

From Warpath to Wholeness: The Condemnation and Rehabilitation of Galileo Galilei

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Abstract

Galileo is an ever living symbol for the struggle between science and religion, the medieval and the modern, or intellectual freedom and institutional authority. His life was a triumph for science; a life consumed in scientific discoveries and unhesitatingly stood for truth and trumpeted it over the roof top. However, this courageous stand for truth, bugling the truth he knew as absolutely correct, cost him his personal life; he was misunderstood, condemned without evidence and sentenced to the coldness of silence. Still, in the stillness of his imprisoned house, he heard the symphony of the heavenly bodies and observed the perfect periodic undulation of the pendulum. Thus, he discovered new physical laws and astronomical insights, penetrating the immensity of the universe. In Galileo we touch a genius, a man committed to science and a man who practiced his faith who bridged what seemed to be unfathomable wedge between them. He is a martyr for human intuitiveness; a man fallen into the death trap of human connivance and viciousness and ones own ill judgments and calculated risks. His pungent, pointed arguments against his adversaries penetrated the hardest armaments and thus disarmed them; in a nutshell the tears and triumphs of Galileo Galilei always inspire humanity.

Galileo's case is an example of the warpath model of the interaction between religion and science. The theologians, philosophers and Church leaders misunderstood him. Moreover he was unable to give clinching proof for Copernican view. The condemnation of Galileo is a classical case of how scientific discoveries call for a review of theological and hermeneutical positions and how resistant the institutional authority will be for doctrinal changes. Not only scientific and theological arguments but personal clashes contributed the condemnation of Galileo. However as a true scientist Galileo pushed for the conception about the universe; for which he was condemned; but as a true believer, Galileo had undergone the punishment with sincerity. In 1992 after 13 years of serious research done by four committees headed by internationally known scholars, Pope John Paul revoked the condemnation of Galileo and reinstated him as a model scientist and true believer. The Galileo myth was a stumbling block for the fruitful interaction between science and the Church and heroically Pope John Paul undertook the review of the issue and after prolonged research and study accepted that though all the parties involved in the Galileo issue acted in good faith, the Catholic Church erred in condemning Galileo and asked pardon for committing such an inadvertent crime against science and scientists. Pope John Paul examining the underpinning reasons humbly accepted that "the Galileo case was the symbol of the Church's supposed rejection of scientific progress, or of dogmatic obscurantism opposed to the free search for truth." (Pope John Paul 1999) According to Pope John Paul due to the Galileo case there was a general impression that science and Christian faith were incompatible leading to a "tragic mutual incomprehension" and a fundamental opposition between science and faith. In his sincere effort to resolve the age old suspicion and conflict between the Church and the sciences, John Paul humbly accepted that the Church had gone wrong in condemning

Galileo and emphasized that instead of the theologians, it was Galileo who showed the way of understanding the scripture with the established empirical data. The war thus, raged between nascent science and the established religion was amicably settled by Pope John Paul after examining thoroughly the complex reasons behind the condemnation of Galileo and exonerated him in the pedestal as the father of modern science and a true believer who is even model to the theologians in reconciling the scripture and nature by understanding the true meaning of scripture and the complex dynamics of nature. In resolving the Galileo myth, Pope John Paul has the intention of never repeating again this tragic incident in the name of religion. Today, as new ground breaking discoveries in the fields of genetics, nanotechnology, quantum relativity and artificial intelligence are made, the warpath model of science and religion interaction must pave the way for wholeness, integrating and working together for a better future of humanity. The exoneration of Galileo is an example of the reconciliation between science and religion based on mutual appreciation and is a pointer toward the partnership

Biography

Dr. Mathew Chandrankunnel studied physics and Philosophy and defended his doctoral thesis on the theme 'In Search of Causal Quantum Mechanis' at the University of Leuven, Belgium. He worked under Nobel Prize winners such as Carl Friedrich Von Weizaecker, Aage Bohr, etc. In his research, he compared the Interpretation of Bohr and Bohm in Quantum Mechanics. At present He currently serves as registrar and Professor of Philosophy of Science at the Pontifical Athaeneum Dharmaram Vidya Kshetram, Bangalore, India. He also serves as the Director of the Centre for the Study of World Religions and Chairman of Bangalore Forum For Science and Religion Supported by the local Societies Initiative of the Metanexus Institute. Also the President of McGill-Bangalore Chapter of SigmaXi International Science Organisation. A Catholic Priest, ordained in the year 1987, he belongs to the Congregation of Carmelites of Mary Immaculate. Dr. Chandrankunnel worked as a science Journalist and written many articles and books including the Philosophy of Science. He also taught in several Indian as well as Foreign Universities.

Introduction

Galileo is an ever living symbol for the struggle between the medieval and the modern, between science and religion or intellectual freedom and institutional authority. His life was a triumph for science; a life absorbed in scientific pursuit and a life that unhesitatingly stood for truth and vigorously fought for it without calculating its consequences. However, this courageous stand for truth cost him his personal life; he was misunderstood, condemned without justification and sentenced to the coldness of silence. Still, in the stillness of his imprisoned house, he heard the symphony of the heavenly bodies and observed the perfect periodic undulation of the pendulum. Thus, he discovered new physical laws and propagated astronomical insights, thereby penetrating the mysteries of the universe. In Galileo we touch a genius - a man committed to science and a man who practiced his faith - but bridged the seemingly unfathomable schism between them. He is the martyr for human intuitiveness; a man fallen into the death trap of human connivance and viciousness and one's own ill judgements and calculated risks. His acrimonious, eloquent and pointed arguments against his adversaries penetrated the hardest of their theological armaments that disarmed them effectively; in a nutshell the tears and triumphs of Galileo Galilei will always inspire humanity.¹

