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COTTON MATHER'S RELATIONSHIP TO SCIENCE

by

JAMES DANIEL HUDSON

Under the Direction of Dr. Reiner Smolinski

ABSTRACT

The subject of this project is Cotton Mather's relationship to science. As a minister, Mather's desire to harmonize science with religion is an excellent medium for understanding the effects of the early Enlightenment upon traditional views of Scripture. Through "Biblia Americana" and The Christian Philosopher, I evaluate Mather's effort to relate Newtonian science to the six creative days as recorded in Genesis 1. Chapter One evaluates Mather's support for the scientific theories of Isaac Newton and his reception to natural philosophers who advocate Newton's theories. Chapter Two highlights Mather's treatment of the dominant cosmogonies preceding Isaac Newton. The Conclusion returns the reader to Mather's principal occupation as a minister and the limits of science as informed by his theological mind. Through an exploration of Cotton Mather's views on science, a more comprehensive understanding of this significant early American and the ideological assumptions shaping his place in American history is realized.

INDEX WORDS: Cotton Mather, "Biblia Americana," The Christian Philosopher, Hexaemeron, Natural Philosophy, Enlightenment

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Arts

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Georgia State University

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James Daniel Hudson

2008

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by

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DEDICATION

This thesis is dedicated to my wife, Marcella Rae Vardeman. Without her persistence and love, this project would have never come to light.

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Grateful appreciation must be extended to my thesis committee, especially to Dr. Reiner Smolinski, who first introduced me to Cotton Mather and first encouraged me to explore the little known realm of Cotton Mather the scientist. His constant encouragement, gentle prodding, mammoth erudition, and kind words enabled the completion of this project.

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INTRODUCTION

Cotton Mather's Relationship to Science

In his unpublished "Biblia Americana," Cotton Mather (1663-1728) begins his analysis of the Mosaic creation account by posing a question: "A Just Paraphrase on the First Chapter of Genesis, agreeable to the Modern Discoveries?" (1). Similarly, in *The Christian Philosopher* (1720/1; 1994),[1] Mather announces "that Philosophy is no Enemy, but a mighty and wondrous Incentive to Religion" (7).[2] In doing so, he instantly establishes, as he sees it, the rich correlation between religion and philosophy (natural theology)[3] permeating both texts and indicates that science and religion do not inexorably contradict one another. His use of such words as "incentive" and "agreeable" serve as equal stimuli directing the reader to view science and religion as vehicles that illuminate the wonders of God. Mather believes that God reveals himself in two books: The Book of Scripture and the Book of Nature, and even though the Scriptures are the authoritative voice of God, the complexity and purposefulness of the physical universe imply a

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[1] The dates in parentheses after each text indicate the earliest publication of the aforementioned text. The objective of this device is to give the reader a more comprehensive understanding of significant texts written both by Cotton Mather and those that heavily influenced him. In addition, the dates allow a clearer portrait of the time period in which Mather lived and worked. If more than one date is given –as in this specific instance—the second date indicates the republication year. Since Mather's "Biblia Americana" – composed between 1693-1728—remains unpublished, no publication date exists.

[2] All quotes are reproduced exactly how they appear in the original printed source. Accordingly, any variation of spelling, capitalization, and punctuation reflect the conventions of the seventeenth and eighteenth centuries. Since it is impossible to replicate the elongated penmanship of the letter s, which can appear like the letter f, I employ the typescript "s" throughout.

[3] Natural theology connects revealed religion (foundation of Christianity is the Holy Bible) and natural religion (the belief in God as evidenced by the design and harmony of nature). Natural philosophers/theologians argue that God can be known through the study of nature.

designer (Solberg lxxiii – lxiv). In both his exposition on the Hexaemeron[4] in "BA"[5] and throughout *TCP*,[6] Mather's objective is to show that the intelligent design of the natural universe powerfully testifies to an omnipotent and infallible creator.

