1614 Galileo had thrown down the gauntlet in the astronomical lists by publishing his Letter to the Grand Duchess Christina. Not only did he defend in it his clumsy heliocentric views already shown to be untenable five years earlier by Kepler's *Astronomia Nova*, but he also tried – Koestler seems to be the first one to put the finger on it – to turn the table on his opponents by asserting that rather than he having to prove his proposition right, they had to prove it to be wrong. The next year a Carmelite monk, Foscarini, had come outspokenly to Galileo's aid, and on-April 4, 1615, this caused Bellarmine, "Master of Controversial Questions", to write a letter to Father Foscarini, the thrust of which is just as valid now as it was then:

"My Very Reverend Father,

"It has been a pleasure to me to read the Italian letter and the Latin paper you sent me. I thank you for both the one and the other, and I may tell you that I found them replete with skill and learning. As you ask for my opinion, I will give it as briefly as possible because, at the moment I have very little time for writing.

"First I say it seems to me that your Reverence and Signor Galileo act prudently when you content yourselves with speaking hypothetically and not absolutely, as I have always understood that Copernicus spoke. For to say that the assumption that the Earth moves and the Sun stands still saves all the celestial appearances better than do eccentrics and epicycles is to speak with excellent good sense and to run no risk whatever. Such a manner of speaking suffices for a mathematician. But to want to affirm that the Sun, in very truth, is at the centre of the universe and only rotates on its axis without travelling from east to west, and that the Earth is situated in the third sphere and revolves very swiftly around the Sun, is a very dangerous attitude and one calculated not only to arouse all Scholastic philosophers and theologians but also to injure our holy faith by contradicting the Scriptures...

"Second, I say that, as you know, the Council of Trent forbids the interpretation of the Scriptures in a way contrary to the common agreement of the holy Fathers. Now if your Reverence will read, not merely the Fathers, but modern commentators on Genesis, the Psalms, Ecclesiastes, and Joshua, you will discover that all agree in interpreting them literally as teaching that the Sun is in the heavens

and revolves round the Earth with immense speed and that the Earth is very distant from the heavens, at the centre of the universe, and motionless. Consider, then, in your prudence, whether the Church can support that the Scriptures should be interpreted in a manner contrary to that of the holy Fathers and of all modern commentators, both Latin and Greek...

“Third, I say that, if there were a real proof that the Sun is in the centre of the universe, that the Earth is in the third sphere, and that the Sun does not go round the Earth but the Earth around the Sun, then we should have to proceed with great circumspection in explaining passages of Scripture which appear to teach the contrary, and we should rather have to say that we did not understand them than declare an opinion to be false which is proved to be true. But I do not think there is any such proof since none has been shown to me. To demonstrate that the appearances are saved by assuming the sun at the centre and the earth in the heavens is not the same thing as to demonstrate that in fact the sun is in the centre and the earth in the heavens. I believe that the first demonstration may exist, but I have very grave doubts about the second; and in case of doubt one may not abandon the Holy Scriptures as expounded by the holy Fathers...”

Bellarmino's position, the letter shows, is basically the instrumental one, and before he is willing to tamper with the generally accepted understanding of Holy Writ he wants solid, logically irrefutable proof, which neither Galileo nor anyone else, has ever been able to present. For the heliocentric realists have since 1615 achieved only hollow victories and suffered sound defeats.



If one follows from 1633 to 1981, the dispute about the fabric of the Heavens that the Almighty has left to us and the quaint opinions voiced, to quote Milton, it looks as if a perverse Spirit has blinded the astronomers and mankind believing them. For all the “proofs” presented to affirm the physical truth of the heliocentric system are logically worthless and the conclusions to be drawn from experiments contradicting Copernicus logically valid, but not accepted! To say that may sound outrageously nonsensical, yet it is so simply true that even dabblers in astronomy and epistemology cannot fail to see this. Of course there have always been a few people who were aware of the fact. Alexander von Humboldt (1769-1859), for instance, wrote: “I have already for a long time known that we have no proof for the system of Copernicus.” However, so great was also in his days already what we now call “peer pressure” that he added, “But I do not dare to be the first one to attack it.” (Quoted in *Christliche Weltanschauung* by F.E. Pasche: p. 43)

In his *Dialogue on the Great World Systems* Galileo forwards a proof “as solid and rational as ever before” that the Earth revolves around the Sun. To wit: the rotating spots on the Great Light's surface move, as seen from the Earth in changing curves. One of the three participants in the discussion, Simplicio, cast in the role of one of those “dumb idiots” – Pope Urban VIII included – who dare to oppose Galileo's alter ego Salviati, disagrees. If the Sun travels around the Earth exactly the same will be observed. Salviati counters this levelheaded remark with declaring it “very hard and almost impossible to believe that during the Sun's orbit around the Earth its axis would always remain parallel to itself.” Yet later he contradicts himself by asserting that to postulate such a fixed tilt for Mother Gea is “far from having any repugnance or difficulty in it.”

Simplicio's rejoinder is, as everyone will see, logically unassailable. Yet until the coming of Einstein nobody seems to have paid attention to it. Time after time astronomers have “affirmed the consequent,” a logical error “sometimes committed by eminent men of science who fail to distinguish between necessary and probable inferences, or who disregard the distinction between demonstrating a proposition and verifying it,” thus e.g. Cohen and Nagel. (*An Introduction to Logic*

by Morris R. Cohen and Ernest Nagel: pp. 98-105) I dare to go even further than these logicians: not only sometimes, but always, unavoidably, scientific theorizing commits this fallacy. And by contending this we do not utter a newfangled notion - we unashamedly join an illustrious company of clerks from Plato (427-347 B.C.) to the first Chancellor of Oxford University, Albert Grosseteste (1168-1253), and from St. Thomas Aquinas (1225-1274) to Sir Karl Popper (1902-...), who in principle all hold this position. Induction cannot deliver truth and affirming the consequent leads astray. "Proven" scientific pronouncements are beyond human reach.

This "affirming the consequent", i.e., using the *modus ponendo ponens*, which did not catch even simple Simplicio napping, has from Newton's rotating bucket on – and Berkeley pointed it out to him! – again and again been employed to "prove" Copernican truth. To select one instance from among the many: when in 1729 James Bradley came forward with an explanation of the aberration of starlight he had observed, all and sundry considered his fallacious hypothetical syllogism to be a verification of the Copernican viewpoint.

The commonly used analogy is that of a man holding a piece of stovepipe vertically when standing outside in the rain on a windless day. As long as he is standing still in the rain – drops will fall through the pipe, but if he is moving he must tilt the pipe slightly forward. True enough. However, if our man is not walking and the rainclouds and the rain are carried along towards him with the wind at his walking speed he will have to tilt his pipe in exactly the same way. By analogy applied to the stars: if the Earth moves relative to the stars our telescopes will have to be tilted. This is the case, and hence the Earth orbits the Sun. Ah, but if the starry dome were to move relative to us we would see exactly the same result. The proof is no proof – the heliocentric conclusion is only convincing for those who are already convinced that Copernicus is right. Logically Bradley's analogical demonstration still needs to be verified by directly measuring the Earth's velocity through absolute space.