Scripture and Science

When Christianity was still in its infancy, Augustine who fused Greek Platonic philosophy with Christian thought had warned that when there was a conflict with the literal understanding of Bible and the scientific knowledge of the times, Bible must be metaphorically understood. According to him "Scripture is not concerned about the form and shape of the heavens; the Holy Spirit did not wish to teach men things of relevance to their salvation".² The Medieval scholars though introduced many literary and allegorical ways of interpreting the Bible, and gradually due to the Lutheran and Calvinistic Protestant influence, a literal interpretation of the Bible came into force. In 1531, Martin Luther criticized Copernicus and stated that "do not listen to him; that mad man

¹ The whole issue is elaborately dealt in the book Mathew Chandrankunnel, *Religion and Science:- From Warpath to Wholeness, The Condemnation and Rehabilitation of Galileo Galilei*, Dharmaram Publications, Bangalore, 2004. A book funded by the LSI grant.

² Cited by Ernan McMullin, in "How Should Cosmology Relate to Theology?" In Arthur Peacocke, ed. *The Sciences and Theology in the Twentieth Century*, Notre Dame: Notre Dame University Press, 1981. p. 21.

(Copernicus) wants to turn upside down all astronomical knowledge, but as scripture tells us, Joshua ordered the sun and not the earth to stand still.” The Biblical literalism of the theologians had played a conspicuous role in the first trial of Galileo. Augmented by the Protestant revolution, Lorini, Cacini, Colombie and others were attacking Galileo on account of the Copernican view, stating that he was contradicting the Scripture. Ludovico delle Colombe wrote a dissertation *Against the motion of the earth* in which he attacked Galileo by questioning “Could those poor fellows [namely, the promoters of the Copernican theory] perhaps have recourse to an interpretation of scripture different than the literal interpretation of Scripture different than the literal sense? Definitely not, because all theologians, without exception, say that when Scripture can be understood literally, it ought never be interpreted differently”.³ The following are some scriptural passages quoted against Galileo where the explicit statement of the motion of the sun is placed.

“Stand still, O sun!, O moon!, in the valley of Ajalon! And the sun stood still, and the moon stayed, while the nation took vengeance on its foes” Joshua 10:12-13

Lord has made the world firm, not to be moved Ps:92:1

Fixed the earth upon its foundation, not to be moved forever Ps.103:5

The sun rises and the sun goes down: then it presses on to the place where it rises. Eccl:1:5

Galileo on the other hand tried to explain that the motion of the earth rather than the sun is pliable to explain the Biblical passage. Galileo wrote to his friend Dini (May 1615) that “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 two truths can contradict one another, this and Bible must be perfectly harmonious.”

This idea of complementarity had already been proposed by St. Thomas Aquinas when he stated that reason and faith flow from the same divine Source and Galileo held it very dearly. “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

³ Jerome Langford, *Galileo, Science and the Church*, Descless Company, New York, 1966. Hereafter the book will be referred to as Langford.

be maintained all; thus, since no two truths can contradict one another, this and the Bible must be perfectly harmonious.” Galileo again interpreted that by stopping a sun centred system, it would be easier to stop the world and its activities than keeping earth as motionless.

St. Thomas had in his synthesis of Christian faith with the Greek philosophy especially that of Aristotle proposed that the Aristotelian cosmology is hypothetical. However, centuries of interpretation by commentators and theologians integrated the Aristotelian Cosmology with Christian faith. Moreover Aristotelian cosmology could substantiate a literal interpretation of the Bible. So the introduction of a new cosmology became a threat to Christian faith itself. Galileo became the victim of this integration and identification between the Aristotelian cosmology and Christian faith.

The same attitude was taken almost by the theologian and Church leader Cardinal Bellarmine. In evaluating the Carmelite Foscarini’s book, Cardinal Bellarmine wrote back to him which was an unofficial but quite definite statement of the Church's attitude toward the new astronomy. He was convinced that any introduction of a new cosmology, sun centred system or copernicansim would be detrimental to Christian faith since it was totally against the literal interpretation of the Bible. He wrote a letter to Foscarini, quoting the Council of Trent, that a free interpretation of the Bible was prohibited. He wrote that “to wish to affirm that the sun is really fixed in the centre of the heavens and merely turns upon itself 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 thing*, not only by irritating all the theologians and scholastic philosophers, but also by *injuring our holy faith and making sacred Scripture false*”.

Galileo argued for copernicanism even after receiving the warning from the Cardinal. He proposed that the scriptural understanding was wrong and there could not be any contradiction between the two truths. For him there was only one truth. He informed the cardinal that he did indeed believe that copernicanism is a reality and not merely a mathematical hypothesis. “I should not like to have great men think that I endorse the position of Copernicus only as astronomical hypothesis which is not really true.” Though Galileo had given many proofs for the Copernican view of the world, they were not convincing enough for theologians and astronomers. Even learned Jesuit astronomers like Clavius and Grienberger could not accept the Copernican view and Cardinal Bellarmine depended on their advice. Almost two thousand years of (from Aristotle’s time till the

Copernicus time – 500 BC to 1500 AD) belief rooted in the culture and the collected conscience of humanity could not be easily eradicated. An attempt, though, to establish the system was asking for trouble. He goes on to quote the Council of Trent and here his theology definitely is weak.