Mather's two treatises on science—excepting *The Angel of Bethesda* (wr. 1723/24, publ. 1972)[7] and the unpublished "Curiosa Americana" (1712, 1714)[8]—"BA" and *TCP* are described as being "opposite sides of the same coin" (Solberg xxxvi). "In the 'Biblia' Mather had examined the Scriptures in terms of science, whereas in The Christian Philosopher he reversed this by surveying science from a religious perspective" (Beall and Shryock 50). All in all, each treatise demonstrates that Mather was a keen follower of developments in the scientific community. *TCP* mirrors the architecture of the "BA" as a compilation of "Treasure[s] of Illustrations for the Bible, dispersed in the Volumes of this Age . . . fetch'd all together by a laborious Ingenuitie" (*Diary* 2: 170). In essence, each treatise is derived from the known scientific knowledge of Mather's time. The significance of this extensive borrowing illustrates Mather's reception of theories of science advancing him into the Enlightenment and away from the Calvinist doctrine previously underlying Puritanism. Mather's utilization of science to uncover the

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[4] The six creative days as recorded in Genesis One.

[5] "Biblia Americana." I use this abbreviation throughout the remainder of the thesis unless this specific text appears in a quote.

[6] *The Christian Philosopher*. I use this abbreviation throughout the remainder of the thesis unless this specific text appears in a quote.

[7] The earliest and most comprehensive medical handbook in colonial America. See Otho T. Beall and Richard Shryock's study entitled *Cotton Mather: First Significant Figure in American Medicine*. See also Reiner Smolinski's *Millennial Impulse in American Literature* (102). Citations for these secondary works are located in my Works Cited at the end of thesis.

[8] A collection of 23 letters written by Cotton Mather to the Royal Society in London. In them, Mather observes and describes "American curiosities" (animals, plants, Indian customs, weather, earthquakes, etc.). For further information on "Curiosa Americana" see Smolinski's *Millennial Impulse in American Literature* (102). See also Otho T. Beall, Jr., "Cotton Mather's Early 'Curiosa Americana' and the Boston Philosophical Society of 1683," *William and Mary Quarterly*, 3rd ser. 18 (1961): 360-372, and David Levin's "Giants in the Earth: Science and the Occult in Cotton Mather's Letters to the Royal Society," *William and Mary Quarterly*, 4th ser. 45 (1988): 751-770.

evidence of God in the natural world counters the Puritan doctrine that "nature [is] inherently flawed and of little ontological or epistemological value to man" (Jeske 583). Thus, Mather moves away from Puritan orthodoxy dictating the supernatural mysteries of the universe by rendering them, through science, visible and natural. To Mather, science is not a foe, but a friend to religion.

In both his commentary on the Hexaemeron in "BA" and throughout *TCP*, Mather is motivated to amass "a Number of golden Keyes for His precious Word, and learned, charming and curious Notes on His Word, far beyond any that had yett seen the Light" (*Diary* 2: 170). Especially in the conceptualization of his "BA," Mather endeavors to surpass the "ordinary Commentators" (170) such as Simon Patrick's (1626-1707) ten-volume *Commentary upon the Historical Books of the Old Testament* (London, 1695-1710) from which commentary Mather quotes extensively; Matthew Poole's (1624-79) two-volume *Annotations upon the Holy Bible* (London, 1683-85) and his five-volume *Synopsis Criticorum Biblicorum* (London, 1669-76); and Matthew Henry's (1662-1714) *Exposition of the Old and New Testaments* (1708-10) ("Biblia Americana Project").[9] Mather's pronouncement that "BA" is "one of the greatest Works, that ever I undertook

[9] The "Biblia Americana Project" is my designation for the current effort to publish an Authoritative Edition of Cotton Mather's "Biblia Americana." A team of scholars, led by Dr. Reiner Smolinski, are editing the six folio volumes of the holograph manuscript. A superb presentation of the scope and purpose of the editorial project can be found online at www.bibliaamericana.gsu.edu/. Hereafter, information appearing in my parenthetical references with the citation "BAP" refers to material excerpted from this website.

[10] A representative example of Mather's desire to publish "BA" exists in his Advertisement located at the end of *Bonifacius* (159-163). An excerpt of the piece follows: "The author [Cotton Mather] lives in daily expectation of his death; but he dies with some hope, that the glorious Head of the Church, will stir up some generous minds, to forward an undertaking so confessedly worthy to be prosecuted. It is fit, that they should be informed, where these volumes lie waiting to be called for. They are in a *library*, to be soon found in the *American* BOSTON. And this is the title of them. BIBLIA AMERICANA" (160-61).