To draw attention to the present sorry state of Galileo's "New Science", and to warn the Roman Church, still precariously holding the Biblical view of the Universe, against the consequences of vindicating the conceited "victim" of the 1633 trial – that I see as my duty. For about said science this is what Lewis Thomas, a man who knows what he is talking about, has to say:

"Science is founded on uncertainty. Each time we learn something new and surprising, the astonishment comes with the realization that we were wrong before. The body of science is not, as is sometimes thought, a huge coherent mass of facts, neatly arranged in sequence, each one attached to the next by a logical string. In truth, whenever we discover a new fact it involves the elimination of old ones. We are always, as it turns out, fundamentally in error..." (*On Science and Uncertainty* by Lewis Thomas: article in *Discover*, Oct 1980: p.58)

"The principal discoveries in this century, taking all in all, are the glimpses of the depth of our ignorance about nature. Things that used to seem clear and rational, matters of absolute certainty – Newtonian mechanics, for example – have slipped through our fingers, and we are left with a new set of gigantic puzzles, cosmic uncertainties, ambiguities. Some of the laws of physics require footnotes every few years, some are cancelled outright, some undergo revised versions of legislative intent like acts of Congress ..." (*Making Science Work* by Lewis Thomas: article in *Discover*, March 1981: p. 88)

This then is the present situation on the battlefields of the Warfare between Science and Theology. Brandishing the astonishing results of research and experimentation founded on ever-changing theoretical assumptions, worldly learning has during the last three centuries victoriously overcome one

theological defense after another. Not satisfied yet with those gains the secularists now press for an unconditional surrender of the last forlorn pocket of resistance, the never yet officially and openly recanted Roman Catholic position that the doctrine of a moving, not central Earth is philosophically absurd and false. Since neither this view expressed in Galileo's condemnation of 1633, nor the same opinion held by the decree of 1616, have been proclaimed *ex cathedra*, and are hence no infallible dogmata, an "amende honorable" remains permissible. It becomes even probable and consequent if viewed in the context of ecclesiastical history after the Scientific Revolution of the seventeenth century.

Among the churches of the Reformation the Calvinists were the first ones, a rapidly dwindling number of diehards excepted, to cave in. Eagerly availing themselves of their progenitor's "accommodation theory" in Scriptural exegesis, they took to the New Science as ducks to the water. The English Puritans, and Newton also, showed themselves only too happy for such a chance to destroy the medieval hierarchical, "three-decker" Universe still defended by that Great Whore on the Seven Hills. Many contemporary followers in the Genevan tradition go even further. As one spokesman for them expresses it: "The secularization of natural science was in some respects its christianization." (*Geschiedenis der Natuurwetenschappen* by R. Rooykas) The Lutherans on the other hand, a remnant among them still until our century holding out for a Scripture sovereign over all learning, did not put the ship about so soon and so enthusiastically, but took some time before following Galileo's gospel. Rome contrariwise stood firm by the astronomical truth clearly endorsed by Holy Writ. Only in 1822, following years of internal wrangling, Pope Pius VII gave in to "the general opinion of modern astronomers", and in 1835 Leo XII struck all helio-centric propaganda from the index.

Naughty, naughty Pope Leo XII.

Then, of course, the fences came down. Four decades later Darwinists could easily begin to infiltrate the seminaries, provided they did not hamper their converts in paying lipservice to a Creator-Cod guiding the evolutionary progress. In 1893 Leo XIII in his *Providentissimus Deus* encyclical allowed a manhandling of the Divine Word, as far as the relation between faith and science is concerned,⁶⁹ akin to that adopted by Geneva already more than three hundred years earlier, canonizing – as de Santillana

⁶⁹ Regretfully, a careful inspection of *Providentissimus Deus* shows that van der Kamp's accusation is well founded. Pope Leo XIII does it so subtly as to be hardly perceptible, but he definitely leaves the back door open for the proponents of Galileo, Darwin, and the rest. Thus in the subsection titled "Natural Sciences" he makes an admirable start which ends with St. Augustine's words, "whatever they (the physicists) can really demonstrate to be true of physical nature we must show not to be contrary to our Writings ('Litterae' which includes all writings to do with the Catholic Faith – decrees of popes and councils as well as the *Bible*); but whatever they put forward in any of their works which is contrary to our Writings, that is to the Catholic Faith, let us take every opportunity to expose as entirely false and at any rate let us unhesitatingly believe it is so." But he then follows with such weakenings of the foregoing as: "...the sacred writers or more accurately 'the Spirit of God Who spoke through them, did not wish to teach men those things (namely the intimate constitution of the visible world) which would be of no avail to salvation:' wherefore they, rather than directly pursuing the exploration of nature sometimes described and treated these things either by a certain kind of metaphor or as common usage used to be in those days and indeed is still so today in everyday life even among men of great learning. Yet, just as in common usage, ...likewise the sacred writer conforms to those things which are apparent to the senses, or alternatively to those things which God, speaking to men, has signified after human custom according to the manner of comprehension." Surely those words leave us free to believe that *Genesis* might have more truthfully said: "In the beginning God created the Sun and the stars, followed by an earth put into orbit round the Sun." A paragraph or two later he becomes eminently sound again, e.g. "the Catholic interpreter ... must always bear in mind that much of what has been held and proved as certain has afterwards been called into question and rejected." But, as van der Kamp said to me in a private letter on the subject, by then he is locking the stable door after the steed has been stolen.

remarks – Galileo’s exegetical precepts. (*The Crime of Galileo* by Giorgio de Santillana: p. 98)

True, in 1907 Pius X in *Pascendi Gregis* tried to stem the tide and quoted in his excommunication of Abbe Loisy the words of Augustine: “In an authority so high (i.e. Scripture), admit one officious lie, and there will not remain a single passage of those apparently difficult to practise or to believe, which on the same most pernicious rule may not be explained as a lie uttered by the author willfully to serve a purpose...”⁷⁰ However, after 1943 encyclical *Divino Afflante Spiritu* the higher criticism, already rampant in apostate main-line Protestantism for more than a century, really came into its own in Rome also. Last and worst: the liberalizing and ambiguous statements of Vatican II (1963-1965) about the rightful independence of science clinched the case. (*The Documents of Vatican II*, by Walter M. Abbott: p. 233) That “the humble and steady minds” among adepts of science now declare the secrets of reality, that is of cosmology, to be out of bounds for mortal men the Council apparently did not take into account.

The consequences of thus trimming the sails of Peter’s bark to the wind are all too clear: in about a hundred years the Roman Church has reached the position that it took the large, “main-line” Protestant denominations three hundred years to reach. It is, I maintain however, wishful thinking to hope that a resolute renouncement of the geocentric truth, held by the Fathers and, be it hushed up, still on the Vatican’s book, will end the warfare between the secularists and the saints (in the Pauline sense). The day after tomorrow, molecular biologists may well succeed in deriving life from dead matter. And may use this fact in an attempt to substantiate Monod’s Monte Carlo game of change and time that without any intelligent director has progressed from a primordial soup to you and me. They will again use the faulty logic with which the New Science has been brainwashing Christendom from Galileo’s first proof on. For even if men would manage, via a number of intermediate stages, to progress from constructing a bacterium to making a baboon, they will only have demonstrated that it can be done in such an evolutionary manner, not that it has been done that way. Allowing Christians to read the divine Revelation by the light of secular cosmology, geology, and biology will not blunt the attacks of our post-Christian civilization on the faith in Almighty God, Maker of heaven and earth, who in wisdom has made all things. The Prince of this world will go on, urging renegade humans to reduce man, created in God’s image and after His likeness, to just a blob of matter-inmotion without ethical restraints. “If it feels good, do it!” – I have seen bumper stickers advising it. Incest, copulation with

⁷⁰ It is interesting that, by contrast with the other Pius – XII (author of *Divino Afflante Spiritu*) – Pope Pius X was the first Pope to be a canonized saint for over two hundred years. (The last Pope before him to be canonized was Pius V.) In fact, Pope Pius XII’s *Divino Afflante Spiritu* is in my view unexceptionable other than that it praises at length and without any qualification at all Pope Leo XIII’s *Providentissimus Deus*. In other published addresses some of the things he said were far from harmless however, for instance offering up paeans of uncritical praise of modern science. One source of such addresses is a booklet of selected addresses called *Christianity and Modern Science* – N.M.G.

children and what-not included (“Cradle to Grave Intimacy” by John Leo, article in *Time Magazine* (20h October 1980, p. 61) – the satanic apostles of Aldous Huxley’s *Brave New World* may well bring that world about, unless maybe in God’s great design Orwell’s *Nineteen Eighty-Four* is going to stop them.