If Galileo been willing to accept the fact that he had no such proof and that all he could do with evidence at hand was to question several important aspects of the Ptolemaic system, the whole matter might have rested there. But Galileo refused to compromise. He was not teaching the heliocentric universe as a hypothesis even though he could not prove it to be any more than that. Here Galileo is commonly pictured as having no choice. His celestial discoveries through the telescope proved him beyond doubt the reality of copernicanism. However, the others were not convinced of the proofs and hence were not ready to accept the truth value of copernicanism. Except a few many were of the opinion that Copernican theory was only a mathematical hypothesis. In this regard Langford writes that, “he had to carry forth the flame of truth without regard to whom or what it burned on the way. Galileo was convinced that he had the truth. But objectively he had no proof with which to win the allegiance even of open-minded men. Many influential Churchmen believed that Galileo might be right, but they had to wait for more proof. Galileo was asked by his friends wisely to be cautious. To beat the University philosophers at philosophy was one thing: to challenge theologians in theology was quite another. Bellarmine had given him an opening, however narrow it might seem to us, "Prove your theory and we will change our exegesis, otherwise teach it as a hypothesis, which saves the appearances”.

Moreover the cosmology had blended inextricably with the Christian theology through a literal interpretation of the Bible making matters rather complicated. Galileo in his passion for the establishment of the Copernican view proclaimed and propagated it vigorously without understanding the hidden dimensions underpinning it. In a militant attempt to establish the Copernican view, he attacked the holders of traditional view with sharp arguments with tactlessness including even personal references. These tactics complicated matters further when many were waiting for an appropriate moment to humiliate Galileo. He also irked the powerful religious congregations perhaps with a false belief that the highest authorities of the Church were with him unequivocally. Hence,

Galileo tried all available means to establish the Copernican view while others found that Galileo lacked clinching proofs for the said view.

And also the timing of the Galileo affair was not at all easy for theologians to have a free look at any text that sounded opposing or against scriptures. Theologians were understandably sensitive whenever they felt that the authority of scripture or the rights of the Church as its custodian, guardian, and expositor were being questioned. In the 17th century, catholic theology had lost a good deal of its elasticity, creativity and élan vital, and the necessity of clarifying and backing up its doctrinal positions led to a somewhat canonical approach in theological matters. The Catholic Church usually regarded new orders of knowledge with disbelief and weariness.

In a Letter to Castelli, in an almost the content wrote to the Grand Duchess of Tuscany, Galileo carefully spelled out his position as a scientist and a catholic. He reaffirmed his commitment to the truth and authority of the Bible, and then raised the question of its proper interpretation. Galileo once again emphasised that the Bible obviously speaks at times in figurative terms and language understandable to average persons. Galileo expressed concern about "the carrying of Holy Scripture, into disputes about physical conclusions." God has given us two books, one of nature, the other of scripture. "Both the Holy Scriptures and nature proceed from the Divine Word, the former as the saying of the Holy Spirit and the latter as the most observant executrix of God's orders." As copies of that letter circulated freely, the battle was not yet completely out in the open. But the lines were being drawn up. Theologians, courtiers and laymen were taking sides. The condemnation became inevitable.

While Fr. Lorini received a copy of the letter to Castelli, and took it back to the convent, the Dominicans at San Marco's agreed that it looked suspicious. On Feb. 7, 1615 Fr. Lorini sent a copy of the letter to Paolo Cardinal Sfrondrato, one of the Inquisitors General in Rome with the following letter.

When I saw that. . . *the followers of Galileo. . . were taking upon themselves to expound the Holy Scripture according to their private lights and in a manner different from the common interpretation of the Fathers of the Church; that they tried to defend an opinion which seemed quite contrary to the sacred text; that they spoke in a slighting way of the Fathers and of St. Thomas Aquinas; that they were trampling under foot all of Aristotle's philosophy, which has been of such service to*

scholastic theology; . .⁴

The above accusations were so strong that the Inquisition Committee member Cardinal Sfrondrato turned the matter over to the Holy Office for examination.

First Trial

Pope Paul V receiving the complaints against Galileo called Cardinal Bellarmine and on his advise a Pontifical commission was appointed to deduce whether Copernican system was heretical or not. Because of the influence of Cardinal Bellarmine a personal approach to Galileo was made rather than on Copernicanism itself. A group of eleven theologians were appointed to study the Copernicanism on 19th February 1616 and gave their report to Cardinal Bellarmine on 25th February.

Two propositions of Galileo's doctrines were submitted to the eleven Consulters for their opinion.

- I. The sun is the centre of the world and completely immovable by local motion.
- II. The earth is not the centre of the world, nor immovable, but moves according to the whole of itself, and also with a diurnal motion.

The consulters gave the following opinion of the first proposition.

The first proposition was declared unanimously to be foolish and absurd in philosophy 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.

With regard to the second proposition they stated,

All were agreed that this proposition merits the same censure in philosophy, and that, from a theological stand point; it is at least erroneous in the faith.

As the above report indicated, on 25th February it was placed in the weekly meetings of the Inquisition under the presidency of Pope Paul V who instructed Cardinal Bellarmine to admonish Galileo to disperse with copernicanism. Thus Clear instructions

⁴ Langford. P. 57. Italics added.

were given that there should be two interviews with Galileo and only if the first interview failed only then the second should be convened.