[11] The "Matthew Poole Project" is my designation for the efforts of Rev. Steven Dilday to publish, for the first time, an English translation of Matthew Poole's *Synopsis Criticorum*[*Translation of Interpreters*]. Rev. Dilday is transcribing the English translation online at www.matthewpoole.net/; this website serves as the source for my citations.

in my life" (*Diary* 2: 169) and his repeated requests that "BA" see publication demonstrate his desire to surpass, in breadth and scope of scholarship, the "ordinary" works of his contemporaries ("BAP").[10]

Even a cursory comparison of these commentaries when contrasted with the "BA" reveal differences in style and substance ("BAP"). Among them, Mather's "BA" has as its cornerstone a question-and-answer technique that is highly dissimilar from the traditional presentation of a summary of each individual verse with subsequent analysis shared by the Henry and Poole commentaries. Take, for example, the beginning of Henry's *Commentary* on Genesis 1: "In these verses we have the work of creation in its epitome and in its embryo" (2) compared to Poole's *Annotations*: "In the first place, he sets forth the event as a whole, so that the Author of the world might be known" ("Matthew Poole Project" 69).[11] Mather's introduction to Genesis does not start with a citation of Gen. 1:1 but with an excerpt from Thomas Pyle's *Commentary*: "A Just Paraphrase on the First Chapter of Genesis, agreeable to the modern discoveries" ("BA" 1).[12] In this regard, Mather's main focus in not on the actual text of the Bible, but on illuminating and enlarging this text with a "vast array of citations from the Church Fathers, medieval and post-Reformation theologians, Rabbinic literature, ancient history, classical and modern philosophy, philology, and from the natural sciences of his day" ("BAP"). Accordingly, Mather suffuses each of his essays, in both "BA" and *TCP*, with

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[12] In his holograph manuscript "Biblia Americana," Mather does not paginate his commentary; instead, he generally follows the divisions of the Bible into book, chapter, and verse. All citations from "Biblia Americana" refer to Mather's commentary of the Hexaemeron as recorded in Genesis Ch. 1. Thus, the pagination that appears throughout this paper is directly taken from the typescript furnished by Dr. Reiner Smolinski, general editor of the Authoritative Edition of the "Bibia Americana."

the best knowledge of his day in a dual effort to demonstrate how science resounds to the "GLORY [OF] GOD IN THE HIGHEST" (Mather, *TCP* 7). Consistent with his efforts is his belief that to be "entertaining," all useful scholarship should be "stuck with as many Jewels, as the Gown of a Russian Embassador" (*Manuductio ad Ministerium* 44).[13] Significantly, Mather does not prominently place as do Henry and Poole the dates as outlined in James Ussher's (1581-1656) chronology of the universe, *Annals of the Ancient and New Testament* (1650).[14] Mather does, though, cite Ussher's *Annals* in "BA." His motivation, then, is to employ a different methodology than that of the standard commentaries of the time ("BAP").

John Cotton, Increase Mather, and Cotton Mather

The importance of Mather's reception of science is seen in the context of his illustrious ancestors, his father Increase Mather (1639-1723) and his grandfather John Cotton (1584-1652). Interestingly, the evolution of thought accompanying the Enlightenment shows itself through the lives of these three men. John Cotton, Cotton Mather's maternal grandfather, described as "the chief spokesman of American Puritanism" demonstrates the classic Puritan attitude towards science (Hornberger, "Puritanism and Science" 503). Above all, John Cotton believes that the Bible can resolve any and all questions. True, he expresses his dismay at science, or more

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[13] "BA" captures the spirit of Mather's metaphor. Whereas Mather viewed great scholarship as being "crowned" with references, or knowledge, his heavily allusive writing style is perhaps a main reason why "BA" remains unpublished. Worthington Chauncy Ford, editor of the first two volumes of Cotton Mather's *Diary*, describes "BA" as "a great undigested mass of material, drawn from many sources and with no evidence of design or settled plan" (xi). This comment demonstrates a generally recognized academic opinion that the six folio volume "BA" is an impenetrable and forbidding text, and that a scholarly endeavor attempting to interpret it would be a maddening and perhaps even futile undertaking.