Other than that, for reasons given in chapter, “Under the Laws of the Catholic Church the Papal See is Vacant”, I could not dignify John Paul II with the title of Pope, there is not a word in Mr. van der Kamp’s account that I can disagree with. And he certainly knows how to write effective English.

APPENDIX 3

Celestial Navigation is Geocentric

The following quotation from a letter by an officer at the Royal Air Force Academy at Cranwell, England, to a well known scientific journal is of interest.

One can of course believe anything one likes as long as the consequences of that belief are trivial. But when survival depends on belief, then it matters that belief corresponds to manifest reality.

We therefore teach navigators that the stars are fixed to the Celestial Sphere, which is centred on a fixed Earth, and around which it rotates in accordance with laws clearly deducible from common-sense observation.

The Sun and Moon move across the inner surface of this sphere, and hence perforce go around the Earth. This means that students of navigation must unlearn a lot of the confused dogma they learned in school. Most of them find this remarkably easy, because dogma is as may be, but the real world is as we perceive it to be.

If Andrew Hill will look in the Journal of Navigation he will find that the Earth-centered Universe is alive and well, whatever his readings of the Spectator may suggest.

(Signed)

Darcy Peddyhoff

Royal Air Force College

Cranwell

Lincolnshire, England

(*New Scientist*, Aug. 16, 1979, p. 543)

Not the least interesting thing in the passage just quoted is the officer’s use of the term “confused dogma” when speaking of modern astronomy. For the sake of completeness I shall now fill in any gaps ~~he~~ left that might interest readers by giving the following summary of the principles of celestial navigation. (1) Celestial navigation is based on the premise of two concentric spheres – one (celestial) larger than the other – sharing a common pole, with the smaller and inner sphere remaining stationary

while the outer revolves about it. (2) Calculations are based on the laws of spherical trigonometry. The measurements used to translate the computations into a position or “fix” on the earth are done in nautical miles (even in these days of almost universal metrication!). Each of the 360 degrees of the circle is divided into 60 minutes. The nautical mile is defined as the length of one minute of longitude on the equator, or 6,080 feet.⁷¹ (3) The tables used to reduce or compute the resultant observations are based on 360 degrees. (4) All the navigators of the world use the same basic system, their calculations and charts being based on a fixed earth and the basic unit of the nautical mile.

APPENDIX 4

The Problem of Reconciling Foucault’s Pendulum, the Coriolis Effect and the Geosynchronous Satellites with a Geocentric Universe

In paragraphs 41-46 I described the phenomena referred to in this title, attempted a brief explanation of the solution, and referred those who (as for sometime I was myself) still not satisfied to the appendix. In the hope of satisfying the reader conclusively, I quote two experts on the subject.

The first is Mr. Walter van der Kamp, to whom I refer often in this chapter and my quotation of his is simply a concise answer to my question to him on the subject. I shall introduce it with my question in case the reader may have a similar question on his own mind:

What I do not understand is what force can physically provide the converse of the centrifugal force which we assume, in Newtonian physics, to keep the geosynchronous satellite up. Equally difficult to grasp seems to be the physical force that could account for the Coriolis effect. If the earth is stationary and the bullet is shot straight, whan can move it off course? What physical element can attract it?

Mr. van der Kamp replied:

The true nature of “forces” acting on bodies is outside our ken We “see” their effects, but they themselves cannot be observed or grasped. Bodies act “as if” (Newton), but that is all that we can affirm. “Mach’s principle”⁷² asserts that all material bodies “influence” each other and keep (e.g. in the solar system) things in balance, with the Coriolis effect

The rotary motion offers an excellent illustration of Newton’s idea of the absolute motion. Let us take an example. Imagine a merry-go-round surrounded by a round building similar to what we see at fairs. When we sit in it, we get fairly soon the impression that we stand still, together with the merry-go-round, while the building moves around us. If we forget for a moment what we saw before getting

⁷¹ 6,080 feet in Great Britain. In the United States it is 6,076.115 feet.

⁷² The idea put forward, by Ernst Mach will be described by Professor Reichenbach in the passage by him reproduced in this appendix. – N.M.G.

in, namely, that the building stands firmly on the ground and the merry-go-round is equipped with wheels, have we any way of determining, while sitting in the merry-go-round, whether it is the building or the merry-go-round that moves?

Indeed, we have. For we feel, while sitting in the merry-go-round, an outward pull caused by the so-called centrifugal power. This power forces us against the railing. Were the merry-go-round to stand still and the building to move, then the sight for the eyes would be the same, but the push toward the railing, the centrifugal power, would not be there. A true state of rest can be recognized by the absence of the centrifugal power. Its appearance or disappearance plays a decisive role in the question of absolute motion.

This was Newton's idea explained by him in a similar example (that of a revolving pail). We can, he declared, determine even the direction of the rotation. Suppose there is another, smaller merry-go-round attached to the larger one approximately at its center, but revolving in the opposite direction. We climb now into the smaller merry-go-round and investigate: is the outward push (that is, the centrifugal power) stronger or weaker than in the larger one? If it is stronger, then the rotation of the smaller merry-go-round is faster than that of the larger one; and the direction of the rotation is the same. But if it is weaker, then the smaller merry-go-round rotates backward, in the opposite direction to that of the larger one.

Almost 200 years had to pass before a real refutation of Newton's thought was found. In the eighties of the last century, Ernst Mach, in criticizing Newton's work, found the counter-argument. If we return to our example of a merry-go-round, this was Mach's idea: Newton has overlooked that the case of the merry-go-round at rest and of the building in rotation does not represent the opposite of the original case. He has forgotten to take into consideration the surroundings of the building, the earth, the whole universe. For, in revolving, the merry-go-round does not revolve with regard to the building alone but also with regard to the earth. In the contrary case we must let not only the building revolve round the resting merry-go-round, but also the earth and the universe - only then shall we present an equivalent but reverse picture.

But in that case, continued Mach, the centrifugal force will appear again in the merry-go-round, for this case is no other than the original one, though presenting a kinematically different description. In this description, the centrifugal force should be understood as an effect of the revolving earth-mass or even of the star-mass. These moving masses produce **((EU paper size caused bottom line cutoff during photocopy – that line is missing here – PE))** . . . round. In quite a surprising way, the concept of force become thus involved in the reversion leading to the two equivalent interpretations. The same observable effect, namely, the pressure against the railing, appears in one conception as a consequence of the merry-go-round's movement, in the other, as a consequence of the rotation of the surrounding masses. That rotating masses should form such a field of radially divergent forces, is for the science of physics a new but not an unusual thought. According to this conception, the Newtonian attraction of masses would be supplemented by the new forces arising out of rotary movement. One could imagine (according to Mach) that the walls of the building are several miles thick; then, in rotating around the merry-go-round the mass of the walls would produce in the middle of the merry-go-round a field of radially divergent forces, corresponding to the centrifugal field. This field, of course, would be far inferior in strength to that produced by the rotating universe.