It is evident that Cardinal Bellarmine had gently instructed Galileo to desist from stating that the Copernican cosmology as a proved fact. But Galileo was adamant so, on 26th February 1616, thus Cardinal Bellarmine in the name of the Pope formally instructed Galileo **“to relinquish altogether the said opinion, namely, that the sun is the centre of the universe and immovable, and that the earth moves; nor henceforth to hold, teach, or defend it anyway, either verbally or in writing. Otherwise proceedings would be taken against him”**⁵. The Papal decree prohibited even books which suggested that the Holy Scriptures support copernicanism. It is to be mentioned that none of Galileo’s works were prohibited by the Decree. It seemed that Galileo did not take the decree seriously considering that it prohibited only books stating that Bible supported copernicanism. He wrote *“The Dialogue between two World Systems”* and the complaint was sent to Rome and the book was confiscated and asking Galileo to report to the Roman Inquisition.

The Second Trial

On 25th September 1632 the Inquisitor at Florence forwarded the manuscript of the *Dialogue* to Cardinal Francesco Barberini and he in turn asked the authorities to stop the sales of *Dialogue*. He also ordered Galileo to present himself before the Roman Inquisition before October. A special commission was authorised by the Pope, consisting of three members: Riccardi - the papal theologian; and Agostino Oreggi the Inquisitor.

Galileo could not make it to the Inquisition in October due to ill health. He presented himself before the Inquisition on 12th April 1633. The hearings began on the next day. The special commission looked into the Galileo matter, summarised its findings, and submitted them to the Pope on September 11, 1632. It listed eight counts, though only three main charges against the author of the *Dialogue*: -

I Galileo have transgressed the orders in deviating from the hypothetical standpoint, by maintaining decidedly that the earth moves and that the Sun is stationary.

⁵ Ludwig von Pastor, History of Popes, Vol. XXV Routledge & Kegan Paul, London, 1955. p. 296. Hereafter referred to as Ludwig.

II He erroneously attributed the motion of the tides to the stability of the sun and the motion of the earth, which is not true.

III He has been deceitfully silent about the command laid upon him in 1616, "not to hold, teach, or defend in any way, verbally or in writing," his Copernican view.

Then follows the remark: "It now remains to be considered what proceedings are to be taken against the author, and against his printed book. The rest of the document is taken up with an elaboration of the charges against Galileo, and a fuller account of the Congregation for the *imprimatur*. The third charge came as a surprise even to the Pope. The injunction, as we have noted in the first trial, was illegal and Bellarmine had told him to ignore it. But it had been worded in the records of the Holy Office in that Galileo had been condemned in the first Trial. Now, no one was sure in Rome what exactly had taken place in 1616; the written document seemed to be giving sufficient reason to take action against Galileo. The preliminary commission did not recommend and action as to condemn Galileo out right. But there were people in Rome who not only recommended but also demanded that Galileo be punished. It was a time when Galileo's enemies reigned and everything turned in their favour.

The Process of Inquisition

In the first hearing, Galileo tried to convince the Commissary-General, that he had not been abjured by Bellarmine and had not done any thing contrary to the decree. But the Commissary remained unconvinced. The first hearing was over by those proceedings. On 17th April, 1633 five days later, the consulters of the Holy Office delivered their opinions on the Book - *Dialogue*, which they had been entrusted to study. They agreed that; (1) that the dialogue did maintain the doctrine of the earth moves and the sun is stationary; (2) that Galileo not only taught this doctrine but maintained it personally even to that day; (3) that the publication of the dialogue was an infringement of the order of 1616. The two trials, namely that of 1616 under Pope Paul V and that of under Pope Urban VIII differ greatly. The 1616 trial was only against the heliocentric doctrine while the author was not at all considered. In the second trial, the question was

personal whether Galileo acted against the general prohibition of the Copernican view and the special prohibition placed on him personally. The severity of the proceedings and the punishment must be looked at in the light of anxiety to uphold the inerrancy of the Holy Scripture and the prestige of the Papal authority.

In the second trial, the punishment of 1616 was better known and emphasized. Though many theologians and Church leaders upheld the Copernican view, Galileo's adversaries' arguments convinced the authorities that legally he had acted against the decree. Pope Urban himself stated that, though he was a close friend and admired Galileo "Galileo has dared to meddle with matters beyond his competence and with the most important as well as the dangerous which it is these days; it was not merely a question of mathematics but of Holy Scripture, religion and faith. . . it was an injury to religion as grievous as ever there was an end of a perverseness as bad as could be encountered"⁶. Galileo consistently stated he had not committed any crime irrespective of any stance adapted by the church. Moreover, like St. Paul, Galileo identified himself with the Church and propelled himself to reinvigorate it at the cost of his own life. He had a strong faith that what he had done would be approved by God. All these can be inferred from the following passage he wrote to his French supporter Nicolas-Claude Fabri de Peiresc that

I have two sources of perpetual comfort. First that in my writings there cannot be found the faintest shadow of irreverence towards the Holy Church; and second, the testimony of my own conscience, which only I and God in Heaven thoroughly know. And He knows that in this cause for which I suffer, though many might have spoken with more learning, none, not even the ancient Fathers, have spoken with more piety or with greater zeal for the Church than I.⁷

In the history of science, vilification and condemnation by one's own scientist colleagues are frequent. In the case of Einstein, the theory of relativity was attacked and ridiculed by many scientists as Jewish science. The harassment of Ludwig Boltzmann by premiere scientist Mach and his associates led him to his unfortunate suicide. However, in the name of religion, Galileo was persecuted by the highest representatives of the Church. The regrettable condemnation gave fodder to the enemies of the Church to

⁶ Ludwig. XXIX. P. 60.