[14] A famous and influential chronology of the Bible, which dates the first day of creation to October 23, 4004 BC.

specifically, at scientists, by criticizing them as "*You Hypocrites, you can discerne the face of the skies* . . . but can you not *discerne the signes of the times*" (*God's mercie mixed with His justice* 108).[15] Furthermore, John Cotton is guided by the preacher's sayings in Ecclesiastes: "… in much wisdom is much grief; and he that increaseth knowledge increaseth sorrow" (1.18).[16]

It would be misleading, though, to end a discussion of John Cotton's attitude towards science without illustrating Cotton's commentary on the intent of the Ecclesiastical preacher. Cotton explains that he does not dismiss the pursuit of knowledge or of science. Instead, he wants "To teach us (that which is *Solomons* scope) that the study of these natural things is not available to the attainment of true happiness . . . the study of these restless creatures leaveth the minde more restless" (*A Briefe Exposition upon Ecclesiastes* 12-13). The quest for knowledge is encouraged: "To study the nature and course , and use of all Gods works , is a duty imposed by God upon all sorts of men" (23).[17] Cotton's exhortation is surprisingly modern and no doubt influenced his grandson Cotton Mather. John Cotton, then, advocates a pursuit of knowledge that demonstrates the existence of a creator through natural philosophy, but he insists that science must be subordinate to Scripture. In his *Exposition on Ecclesiastes* (London, 1654), John Cotton illustrates his knowledge of the natural philosophy of Plato

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[15] Specific quote is excerpted from John Cotton's sermon on Matthew 16:1-3 entitled "*And he said unto them, when it is evening, yee say it will be fair weather, for the skie is red*" (108). I originally encountered this quote in Theodore Hornberger's essay "Puritanism and Science: The Relationship Revealed in the Writings of John Cotton" (505). Thorough citation of Hornberger's essay is found in my Works Cited.

[16] All biblical citations are taken from the King James Version. Although Mather owned and consulted numerous translations and editions of the Bible, he most often quoted from the KJV or provided his own translation from one of the Greek, Hebrew, or Latin versions that he owned.

[17] See Hornberger's "Puritanism and Science" (513).

(c. 429-347 B.C.), Aristotle (384-322 B.C.), and Galen (c. 130-c. 200).[18] Although Cotton's views are consistent with the medieval theories of Aristotle's four elements and a geocentric universe, his views are significant insofar as they demonstrate his interest "in the physical causes of natural events and in the possibility of making practical use of knowledge of those causes" (Hornberger, "Puritanism and Science" 514).

John Cotton's writings unsettle the stereotype of Puritan indifference to science. A central representative of the Puritan experiment in the New World (Smolinski, *The Kingdom* 10), Cotton welcomes all knowledge that illuminates the signs and wonders of God. Although his scientific perspectives reflect the shortcomings of his age, they were commonplace in his time period. His interest in science is significant to the extent that it contradicts the historical opinion of the bigoted and reactionary Puritan (Hornberger, "Puritanism and Science" 514). Cotton's willingness to pursue alternative ways of glorifying God prepared the way for his grandson, Cotton Mather, in whose works natural philosophy receives utmost attention.

Increase Mather, John Cotton's son-in-law and Cotton Mather's father, continues the family's interest in science. His *Essay for the Recording of Illustrious Providences* (1684) transmits the scientific knowledge of the European physico-theologians[19] in an attempt to "reconcile the new science with biblical revelation, the Book of Nature corroborating the Book of Scripture" (Smolinski, *The Kingdom* 78). In addition,

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[18] An introduction to the natural philosophy of these prominent early thinkers can be found in Sir William Cecil Dampier's *History of Science*. Plato and Aristotle (28-36), Galen (56-57).

[19] Prominent European physico-theologians (natural philosopers) include Robert Hooke (1635-1702), Robert Boyle (1627-91), John Wilkins (1614-72), Thomas Willis (1621-75), and John Wallis (1616-1703). This group of scientists developed into the Royal Society of London. In both *Illustrious Providences* (1684) and *Kometographia: A Discourse Concerning Comets* (1683), Mather cites Hooke and the German scientist Johannes Kepler (1571-1630) to illustrate the workings of God in nature.