Could this be demonstrated experimentally? But, remarks Mach, the proof is already available. For we do observe the centrifugal force; if we interpret it as an effect of the revolving masses of stars then this is all that can be asked for from observation. The new conception differs from the old one only in the interpretation, not in what can be observed by the senses. Nevertheless, it may be possible to devise experiments in which the idea of Mach would lead to new observations. Imagine a rotating flywheel of a huge machine; it represents a rotating mass and should exercise in its interior a propelling

action creating near its axis an area of “centrifugal force.” Mach did not, of course, mean here the action of the wheel’s own centrifugal force, from whose explosive effect the wheel is protected only by its solidity; rather, he wanted to say that a small body at rest, if placed near the axis, would be subjected to a pull toward the edge of the wheel. This action is, to be sure, so minute that it cannot be demonstrated; the mass of the largest fly-wheel is, indeed, exceedingly small in comparison to that of the universe or of the fixed stars the rotation of which produces the ordinary centrifugal force. (*From Copernicus to Einstein* by Professor Hans Reichenbach: pp. 76-82)

What Reichenbach has written thus far contains all that the reader needs in order to understand the problem stated in the title of this appendix.

I am including his subsequent paragraphs in the same chapter, however, for they are both relevant to this particular discussion and of general interest in that they provide evidence that leading scientists acknowledge that there is no objective proof that the geocentric view of the universe is false.

But even more important than this physical consequence is the relativization of the concept of force, as expressed by Mach. For, what Mach says is that, in accordance with varying descriptions of the state of motion, the field of forces, too, must be presented in a different fashion. No sooner does the concept of force partake of relativity than the dynamic distinction of one state of motion disappears; and then there is no absolute motion in any sense.

Here lies the weight of the argument. The relativity of motion is tenable not only kinematically but also dynamically, if the relativization of the concept of force is introduced. Even forces are not absolute quantities; they depend upon the system of reference. When one passes to a differently moving system, the forces have to be measured differently. What appears as action of inertia when the merry-go-round is conceived as moving, appears as action of gravitation, when it is imagined as standing still and the earth rotating. Even the Copernican world-view appears to be shaken by this consideration. It makes no sense, accordingly, to speak of a difference in truth between Copernicus and Ptolemy: both conceptions are equally permissible descriptions. What has been considered as the greatest discovery of occidental wisdom, as opposed to that of antiquity, is questioned as to its truth value. Though this fact clearly warns us to be wary in the formulation and evaluation of scientific results, nevertheless it by no means signifies a step backward in the progress of history. The doctrine of relativity does not assert that Ptolemy’s view is correct; it rather contests the absolute meaning of either view. This new insight could be gained only because the historical development went through both conceptions, because the replacement of the Ptolemaic world-view by the Copernican world-view established the new mechanics which finally provided the physicist with a means of recognizing the one-sidedness of the Copernican world-view itself...

It would be saying too much to regard the fulfillment of the third stage as given in Mach’s idea. When Mach replied to Newton that the centrifugal force must be accounted for in terms of the relative motion alone, he offered merely a program, not a physical theory; in fact, it was merely a beginning of a program for the physical theory elaborating the idea. Indeed, not only the centrifugal force but all mechanical phenomena must be accounted for in terms of the relative motion; the question is, above all, how to explain relativistically the phenomena of motion in the field of gravitation, i.e., the planet’s movements.

It was the great achievement of Newtonian mechanics that it provided the Copernican world-view with a dynamic foundation. Whereas there existed no difference, from the kinematic standpoint,

between the Copernican and the Ptolemaic systems, Newton, taking the standpoint of dynamics, decided in favour of Copernicus. For his theory of gravitational force offered to the latter view a mechanical *explanation*; whereas the complicated planetary orbits of Ptolemy did not fit into any explanation. (*Ibid.* pp. 82-84)

APPENDIX 5

Do Any Objections to the Geocentric View of the Universe Remain Unanswered?

I believe the most substantial objections have been completely dealt with in earlier pages in this chapter and its appendices; for the attempt has been made to examine closely the evidence against geocentricity as advanced by all the most learned scientists of the last four hundred years. Not every possible difficulty has been examined, however; if some of the difficulties apparent to lay astronomers cause no problem to the learned experts, such difficulties are none the less real, and deserving of not being ignored, for that reason.

The purpose of this appendix, therefore, is to “sweep up”. It will consider such difficulties as have been brought to my attention prior to going to print. If by the end of the appendix all has been answered except what the reader considers to be the one objection that has never been raised but is nevertheless conclusive, I can assure the reader that it is not deliberate. And since I can also assure him that it has not been thought worth raising it by all the great opponents of geocentric theory of the past and of today, I beg him: first to double-check that it has not after all been already dealt with in this chapter; and, if it indeed has not, to research with all care the reasons why both proponents and opponents of the geocentric theory think it is not worth even bringing that particular difficulty up.

Now for two objections that have been raised:

1. “If the earth is neither travelling round the sun nor revolving on its axis, the sun must be travelling at such a speed that it would surely leave a trailer round it, as does, for instance, a comet. Why is there no trailer?”

The concept of space implied in this question is false. The “tails” of comets are not formed by their “rubbing” along space in the way “shooting stars” do that when entering the Earth’s atmosphere. If that were the case our Earth, having – according to the ruling astronomy a total speed of c.300-400 km/sec would have lost its atmosphere within a few days. Space, *sui generis*, is “emptiness”. Comets’ tails are caused by the sublimation of the comet’s body when this is heating up when approaching the

Sun, the latter's radiation pressure, and its gravitational attraction which causes each particle or molecule in a comet's tail to move in an orbit.

2. "Heliocentric theory does at least simplify our picture of the universe. Surely, therefore, it is more likely that this is how God organized it."

I recommend the reader who believes that man's picture of the universe has been simplified by Copernicus, Galileo and Newton to reread such paragraphs as 68 and 233-238 of this chapter, and to read paragraphs 93-109 of chapter "Sir Isaac Newton and Modern Astronomy". But even if the "simplicity hypothesis" were correct, it is hardly sound theological evidence. "No less surely, I should have thought," is the obvious counter, "the straightforward nature of God that has just been postulated would have persuaded Him to have had this 'simple' state of affairs recorded in orderly fashion in the inerrant Scriptures – perhaps in unmisleading words such as: "In the beginning God created the sun and the stars... followed by an earth put into orbit round the sun at some later period, followed by the moon put into orbit round the earth at a later stage still... And God saw all the things that He had made, and they were good."

APPENDIX 6

The Catholic Church's Definitive Position on the Heliocentric Theory

This appendix is comprised mainly of facts and documentation which came to my notice some years after the chapter of which it now forms a part had been completed. And it must be stressed that, while what follows will probably be of considerable interest to most readers, for Catholics it is not merely of interest but also of grave importance. This is because, first, the various authoritative passages quoted in it set out lucidly and in detail the Church's stand on the heliocentric theory put forward by Copernicus, Galileo, and Newton, and maintained by virtually everyone in our century; and, secondly, it shows that the thesis defended in this chapter is a divinely revealed truth, which means that to doubt or deny it, once attention has been drawn to it, is to commit the crime of heresy and thus automatically to throw oneself out of the Catholic Church. The stand of the Catholic Church on the heliocentric theory has been so underemphasized – and sometimes even actively undermined – for such a long time that it has been almost entirely forgotten; but truths do not cease to be truths when they are not being constantly restated; and, since the truth on this issue is that the Church uncompromisingly holds that the Copernican system "is to be rejected as totally heretical," it is a truth which needs urgent resurrection.