⁷ Dava Sobel, *Galileo's Daughter*, Penguin Books, New York, 1999. p. 314. Hereafter the book is referred to as Sobel Sobel.

accuse of the Church against progress and authoritarianism. Colourfully embellished stories and fables on Galileo's condemnation pervade till today in the intellectual realms of humanity. They are reminiscent of the malicious insinuations of dogmatism against natural truths. Thus, the emerging new vision of nature was crucified by conservatism. Intellectual freedom was overpowered by institutional authority. Nascent science was strangulated by the corrupted understanding of spiritual power. Science and religion, reason and faith suspected each other and for the first time, faith condemned reason; going on a war path for centuries ever after this. This ill conceived condemnation was propagated an index of intolerance against any new vision created by science. This event became a tragedy more for the Church than for Galileo. Galileo became a martyr for progress, new vision and science.

This deplorable incident, however, had at least provided some unintended good results. It made Galileo to retract from the distractions of popular lectures and concentrate more on serious research, especially on mechanics. For the theologians and Church authorities, it became a constant reminder and warning for centuries to come; there should not be any more condemnation of scientific discoveries. The Church does forget once in a while and condemns as in the case of the evolutionist Teilhard Chardin.

Galileo's Philosophy of Nature

In a nutshell, Galileo's philosophy of science is two fold. The first phase is the rejection of Aristotelian Cosmology and mechanics. The second phase is then the replacement by the Copernican cosmology and his self developed mechanics founded on mathematics. Like Copernicus, Galileo was certain that the earth revolved around the sun and that was the reality for him. In the second phase, Galileo also replaced the Aristotelian notion of motion. Though many philosophers were proposing the experimental basis of studying nature, Galileo was the first to practise it. Through his experiments on motion, Galileo was able to develop the discipline of mechanics and the study of forced motion. Aristotle was mainly concerned with only natural motion. Thus, Galileo was convinced about the folly of Aristotelian physics and cosmology and was confident replacing it with the Copernican cosmology and a new theory of mechanics.

The new quantitative laws of motion developed by Galileo were later perfected by Newton who acknowledged the great works of his predecessors, especially Galileo, by declaring that he stood on the shoulders of great men. Galileo's published works contain his philosophy, specially a philosophy of nature where mathematics is given prime importance.

The Assayer is another important book of Galileo that contains the rich philosophy of science by Galileo. According to him there is a limit for natural philosophy's quest of discovering the ultimate causes. For Galileo, only mathematics could provide this certainty about the ultimate causes. Only a measurable quantity or observable dimension belongs to the domain of science and the rest that is unquantifiable belongs to the province of faith. According to Galileo, there are two books; books of nature and books of scripture. The book of nature is written in the language of mathematics, and the book of scripture is scribbled in the language of faith. Thus, Galileo viewed philosophy as genuine quest for a quantitative explanation eliminating an all qualitative explanation that guided scientific research till today and which will continue as the philosophy for many more centuries. It can be said that Galileo was instrumental in divorcing natural sciences from philosophy. He introduced experimental verification and mathematics as the basis for true philosophy which he termed as science. The Aristotelian metaphysical concepts and axioms were rejected. Galileo also introduced the philosophy of nature of Democritus, Epicurus, Lucretius, Ockham, Bruno, Copernicus etc. These great thinkers were not in the good books of the official Church and that itself imparted a negative impetus to Galileo and his work. The core of his philosophy of science is explained thus:

Philosophy is written in this grand book, the universe, which stands continually 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 humanity impossible to understand a single word of it; without these one wanders about in a dark labyrinth.⁸

⁸ Galileo, *The Assayer*, trans, Drake, p.237.

Galileo prided himself as the first to develop the telescope and discover so many astronomical phenomena. However, he believed his own greater genius lay in his ability to observe the world at hand, to understand the behaviour of its parts and to describe these in terms of mathematical formulae. This claim of Galileo was endorsed by Einstein who observed that “propositions arrived at purely by logical means are completely empty as regards reality. Because Galileo saw this, and particularly because he drummed it into the scientific world, he is the father of modern physics – indeed of modern science altogether.”⁹

Institutional Authority Vs. Intellectual Freedom

In the condemnation of Galileo, in spite of all the complexities underpinning the trial, a relevant issue is that of the conflict between institutional authority and intellectual inquiry. We have perceived how the religious congregations were attacking Galileo for stepping into their holy territory of interpreting the Bible and rendering new theological insights. The Dominicans were critical about Galileo for putting down Aristotle. It was their great conferor St. Thomas Aquinas who baptised the philosophy of Aristotle to Christian faith and hence they had to criticise anyone attacking Aristotle. Galileo was disillusioned by the system of learning and debating by simply quoting Aristotle at that time. The experiments conducted by Galileo made him aware of the inconsistencies in Aristotle’s axioms. He was certain that these be replaced by principles derived from experiments.

Though a new methodology to understand nature was proposed by many philosophers and visionaries like Bacon, Hobbes, Descartes, it was Galileo who developed and practiced it and hence had the right to be called as the father of modern science. His inquiry was of course separated from religious vision and thus came in conflict with the institutional authority. As such, there was no conflict because he was able to blend his faith and his science as two sources from the divine; but others were not ready to accept such a revolutionary idea at that time. Thus, an apparent clash between religious authority and intellectual freedom became imminent leading to the condemnation of Galileo. The second trial was as sequel of the first trial. In this regard,

⁹ Sobel. P. 326.

the condemnation of Galileo by the Church authorities cannot be justified in any manner. Of course, there were many factors that affected the unjustifiable condemnation. In spite of the complexities of Galileo' trial it is reasonable to surmise that the core issue remains institutional authority versus intellectual freedom. As we have the reason to believe so, the final verdict came only from the Church authorities including the Pope Urban VIII. We may not be able to discover, who was / were to bear the name of the chief protagonist of this unjust trial; still we have reason to believe that the Church as whole was responsible for it.