Mather's *Kometographia: Discourse Concerning Comets* (1683) addresses both the theological and scientific implications in nature. His acknowledgment of the emerging science suggests that he may perhaps accept that "Comets may be supposed to proceed from natural causes" (18). However, as if straddling old and new, he subverts his rationalist explication by arguing that comets are still "portentous signs of Divine anger and prognostics of great evils hastening upon the world" (18). The account of natural phenomena in Increase Mather's *Illustrious Providences* (1684) proceeds, in empirical fashion, through observation. He is clearly on the verge of offering empirical explanations, but he still prefers the providentialist view of nature: "Whether there might not be some natural reason of the great flood in Connecticut at this time; the ingenious upon the place, who know best how things are there circumstanced, may consider" (*Providences* 332). Mather is willing to entertain scientific explanations for a spring flood, but true to his didactic aim, he prefers to attribute all to God's wrath: "Thus doth the great God *Who sits King upon the Floods for ever*, make the World see how many wayes he hath to punish them" (331). Increase Mather recognizes that there are scientific explanations for natural phenomena, but does not dwell on them. Empiricism is mentioned only secondarily and is buried in his archaic description of nature as the penultimate sign and wonder of God.

Cotton Mather, unlike his father, "moves with ease between scientific explanations and theological justifications" (Smolinski, *The Kingdom* 102). While his father emphasizes the wonder of comets, the son advises against it: "Perhaps there may be some need for me to caution you against being dismayed at the signs of the heavens, or having any superstitious fancies upon eclipses and the like" (*Manuductio ad*

Ministerium 4). Phenomena that are previously marked as a portent of God are now interpreted by Mather in an objective and rational way. Yet, just seven years prior, Mather is still wrestling with the idea of comets as portents: "I think it most probable, that these frightful Bodies are the Ministers of Divine Justice" (*TCP* 53). Mather, for the most part, vigorously pursues scientific explanations; yet as seen here, he does at times evince his superstition, unable fully to shake off the influence of both his father and grandfather. These regressions, though, are sporadic, and Mather comes to accept and even promote science over superstition, demonstrating a movement away from the unscientific perspective of astrology and into the scientific realm of simply viewing them as natural occurrences (Robbins 5).[20]

The Design Argument

TCP and "BA" reflect a shifting of thought brought on by the Enlightenment. Consequently, these texts are excellent mediums for interpreting the transitional nature of the late seventeenth and early eighteenth centuries. Mather's thesis is the design argument. Predicated in antiquity, it originated with Plato's formulation that the ordered and harmonious arrangement of nature attests to a purposeful and unerring creator. This teleological conception of the universe culminated in Mather's age with Robert Boyle (1627-91), Isaac Newton (1642-1727), and such physico-theological writers as John Ray (1627-1705), William Derham (1657-1735), John Bentley (1662-1742), George Cheyne

[20] Ancient tradition, commonly associated with Babylonia, that the stars predict the course of humankind. Shades of astrology are clearly seen in Increase Mather's *Discourse Concerning Comets* (1683), in which he fixates on natural phenomena as omens and visible signs of Christ's return. Much like the ancient astrologers, theologians and ministers throughout Christendom yielded mighty influence and thus power over humanity despite their ignorance of scientific processes and occurrences. It is not until the Enlightenment and development of empirical science that observation and experiment explain such things as earthquakes, floods, and comets as normal and natural processes.

(1671-1743), William Whiston (1667-1752), and many that were inspired by them (Solberg lxix).

A more thorough, though still incomplete exposition, of the design argument is needed to trace both the history of natural philosophy (the study of nature) as evidence of the existence of God and its influence on Cotton Mather. Plato, in his *Timaeus*, is the first philosopher to conceptualize a cosmology that has a fundamental deity as its cause. Although the pre-Socratics attempt to explain the "creation" in a scientific way, they mainly look upon the world as a development of matter from chaos to formation[21] without ascribing to it, as Plato does, a creator who embeds teleological principles (Robbins 2-3). Plato's formulation of the universe as proceeding from a cause and of this universe evidencing a pattern of "purposed processes" (3) influences the early Hexaemeral writers including Philo Judaeus (c. 20 B.C.-A.D. 50), Origen (c. 185-c. 254), Basil the Great (c. 330-79), Ambrose (339-97), and St. Augustine of Hippo (354-430). All Hexaemerons, then, including Cotton Mather's investigation of the creation in "BA," can be ultimately traced to Plato's *Timaeus* as the source (5). To Mather, Plato's philosophy further authenticates the belief –shared by the early Hexaemeral writers—that Plato was influenced by and therefore drew from the ideas first espoused by Moses in the