The first extract I shall be quoting, which has been translated from the Latin by

J.S. Daly, is from the article “Mundus” (The World) in The Canonical, Juridical, Moral, Theological, Ascetical, Polemical, Rubricistical, and Historical Reference Library (“reference library” is the closest equivalent the translator can find for *prompta bibliotheca*) by the Rev. Lucius Ferraris, O.F.M. This eighteenth century work is referred to by *The Catholic Encyclopaedia* (1913 edition) as “a veritable encyclopaedia of religious knowledge,” and, having been published by the Vatican (at the press of the Sacred Congregation for the Propagation of the Faith), has semi-official status in the Catholic Church.

Here is the article. The occasional emphases added are mine.

Article *Mundus*, Numbers 90-104

90. The principal and best known among the systems of the universe now flourishing in schools of astronomy and physics are three in number: namely the Ptolemaic, the Copernican and the Tychonian.

91. The term “system” is commonly understood to mean “a certain constitution and disposition of the universe and of its parts in relation to one another, designed to explain the movements and other phenomena of the stars.” For, having for a long time observed the different appearances of the stars, astronomers have developed certain systems or hypotheses by which they proffer reasons for the motions of the stars, “save their appearances,”⁷³ and represent the whole construction of the universe by the position and order of all its parts.

92. The first of these systems, and the oldest among the three, is the Ptolemaic, which is so called after Ptolemy – the prince of the ancient astronomers – who flourished in the second century A.D. Although he was not its originator, such a system having been held by Plato, Aristotle, Eudoxus, and indeed by almost all the famous astronomers who lived before him, it was named after him because he put the final touches to it.

93. The Ptolemaic system of the universe fixes the immobile, terraqueous globe⁷⁴ at the centre of the universe, and about this centre the following movements occur in the order stated. First, there are two spheres, one of air and, outside that, one of fire. Then come the planetary orbs in this order: first the orb of the moon, then those of Mercury, Venus, the sun, Mars, Jupiter and Saturn. Then follows the firmament or sky of the fixed stars, to which are added the two crystalline skies and the “primum mobile”, which are skies without stars. And thus, according to this hypothesis or system, are enumerated the eleven orbs in that heavenly and supernal region. And although Ptolemy made no mention whatever of the solidity of the skies, yet all the advocates of this hypothesis or system would have the skies to be solid and consistent; for they considered it to be impossible that the movements of the stars according to the unchanging pattern at which we all wonder should take place in a subtle and fluid substance.

⁷³ i.e. they put forward theories with respect to the order of the universe which are consistent with, and sufficient to explain, all the observed movements of the Ptolemy – the prince of the ancient astronomers – who flourished in the second century A.D. Although he was not its originator, such a system having been held by Plato, Aristotle, Eudoxus, and indeed by almost all the famous astronomers who lived before him, it was named after him because he put the final touches to it.

⁷⁴ i.e. the earth. (Translator)

94. This system was received by almost all the ancients; but in these our days⁷⁵ almost everyone rejects it, since solidity of the entire planetary region, with the planets fixed to their orbits and moving only with them, has been ascertained to be totally incompatible with experimental evidence. For if the planetary region were not fluid, even if the planets themselves were fixed to solid heavens, they would not be able to descend from one heaven to another without penetration, which is by nature impossible; and yet it is certain that the planets sometimes ascend and sometimes descend; for Mercury, Venus and Mars are sometimes above the sun and sometimes below.

Moreover, since the many orbits (or excentric circles) and epicycles (or small circles)⁷⁶ established by the members of the Ptolemaic school to explain the appearances of the planets are in contradiction to these very planetary phenomena, as is clear from the waxing and waning of Venus and the moon and from many other things of this kind, almost all astronomers have recognized the impossibility of these things since the Tychonian system has become known.

95. The second of the systems of the universe mentioned above is the *Copernican*, so called after Nicholas Copernicus, a canon of the town of Thorn⁷⁷ in Borussia – that is, Polish Russia – who was born on 19th February in the year 1473, and devoted thirty continuous years, namely from 1500 to 1530, of labour and effort establishing and perfecting this system. However, this system had already been held – although not in so pure and clear a form – by Pythagoras, Heraclides, Ponticus, Nicaetas of Syracuse, Ecopantus, Leucippus, Plato and other ancient philosophers and astronomers. And, after he had fully illustrated and perfected it, Copernicus was followed by many of the more recent scholars, such as Joachim Rheticus, Kepler, Galileo, Simon Stevinus, Phillip Lansberg, Ismael Bullialdus, René Descartes, Newton and others, who all defended what is commonly called the Copernican hypothesis uncompromisingly and with all their strength and brilliance.

96. This Copernican system places the immobile sun at the centre of the universe, and says that about this centre there move: first Mercury, secondly Venus, thirdly the earth joined with the moon, and then, successively, Mars, Jupiter and Saturn. Beyond all these orbits of the planets and the earth it places the altogether immobile sphere of fixed stars spread throughout an almost infinite space. To “save the appearances” of the sun, it makes the earth a mobile planet, attributing to it three movements:

(a) about its own axis or centre, from setting to rising in an interval of twenty-four hours, this motion being called diurnal, because it is the cause of the day;

(b) in a great sphere or zodiac about the sun, according to the series of signs, this motion being called the year because it is completed in the space of a year;

(c) the third movement of parallelism or inclination, so called because, as a result of it, the axis of the earth in its annual revolution always remains parallel to itself, and unchangingly faces the same part of the sky; whence it comes about that, while the earth is turned through its annual motion around the sun, the customary vicissitudes of the seasons return at their appointed times. Hence the axis of the earth in this hypothesis is to be conceived as always parallel to its position at any other time of the year and to the axis of the equator; and this is also called the motion of inclination, because the earth, as he himself (presumably Copernicus – Translator] said, deflects sometimes more to one side of its axis and sometimes more to the opposite by a small amount.

⁷⁵ i.e. in the first half of the eighteenth century. (Translator)

⁷⁶ An epicycle is a small circle subsidiary to a larger circle. (Translator)

⁷⁷ ((LOST THIS FOOTNOTE via European size paper – bottomline cutoff during photocopy))

97. However, this Copernican system, since it is manifestly contrary to Sacred Scripture, even pre-scinding from other reasons, is to be rejected as totally heretical; for it is expressly stated in many places in Sacred Scripture that the sun moves. In *Genesis* 1:14, for instance, it says: “And God said: Let there be light made in the firmament of heaven, to divide the day and the night, and let them be for signs, and for seasons, and for days and years.” By these words it clearly demonstrates that days, nights, years and times are constituted by the motion of these great lights of the sun and the moon – especially of the sun, which, by its movements towards and away from us, constitutes the signs of the four seasons of the year, spring, summer, autumn and winter, and by its regular revolutions ordains the hours, days and nights, months and years, which it could not do if it were immobile and absolutely without motion. And in *Josue* 10:12,13 it is expressly written: “Then Josue...said before them: move not, O sun, toward Gabaon, nor thou, O moon, towards the valley of Ajalon. And the sun and the moon stood still, till the people revenged themselves of their enemies... So the sun stood still in the midst of heaven, and hasted not to go down the space of one day.”

The following Scriptural passages are also pertinent:

- (a) *Ecclesiastes* 1:5,6: “The sun rises, and goeth down, and returneth to his place: and there rising again, maketh his round by the south, and turneth again to the north: the spirit goeth forward, surveying all places roundabout, and returning to his circuits.”
- (b) *Isaias* 38:8: “And the sun returned [as reflected by the sundial of Achaz] ten lines by the degrees by which it was gone down,” according to what is written in *4 Kings* 20:11 [“And he (the Lord) brought the shadow ten degrees backwards by the lines by which it had already gone down in the dial of Achaz”].
- (c) And in *Matthew* 5:45 Christ Himself says: “...who maketh his sun to rise upon the good and bad.”
- (d) Likewise the Apostle [St. Paul], writing to the *Ephesians* (4:26): “Let not the sun go down upon your anger.”