Further, the authorities did not give much thought to intellectual freedom in the pursuit of scientific knowledge. But at the same time we have to bear in mind that, there were ten Cardinals who were entrusted to deliver the final verdict, among them only seven were willing to undersign the sentence. Therefore, we must agree that there were persons who were able to reconcile with the new view. What we can conclude from this aspect is that, it is the 'authority' that failed to see the dynamic phenomena of human intellect and not the religion in itself.

Moreover, I am convinced, along with others, that it was not heliocentric view alone that caused his condemnation. If it were so, there was the high-ranking Cardinal Nicholas of Cusa (1401-64) who espoused the heliocentric view even before Copernicus. Cusa though being a Catholic and a Cardinal did not face any harm or threat from the Church. Therefore, it was not heliocentrism alone which prompted the Church to condemn Galileo. It may have been vengeance, personal animosities and professional jealousy that brought about this ignominious condemnation.

The Rehabilitation of Galileo

In 1757 Pope Benedict XIV, took up the condemnation of Galileo, and the congregation of the index secretly allowed the ideas of Copernicus to be tolerated. But it again took some more years to have the discoveries to be published. In the year 1820 a crisis was precipitated. On 16th August 1820, the Cardinals of the Holy Inquisition graciously agreed that Copernican cosmology was right and it was not all against the Bible.

The mood of Galileo's condemnation has been drastically changed by now. Still the old wound remained bleeding. It remained the same until the intervention of Pope John Paul II. On October 31, in 1992, owing to the efforts of Pope John Paul II, the Church finally admitted that it had erred in its 359-year-old persecution of the 17th century astronomer and physicist Galileo Galilee. The announcement was made by Pope John Paul II at a meeting of the Vatican's Pontifical Academy of Sciences in Rome.

We owe much to Pope John Paul II for the recent developments in the relationship between science and religion. Right from the very beginning of his papacy, he was earnestly trying to reconcile between science and religion. Even the great Copernicus saw it as harmoniously existing relationship. Copernicus saw the world through the eyes of a scientist that "it is a work of His hands"; a wonderful blending of his faith and reason. Copernicus the priest and the Copernicus the astronomer were reconciled in one person harmoniously and complementing each other. His science led him to contemplate on the highest good and the greatest beauty that could only be achieved through faith. Whatever revolutions happen in science, should definitely contribute to the increase of faith rather than denying it. Thus Copernicus invites the modern scientist to maintain inextricable amalgam of science and religion, reason and faith. The core of John Paul II's teaching on science can best be understood as an attempt to restore - throughout the Church and throughout the world - the harmony between reason and faith, the apparent warpath between science and religion created by vested interests. Faith and reason, science and religion were vested in the heart of Nicholas Copernicus harmoniously; a harmony which was manifest in the heart of Copernicus' great disciple, Galileo Galilei.

John Paul immediately after his Coronation took up the initiative to renew the ruptured relationship between science and religion. First, he sought to discover what caused the rupture in this relationship: what went wrong and why? Secondly, he initiated a deeper reconciliation by calling scientists and theologians to work toward establishing a new unity (what he calls a "relational unity") between science and religion. Thirdly, from this new unity, he calls scientists and theologians to work together for the evolution of true culture (i.e., fully human culture). Pope John Paul's vision is to integrate science and religion so that a new human culture could be developed; based on scientific scrutiny and religious understanding.

Analysis of the Rupture and the Reinstatement of Galileo

In 1979, at the beginning of his pontificate, in his address to the Plenary Session of the Pontifical Academy of Sciences, commemorating the birth centenary of Albert Einstein, he emphasised that the “search for truth is the task of basic sciences”. He further stated that “pure sciences are a good which all people must be able to cultivate in full freedom from all forms of international slavery or intellectual colonialism.”¹⁰ Responding to the Pontifical Academy’s President’s address to the Holy Father, Pope John Paul acknowledged in his Presidential address that both Einstein and Galileo represented an era. However, feeling sorrowful sincerely for Galileo Pope John Paul II stated that “the greatness of Galileo is known to everyone, like that of Einstein; but unlike the latter, whom we are honouring today before the College of Cardinals in the apostolic palace, the former had to suffer a great deal – we cannot conceal the fact – at the hands of men and organisms of the Church.”¹¹ Pope John Paul II quoted the Vatican Council II document *Gaudium et Spes* and ordered an interdisciplinary investigation into the Galileo affair to expose the wrongs done. He also called for the rectification of the issue that pervaded the Catholic Church as the oppressor of knowledge and progressive ideas. “Certain attitudes (not unknown among Christians) deriving from a short sighted view of the rightful autonomy of science: they have occasioned conflict and controversy and have misled many into thinking that faith and science are opposed . . . to go beyond this stand taken by the Council, I hope that theologians, scholars and historians, animated by a spirit of collaboration, will study the Galileo case more deeply and, in loyal recognition of wrongs from whatever side they come, will dispel the mistrust that still opposes, in many minds, a fruitful concord between science and faith, between the Church and the world. I give all my support to this task, which will be able to honour, the truth of faith and of sciences and open its door to future collaboration”.¹²

Pope John Paul is all praise of the great astronomer Galileo. Pope hails Galileo as the “founder of modern science” and rightfully acknowledged the attitude of Galileo that

¹⁰ Proceedings of the Pontifical Accademy of Sciences, 10th November 1979 PDF files, p. 1 Herefater referred to as Pope John Paul 1979.