As to the fact that the earth stands firm and is not moved, there are the words of:

- (a) *1 Paralipomenon* 16:30: “For he hath founded the world immovable.”
- (b) *Psalms* 92:1: “For he hath established the world which shall not be moved.”
- (c) *Psalms* 103:5: “Who hast founded the earth upon its own bases: it shall not be moved for ever and ever.”
- (d) *Proverbs* 8:29: “When he balanced the foundations of the earth.”
- (e) *Ecclesiastes* 1:4: “One generation passeth, away and another generation cometh: but the earth standeth forever.”

Hence very properly was the opinion of Copernicus, Pythagoras, Galileo and their followers concerning the movement of the earth and the stillness of the sun proscribed under Urban VIII in the year 1633 as contrary to Sacred Scripture, temerarious and heretical, as is recorded by Riccioli (in book 9 of his *Almagest*) and by Fortunato of Brescia (in *Mechanical Philosophy*, volume 2, treatise 1, dissertation 2, proposition 3) and by Ursaya, in *Criminal Institutions*, book 1, section 6, “Concerning the Crime of Heresy,” n.2, where he has precisely the following words: “If anyone today were to assert that the earth is mobile and the sun the centre of the universe and immobile, he would be a heretic, since

he would be in contradiction to what was defined by the Sacred Congregation of the Most Holy Inquisition on 22nd June 1633 according to Caferr., in his *Synatagmata Vetustatis* for the day 22nd June.”

98. Nor is it of any avail that the Copernicans say that their opinion concerning the motion of the earth is supported by numerous texts of the Sacred Scriptures – such as *Psalms* 76:19, “The earth shook and trembled;” and *Psalms* 81:5, “All the foundations of the earth shall be moved;” and *Psalms* 113:7, “At the presence of the Lord the earth was moved;” and *Job* 9:6, “He shaketh the earth out of her place, and the pillars thereof tremble.” Suchlike things are of no avail, I say, because these texts of Scripture and other similar ones are not to be understood of a true and proper movement of the earth, but of a metaphorical movement of the earth, that is, by taking the earth for the men who inhabit it, who, either by fear, by astonishment or by joy at the occurrence of Divine prodigies, are shaken; or alternatively they may be understood of the violent and extraordinary movements which, by the will of God, occasionally strike the earth, such as the many earthquakes by which, not only cities, but sometimes also entire provinces are shaken and overthrown.

99. Nor would it be valid to insist that the texts of Scripture in favour of our opinion concerning the stillness of the earth and the motion of the sun should be understood of such a metaphorical and apparent movement of the earth in the same way that a ship is at rest for the sailors and the shores seem to move – as is indicated in the famous line of Virgil in book 3 of the *Aeneid*, line 72, where he says: “We are carried forward from the harbour, and the land and the cities recede”⁷⁸ – on the grounds that Scripture often accommodates itself to the understanding of common folk, as when it calls the moon “a great light” (*Genesis* 1:16) although in reality it is almost the least light of all. It would not be valid, I say, since our interpretation of the texts of Scripture adduced in favour of our opinion as representing the sun as having a true and proper action, but the earth as still, is in accordance with the Church’s explanation and definition, as is clear from the foregoing [paragraph 97]. But the Scriptural passages adduced in support of the contrary opinion are certainly not interpreted in accordance with the mind of the Church. The answer to the text in which the moon is called “a great light” is that it is so called because of the great efficacy which it has in the sublunary world, greater than that of the other stars, with the exception of the sun, which is called “a greater light”.

100. Moreover, it is true that, from the texts of Scripture and other reasons adduced by the Copernicans, the Copernican system could be defended as a hypothesis, as was conceded in the year 1620 by that same Sacred Congregation of the Most Holy Inquisition (according to Purchotius, *loc. cit.*, chapter 3, the line beginning, “I answer first,” Fr. Fortuna tus, *loc. cit.*, third proposition and others); since in a hypothesis nothing at all is affirmed as actually existing in the nature of things... but only as possible, in accordance with Cicero’s dictum, in book 5 of his *Tusculan Disputations*, “It is permissible to invent something for the sake of teaching.” (Nor by such a hypothesis is it held that the earth truly moves through space; but only, if the earth were to move through space – which however it does not – all the appearances, relating both to physics and to astronomy, would best be saved and an explanation of them most easily given.) Nonetheless, the Copernican system cannot be defended as a thesis or assertion, since it is certain from the foregoing that it has been proscribed by the Church.

101. The distinction between a thesis and a hypothesis is that a thesis maintains that something is the case and really exists, and asserts that its conclusion is a reality, while a hypothesis maintains nothing at all as certainly existing in reality, but only takes a matter which has already been shown to be certain, and from it deduces something else as possible, without reaching any conclusion as to whether or not it is actually so.

⁷⁸ *Provehimur portu, terraeque, urbesque recedunt.*

102. The third system among the foregoing is the Tychonian, so called from Tycho Brahe, a noble Dane, restorer of astronomy. Having noted that the system of Ptolemy was opposed to reason and experience and that of Copernicus opposed to Sacred Scripture and appearances, he made use of much very learned mathematics, measuring the movements of the stars and their appearances by accurate observations, and, with enormous labour and effort, composed a new system, between the Ptolemaic and the Copernican, which is the most probable. This he did around the end of the sixteenth century, under the reign in Denmark of Christian IV.

103. The Tychonian system places the earth, the moon and the sun as did Ptolemy – that is, it places the earth as the truly immobile centre of the firmament, sun and moon – but it makes the sun the centre of the orbits of Saturn, Jupiter, Mars, Venus and Mercury, as did Copernicus. Wherefore, according to him [i.e. Tycho Brahe], the place of the firmament of the fixed stars is the outermost part of the universe, in the centre of which is found the immobile earth, around which move the moon and the sun; while around the sun, in turn, the rest of the planets move. So in this system there are three things which move about the earth, as about a centre point: the moon, of course, which is closest to it, in a monthly orbit; the sun, which is further removed and, as it were, in the middle, in an annual orbit; finally the firmament, or sphere of the fixed stars which is most remote, in a slow revolution, namely 2 500 years.

And this Tychonian system is in these our times most commonly received because it is simpler than the system of Ptolemy, owing to the fact that it does not have so many “eccentrics”, that is to say, spheres which do not have the same centre as the earth, and “concentrics”, that is to say, spheres which do have the same centre as one another and the earth itself. Moreover, it is more natural than the Copernican system, in that it leaves the earth in its natural stillness, and does not affirm that it is a moving planet.”

104. There can be found an almost infinite number of other systems of the universe invented by most erudite philosophers and mathematicians. But here we have chosen to adduce only three among the more celebrated ones, leaving anyone who may find some other suggestion preferable to invent as many of them as he likes, holding as certain that no one, however experienced, learned and erudite in these matters he may be, will ever comprehend the wondrous artifice by which this universe was ordained by God...

Thus Fr. Ferraris.

It can be added that the value of the article does not only lie in the information it gives on the Church’s standpoint and in the clarity – which scarcely suffers by comparison with the modern authors from whom I have quoted in the main part of this chapter – with which both the Scriptural and the scientific evidence is set out and analysed. In addition, the article helpfully draws attention, in paragraph 276, to works by some other Catholic authors who have written on the subject. One of these, the book by Fr. Ricciolus which Fr. Ferraris cites, contains a passage of considerable interest, because it sets out clearly and succinctly the principles laid down by the Catholic Church on when propositions stated in the *Bible* must be accepted in their literal sense, and applies these principles conclusively to the question of whether or not the earth moves. Here is the passage:

Every proposition affirmed by a canonical writer found in Holy Scripture is to be taken in its literal sense whenever in such a sense there is no contradiction with:

(a) other propositions of the same Holy Scripture which are equally or more sure,

- (b) or with a definition of the Supreme Pontiff of the Roman Catholic Church,
- (c) or with a proposition which is certain and evident by natural light.

But the propositions of Holy Scripture in which the movement of the sun and the stability of the earth are affirmed are asserted by a canonical writer and do not contradict any other kinds of proposition mentioned in the major premise; therefore they must be taken in their literal and proper sense. (*Novum Almagestum* by Fr. Ricciolus S.J.: volume 1, part 2, p. 444)

I am reproducing the documents quoted in this appendix in the order in which I came across them, which is why I have left the next document until last; in order of importance it certainly comes first. It is the famous condemnation of Galileo's position as heretical issued in 1632 by seven cardinals, who were not only especially appointed by the pope, Pope Urban VIII, to examine and give judgement on the matter, but also, as we shall see from the document, received his full backing for the judgement they gave. The document in question, which is the document discussed by Arthur Koestler in paragraphs 137-144 of this chapter, is therefore the ultimate authority behind what Fr. Ferraris says in the extract from his writings that I have already quoted.

The document is also of unusual interest for another reason. It must surely be doubtful whether any official *Church* pronouncement has been more misrepresented by Catholic apologists than this one. Very many authors have leapt to the defence of the Church on the Galileo issue, but not on the basis that it was safe to trust the Church's teachings when delivered in such a manner: on the contrary, author after author has cheerfully conceded that the two popes successively involved in the affair, Paul V and Urban VIII, and also of course the cardinals who rendered the judgements in the popes' names, were completely in error. Rather, the defence has been that the decrees were not infallible pronouncements, since "there is no question in either of them of any *ex cathedra* teaching, or of any intention to propose a doctrine to be held by the universal Church," to quote a typical treatment of the subject from Father Conway's *The Question Box*. (*The Question Box* by the Rev. Bertrand L. Conway, C.S.P.: p. 179)

Although part of what Fr. Conway says is in fact an invalid argument because, as the 1870 Vatican Council taught, the Church's infallibility is by no means restricted to *ex cathedra* decrees and can guarantee also the teaching of the ordinary Magisterium in certain circumstances, he is right in stating that a decree addressed only to a private individual can never be protected by the prerogative of infallibility; and in view of this it is certainly true that, technically speaking, the decree from which I am about to give extracts was not infallible. Furthermore, this is confirmed by the facts that the Pope was not actually making the pronouncement himself, and that, although the seven cardinal inquisitors were speaking in his name, and with his full support of and agreement to

what they were saying, a pope cannot delegate his infallibility.

But one would not envy the many authors who on the Day of Judgement will have to justify their having used the argument that the decree was technically not infallible. There are certainly times when a technical point, however subtle, is, and ought by any reasonable person to be seen to be decisive in an argument; but in this particular matter the technicality gets those who use it nowhere at all. For what those authors omit to tell their readers is the fact, which is equally true and arguably no less important, that the obligation imposed on Catholics to believe what the Church teaches has not one but two foundations. One, of course, is her infallibility, on the occasions where the conditions for it are verified. And the second, which can be applicable even when the conditions required for infallibility are not verified, is her God-given commission to teach – “Going therefore teach ye all nations. ...teaching them to observe whatsoever I have commanded you.” (*Matthew* 28:19) And it follows from this that, as a well known twentieth century author, Canon George D. Smith, wrote, “Much of the authoritative teaching of the Church, whether in the form of papal encyclicals, decisions, condemnations, or replies from the Roman Congregations – such as the Holy Office – and from the Biblical Commission, is not an exercise of the infallible magisterium (teaching authority).” And, notwithstanding this, as the same author continues, “whether her teaching is guaranteed by infallibility or not, the Church is always the Divinely appointed teacher and guardian of revealed truth; and consequently the supreme authority of the Church, even when it does not intervene to make an infallible and definitive decision on matters of faith and morals, has the right, in virtue of the Divine commission, to command the obedient assent of the Faithful.” (“Must I believe it?” by Canon George D. Smith, Ph.D., as article in the *The Clergy Review*, April 1935) In other words, the obligation to believe what the Church teaches is founded not only on her guaranteed veracity (infallibility) but also on the general duty of obedience to all her commands. The required assent, even when based only on obedience and not on infallibility, is not merely an abstention from publicly rejecting whatever utterance is made by the Church in this manner, but is the genuine submission of one’s judgement, so that one truly believes what authority commands one to believe. In circumstances in which the Church has the right to command obedient assent, the Faithful are obliged to give it. “If he will not hear the Church, let him be to thee as the heathen and the publican; amen, whatsoever you shall bind on earth shall be bound also in Heaven,” (*Matthew* 18:17,18) said our Lord.

I chose Canon Smith’s discussion for my source because he deals with the subject so clearly, but if any reader would like to see a weightier authority the following words of Pope Pius IX should suffice: “...it is not sufficient for learned Catholics to accept and revere the aforesaid dogmas of the Church, but... it is also necessary to submit themselves to the

decisions pertaining to doctrine which are issued by the Pontifical Congregations.”⁷⁹
[*Enchiridion Symbolorum* (*Sources of Catholic Dogma*) by H. Denzinger: 1684]

It is worth adding that, although the principle just stated is unquestionably true, as indeed, even without the authoritative confirmation that I have given, it must be if the Church is to be able to function as a consistently reliable teacher of the truths necessary for salvation in all places and in all ages, there is a very reasonable question which can be asked at this point. As Fr. Smith writes later in the article from which I have just quoted, “without an intellectual motive of some sort, no intellectual assent, however obligatory, is possible.” On what intellectual ground, therefore do the Faithful give their obligatory assent to these non-infallible decisions handed out by Church authority? I cannot do better than to quote Canon Smith’s answer: “On the grounds that belief in the Providence which governs the Church in all its activities, and especially in manifestations of the supreme ecclesiastical authority, forbids us to doubt or suspend assent.” (“Must I Believe it?” by Canon George D. Smith Ph.D., D.D., an article in *Clergy Review*, April 1935) In other words, the very fact that we are commanded by Divine authority to believe, is sufficient to assure us that what we are commanded to believe cannot but be the truth.

And although, as already mentioned, the document under discussion did not meet the conditions technically necessary for infallibility, the fact remains that:

- (a) it was a widely published and publicized document;
- (b) it clearly, emphatically and officially, with the full approval of the pope, pronounced that a certain doctrine was heretical; in other words, that to believe the doctrine was to make oneself guilty of a crime even worse than murder, indeed of one of the most terrible crimes it is possible to commit, a crime which automatically, instantaneously and completely throws its perpetrator out of the Church;
- (c) the Church’s most learned theologians, including Fr. Ferraris and those cited by him, interpreted it as a definitive, binding and immutable judgment.