¹¹ Pope John Paul 1979. p. 2.

¹² Pope John Paul 1979. p. 2

was unacceptable to the Church of the 17th century that “the two truths, of faith and of science can never contradict each other”.¹³ Moreover, Pope John Paul II described Galileo’s scientific research had been stimulated, inspired, by the “presence of the Creator” and “enlightened by divine grace”. Pope John Paul who is a philosopher himself evaluated Galileo in high esteem by expressing that “Galileo formulated important norms of an epistemological character, which are indispensable to reconcile Holy scripture and science”.¹⁴ Lately Pope John Paul and the Church recognized that Galileo introduced “the principle of an interpretation of the sacred books which goes beyond the literal meaning but is in conformity with the intention and the type of exposition characteristic of them”.¹⁵

A great desire of the head of the Catholic Church, Pope John Paul was to resolve the rift between science and the Church which was amply exemplified by him in his address to the Pontifical Academy. On 3rd July 1981, the Pope instituted four committees under a commission headed by eminent scholars to study the Galileo affair in depth. The following were the heads of the committees, namely, Cardinal Carlo Martini headed the exegetical section; Cardinal Paul Poupard headed the Cultural section; Prof. Carlos Chagas and Fr. George Coyne S.J headed the Scientific and epistemological section; Mons. Michele Maccarrone for historical and Juridical questions and Fr. Enrico di Rovasenda served as the Secretary. The results of the four committees were presented to Pope John Paul by Cardinal Paul Poupard almost 13 years later. Cardinal Poupard assured the Pope that the “investigation was broad, exhaustive and carried out in all the areas involved”. The lack of astronomical data and exegetical confusion prevalent in that transitional period from medieval to the modern were the actual cause of the condemnation. He agreed that “certain theologians, Galileo’s contemporaries, being heirs of a unitary concept of the world universally accepted until the dawn of the 17th century; failed to grasp the profound, non literal meaning of the Scriptures when they describe the physical structure of the created universe. This led them unduly to transpose a question of factual observation into the realm of faith”.¹⁶

¹³ Pope John Paul 1979. p. 2

¹⁴ Pope John Paul 1979. p. 2

¹⁵ Pope John Paul 1979. p. 3.

¹⁶ Cardinal Poupard. P. 3.

As a result of this well documented, all perspective study made by the appointed commission, Pope John Paul on 31st October 1992, in his address to the Pontifical Academy of Sciences, stated that “the myth of Galileo’s case had encouraged the erroneous idea that science and Christian faith were in opposition but declares that this sad ‘misunderstanding now belongs to the past’”.¹⁷ On this occasion, the Pope posed the question “has not this case (Galileo) long been shelved and have not the errors committed being recognized?” According to him the “underlying problems of this case concern both the nature of science and the message of faith” and the case has to be resolved because “one day we shall find ourselves in a similar situation, one which will require both sides to have an informed awareness of the field and of the limits of their own competencies”.¹⁸ Pope John Paul said the whole issue boiled down into two questions, namely biblical hermeneutics and geocentric representation. Galileo in the first place did not make a distinction between “the scientific approach to natural phenomena and a reflection on nature, of the philosophical order, which that approach generally calls for”. Galileo rejected the opinion of the Church leaders to teach Copernican system as a hypothesis even though irrefutable proof could not be provided by him. Pope John Paul admitted that “it was an exigency of the experimental method of which he was the inspired founder”. Evaluating the culture of the times, Pope John Paul accepted that the geocentric representation was commonly accepted by the culture and identified it with the literal interpretation of the Bible. Thus the new science with its objective method and the freedom of research forced the theologians to examine their own criteria of scriptural interpretation. Pope John Paul publicly praised Galileo by observing that “Galileo as a sincere believer, showed himself to be more perceptive in this regard than the theologians who opposed him”.¹⁹ From an analysis on the Galileo issue Pope John Paul observed that “the birth of a new methodology of approaching the study of natural phenomena demands *a clarification in all disciplines of knowledge*”.²⁰ The influence of an epistemological discovery “obliges them to define more clearly their own field, their approach, their methods, as well as the precise import of their conclusions. In other words, this new way

¹⁷ Pope John Paul address to the Plenary session on “Emergence of Complexity in mathematics, Physics, Chemistry and Biology” 1992, PDF file. P. 1. Hereafter referred to as Pope John Paul 1992.

¹⁸ Pope John Paul 1992. p. 2-3.

¹⁹ Pope John Paul 1999. p.3.

²⁰ Pope John Paul 1999. p.3.

requires each discipline to become more rigorously aware of its own nature”.²¹ Ultimately the new scientific method demanded an epistemological reflection on the biblical hermeneutics. Pope John Paul examining the underlying reasons humbly accepted that “the Galileo case was the symbol of the Church’s supposed rejection of scientific progress, or of dogmatic obscurantism opposed to the free search for truth.”²² According to Pope John Paul, due to the Galileo case, there was a general impression that science and Christian faith were incompatible leading to a “tragic mutual incomprehension” and a fundamental opposition between science and faith. Thus the statement of Pope Urban VIII that “Galileo had made himself guilty of an opinion very false and very erroneous and which had given scandal to the whole Christian world” was retracted by Pope John Paul another incumbent in the same throne, that “Galileo case has become the symbol of the claimed refusal, on the part of the church, of scientific progress, or of a dogmatic obscurantism opposed to free search for truth”. A complete reversal of Galileo’s condemnation occurred here. Galileo was reinstated on the pedestal of a model scientist and a model believer in whom reason and faith harmoniously interwoven.

In his sincere effort to resolve age old suspicion and conflict between the Church and sciences, John Paul humbly accepted that the Church had been wrong in condemning Galileo and emphasized that instead of the theologians, it was Galileo who had demonstrated a way of understanding the scripture with established empirical data. Thus the war raged between nascent science and the established religion was amicably settled by Pope John Paul after thoroughly examining the complex reasons behind the condemnation of Galileo and exonerated him as the father of modern science. A true believer who is a model even to the theologians in reconciling scripture and nature by understanding the true meaning of scripture and the complex dynamics of nature. In resolving the Galileo myth, Pope John Paul had the intention of never again repeating this tragic incident in the name of religion.

Toward an Integration of Science and Religion

²¹ Pope John Paul 1999. p.3.

²² Pope John Paul 1999. p.4.

Pope John Paul investigated the interrelationship between theology, philosophy and natural sciences while commenting Newton's *Philosophiae Naturalis Principia Mathematica* in his introduction to the papers of Pontifical Academy of Sciences.²³ Pope John Paul observed the fragmentary nature of the world. He narrated the division between rich nations and poor nations; northern and western regions of the earth; the antagonism between races and religions that split countries into warring camps; even among academic communities separation between truth and values exists and the isolation of the academic cultures into – scientific, humanistic and religious makes a common discourse “difficult if not at times impossible”.²⁴ The Pope envisions a nuanced interchange between science and religion with a dynamic openness among communities. In his address to the Pontifical Academy of Sciences in 1982, Pope John Paul categorically stated that “there no longer exists the ancient opposition between true science and authentic faith” and he assured the scientific community that “the Church is your ally”.²⁵ In 1990 a group of well known scientists like Carl Sagan, Hans Bethe, Freeman Dyson, and Stephen Jay Gould issued an open letter to the religious community to encourage a spirit of common cause and joint action to save the earth. “As scientists many of us have profound experiences of awe and reverence before the universe. We understand that what is regarded as sacred is more likely to be treated with care and respect. Our planetary home should be so regarded.”²⁶ In response to the above letter by a group of religious leaders like Joseph Cardinal Bernardin, Archbishop Iakovos, Robert Schuller and Elie Weisel welcomed the letter as “unique moment and opportunity in relationship of science and religion”.²⁷ As a result of these mutual and complementary initiatives, a major conference was conducted in 1992 with over 150 religious leaders and scientists coming

²³ Message of Pope John Paul II to Rev. George V. Coyne S.J., Director of Vatican Observatory, 1st June 1988. Hereafter referred to as Pope John Paul 1988.

²⁴ Pope John Paul 1988, p. M2.

²⁵ Pope John Paul II “Science must contribute to true progress of mankind” L’Osservatore Romano, Octo. 4, 1982.

²⁶ “An Open letter to the Religious Community” January 1990. It is available from the Science office of the National Religious Partnership for the Environment, P.O. Box 9105, Cambridge Massachusetts. USA.

²⁷ Quoted in Peter W. Bakken, John Gibb Engel, and J.Ronald, *Engel, Ecology, Justice, and Science and Christian Faith: A Critical Guide to the Literature*, Westport, Connecticut, Greenwood Press, 1995.p.4.

together to make a joint appeal to save and protect the environment.²⁸ Thus, by opening one to the other, common ground and important questions concerning both the fields can be discovered that are vital for the larger interests of the human community. This integration of disciplines and quest for common grounds are all the more evident in scientific disciplines presenting “our universe as a whole and of the incredibly rich variety of intricately related processes and structures which constitute its animate and inanimate components”.²⁹ John Paul anticipates a better understanding of ourselves and the universe which could be translated into technology to facilitate life further. This knowledge can be utilised to destroy and diminish human life on global scale.

Pope John Paul expressed the desire for dynamic integration by illustrating the physicists urge to unify the four forces into a grand unified theory.³⁰ The theory of Relativity proposes a physical continuum and genetics envisions a biological continuum. Thus, the scientific disciplines are increasingly unifying the cosmos and life through their explanatory theories. The Aristotelian division of the terrestrial and the celestial was eliminated by Galileo paving the way for this cosmic integration. So the Pope urges the scientists to continue the search for unity not only among scientific disciplines but integrating all forms of knowing processes. In this aspect he exhorts the scientists and the theologians or science and religion to work toward a unity for the better of humanity.

Pope John Paul also inquires how science will benefit from this process of integration. He strongly points out that science develops best when its concepts and conclusions are integrated into the broader human culture. Therefore according to him, scientists cannot work in complete isolation from the issues discussed by the philosophers and theologians. So Pope Paul II strongly believes that by contributing to such issues, the scientists can realize more fully their human potentialities.³¹ Hence the dynamic interaction between sciences, religion, humanities is an inevitable alternative. This close collaboration will definitely be beneficial to all disciplines because each can point out the

²⁸ “Declaration of the Mission to Washington” Joint appeal by Religious Leaders and Scientists for the Environment, reprinted in Roger S. Gottlieb, ed. *This Sacred Earth: Religion, Nature, Environment*, New York Routledge, 1996. pp. 640-642.

²⁹ Pope John Paul 1988. p. M5.

³⁰ Pope John Paul 1988. p. M6.

³¹ Pope John Paul 1988. p. M12.

limitations of the other and thus help in transcending limitations in their search for authenticity.