And the thought that the Church could carry out her Divine commission to teach if God would allow her to make an erroneous decision in such a matter; the thought that the Faithful could justifiably ignore that and similar pronouncements, on the grounds that such pronouncements might well be wrong; the thought, indeed, that the Church would in such

⁷⁹ Pope St. Pius X repeated this at greater length in his *Motu Proprio* “*Praestantia Scripturae*” issued in 1907. “...Therefore, we see that it must be declared and ordered, as we do now declare and expressly order, that all are bound by the duty of conscience to submit to the decisions of the Pontifical Biblical Commission, both those which have thus far been published and those which will hereafter be proclaimed, just as to the decrees of the Sacred Congregations which pertain to doctrine and have been approved by the Pope.” [*Enchiridion Symbolorum* (*Sources of Catholic Dogma*) by H. Denzinger: 2113]

a case have even fallen into what is known as positive heresy herself⁸⁰ – all these are simply laughable. Indeed at one point, as will be seen, the cardinals say that the theory advanced by Galileo “has already been declared and defined as contrary to Divine Scripture;” and the notion that the Faithful could be expected to take notice of the Church as teacher while at the same time being required to accept that the Church authorities can solemnly make a mistake about the status of her various declarations is even more ludicrous. The fact is that those who used the “non-infallible” argument in an attempt to reconcile the wording of the Galileo condemnation with their belief in an orbiting and rotating earth avoided facing up to and trying to answer the difficulties caused by their hypothesis. Had they done so, they would have been confronted with an irreconcilable conflict between what was taught by the Church and- what was “known to be an undoubted fact” by modern “science”, and the result must have been either to shatter their belief in the Church or, more sanely, to shatter their confidence in the assertions of modern “science”.

Here, now, are the extracts in question. (The occasional emphases added are mine.)

**The Sentence Pronounced Against Galileo
by the Cardinal Inquisitors Against Heretical Depravity,
specially deputed by the Holy Apostolic See**

You, Galileo, son of the late Vincent Galileo of Florence, seventy years of age, were denounced to this Holy Office in the year 1615 on the following charges:

- (a) that you held as true the false doctrine passed down by many that the sun is at the centre of the universe and immobile and that the earth moves with a diurnal motion;
- (b) likewise that you had certain disciples whom you taught the same doctrine;
- (c) likewise that you conducted correspondence on the same subject with certain mathematicians of Germany;
- (d) likewise that you published certain epistles entitled “Concerning Sunspots” in which you expounded the same doctrine as being true, and that, to the objections which were repeatedly made against you taken from Holy Scripture, you responded by interpreting the said Scripture according to your own meaning; and that thereafter a copy was publicly exhibited of a document in the form of an epistle which was witnessed to have been written by you to a certain former disciple of yours, and that in it, following the hypotheses of Copernicus, you included several propositions contrary to the true sense and authority of Holy Scripture.

(...)

Therefore, by mandate of our Lord [the Pope] and of the most eminent Lords, the Cardinals of this

⁸⁰ Positive heresy is the pronouncing as heretical of something which is in fact perfectly orthodox and correct. It excludes its perpetrator from the Church just as definitely and automatically as the much more common crime of negative heresy, which is the doubt or denial of a Divinely revealed Catholic doctrine.

supreme and universal Inquisition, the following two propositions. . .were qualified by the Qualifying Theologians as below:

“That the sun is in the centre of the universe and is immobile by local motion is a proposition *which* is absurd and false in philosophy and formally heretical since it is expressly contrary to Sacred Scripture.”

“That the earth is not the centre of the universe, nor immobile, but is moved with diurnal motion, is likewise a proposition which is absurd and false in philosophy and, considered theologically, at least erroneous in Faith.”

But since we chose meanwhile to proceed with you benignly at that time, it was determined, in the Sacred Congregation held in the presence of our Lord [the Pope] on the 25th February 1616, that the most eminent Lord, Cardinal Bellarmine, would enjoin upon you to withdraw absolutely from the said false doctrine, and, when you refused, it was commanded by the commissary of the Holy Office that you abandon the said doctrine and that you could neither teach it to others nor defend it nor treat of it...

And in order that such a pernicious doctrine might be entirely removed, and no more creep in, to the grave detriment of Catholic truth, a Decree was issued by the Sacred Congregation of the Index in which books which treat of this doctrine were forbidden, and the doctrine was declared false and absolutely contrary to the Sacred and Divine Scripture. Subsequently a book appeared, published at Florence last year, the title of which revealed that you were its author, as it was entitled *Dialogue of Galileo Galilei Concerning the two Great Systems of the World*, the Ptolemaic and the Copernican. As soon as the Sacred Congregation became aware that, owing to the printing of the said book, the false opinion concerning the movement of the earth and the stillness of the sun was gaining ground more and more each day, the said book was diligently considered and in it there was detected an overt transgression of the said command which had been intimated to you. This was because in that book you defended the said opinion which had already been condemned and declared as condemned in your presence. Admittedly, in the said book you strive by various equivocal ramblings to indicate that you no longer hold this opinion as certain, but only as undecided and, to use your own word, probable; but this too is a most grave error since in no way can an opinion be probable which has already been declared and defined as contrary to Divine Scripture.

Wherefore, having taken into account and carefully considered the merits of this your case, as well as your said confessions and excuses and any other matters which the law requires to be seen and taken into account, we have reached the below-written definitive sentence against you.

Having invoked, therefore, the most holy Name of Our Lord Jesus Christ and of His most glorious Mother, the ever Virgin Mary, by this our definitive sentence, we say, pronounce, judge and declare that you, the said Galileo, on account of those things which have been adduced in the process of the writing and which you confessed as above, have rendered yourself to this Holy Office vehemently suspect of heresy. In particular, you have believed and held that the false doctrine, contrary to the Sacred and Divine Scriptures, that the sun is the centre of the orbit of the earth and does not move from east to west, and that the earth moves and is not the centre of the universe, is a doctrine which can be held and defended as a probable opinion notwithstanding that it has been declared and defined as contrary to Sacred Scripture; and consequently that you have incurred all the censures and penalties of the Sacred Canons and other general and particular Constitutions ruled and promulgated against delinquents of this kind. From these it pleases us that you be absolved, provided that you first, with sincere heart and unfeigned faith, in our presence, abjure, curse and detest the above mentioned errors and heresies, and any

other error and heresy whatsoever contrary to the Catholic and Apostolic Roman Church, in that formula which will be shown you by us.

Lest, however, this grave and pernicious error and transgression of yours remain entirely unpunished, and in order that you become more cautious in the future and may be an example to others to abstain from such delicts, we decree that by public edict the book of the *Dialogues* of Galileo Galilei be prohibited, and we condemn you to formal captivity of this Holy Office for a time to be limited by our judgment, and by way of salutary penance we command that for the next three years you recite once a week the seven penitential psalms; reserving to ourselves the power of moderating, changing or removing, entirely or partially, the above mentioned penalties and penances.

And thus we say, pronounce and by sentence declare, rule, condemn and reserve, by this and every other better manner and formula which by law we can and should.

Thus We the undersigned Cardinals pronounce: [there follows the names of seven cardinals].



Koestler has already told us what the “formal captivity” consisted of, and also that Galileo was even allowed to delegate his penance to someone else. It would be a brave man, I suggest, who tried to argue that Galileo was too severely treated. Bearing in mind what the first wedge driven into the inerrancy of Holy Scripture has led to, it would be much easier to defend the contrary proposition.

For the benefit of those reading this appendix who are Catholics, it is as well to end by spelling out clearly the full implications of what has emerged from the authoritative passages quoted in it. As indicated right at the beginning and repeated throughout, what is at issue, in the question of whether the sun moves or the earth is subject to any kind of movement, is a matter of Divine Revelation. Therefore, anyone who subscribes to the system of the universe held by modern “science” is not merely in error; he is a heretic. And if he maintains this position after becoming aware of the Church’s teaching on the subject, as those who have read this appendix certainly are aware, he has automatically put himself outside the Catholic Church, the sole Ark of Salvation.