[21] Prominent philosophers include Thales of Miletus (c. 636—c. 546 B.C.) and Anaximander (c. 610—545 B.C.). They are credited for looking for physical rather than mythological understandings in nature. Mather was clearly irked by their ignoring of God as evidenced by his very strongly worded criticism of Thales. "The Philosopher, who gazing on the *Stars* with his attentive Observation, tumbled into a Pit that he observed not . . . Wretched Astronomers! *Who are among the wandring Stars, to whom is reserved the Blackness of Darkness for ever*" (*TCP* 49). To Mather, "The true *Reading of the Stars* is to look up, and spell out, the glorious Perfections of that GOD, who is the *Father of those Lights*" (34). In addition, Mather deplores the "Atheistical *Anaximander*" ("BA" 44).

sacred Hebrew literature (12). Plato's borrowing lends him the appellation of "Moses speaking in Attic Greek" (Smolinski, "BA" 5n19).[22]

Evidenced by the patterns and processes of nature, this philosophy of a deity expressed by Plato, Aristotle, and by the Hexameral "Fathers" within the Christian tradition combine to provide a framework for the sources and subsequent development of natural philosophy (Robbins 11). During the Middle Ages, natural philosophy was embraced by the Western European universities as "essential for a proper elucidation of theology" (Grant 175). The theologians of this time period were trained in natural philosophy, the sciences, and exegesis of Scripture and inter-related these disciplines by "applying theology to science and science to theology" (84). This results in an emergence of theologian-natural philosophers whose investigation of natural phenomena and eventual accommodation to the Scriptures is done with "relative ease and confidence" (84). The identification of mathematics as important in explaining natural phenomena begins in the late Middle Ages and is instrumental in producing the scientists who are most responsible for the Enlightenment: Copernicus (1473-1543), Galileo (1564-1642), Descartes (1596-1650), Kepler (1571-1630), Boyle, and Newton. Consequently, instead of logical arguments connecting nature to Scripture without empirical investigation, philosophers are able to test their hypotheses through empirical observations of nature. Hence, the "natural philosophy without nature" inherent in the hypothetical speculation of the theologian-natural philosophers is given more reliable expression through mathematics (qtd. in Grant 151). This methodology provides an empirically sound attempt at explaining the natural world. Cotton Mather celebrates the

[22] All citations with this format are to Dr. Reiner Smolinski's editorial notes to Cotton Maher's commentary on the Hexaemeron as recorded in Mather's manuscript "BA."

new science, grounded in mathematics, as a "Mathematical and Incontestable Demonstration" that will help reveal the "System of the World" ("BA" 39). His exuberance for the new science also comes to the fore in his *TCP*: "If the Mathematics, which have in the last Centuries had such wonderful Improvements, do for two hundred Years more improve in proportion to the former, who can tell what Mankind may come to" (305).[23] To Mather, science is a medium for revealing truth; it enables a direct glimpse into the plans of God (Fleming 175).

Of course, the acceleration of knowledge through mathematics must be accommodated to the Scriptures, a task undertaken by a variety of individuals influenced by these "mathematical" theologians, of whom many are scientists themselves. Cotton Mather's contention is that the knowledge uncovered by this latest round of mathematically inclined scientists clearly demonstrates that "Nature provides limitless evidence of design to prove a Deity" (Willey 5). Isaac Newton's pronouncement that "This most beautiful system of the sun, planets, and comets, could only proceed from the counsel and dominion of an intelligent and powerful being" heightens Mather's conviction that science is a profound and wondrous tool for praising God (*Principia* 2: 544). Echoing Newton's rhapsody, Mather evinces a similar enthusiasm for science by directing it into its proper and most revelatory place, as a book of God.

This declaration—"Behold a Religion, which will be found without Controversy"—establishes how fully Mather believes science can authorize and accredit a creator (*TCP* 11). He embraces a Newtonian science that advocates the divine origin as the

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[23] Mather continues by quoting Seneca the Younger (4 B.C./A.D. 1-65) "*Multa venientis aevi populus ignota nobis sciet"* ["Many things that are unknown to us the people of a coming age will know"] (305). Here, Mather makes very clear his acceptance and promotion of the new science.

"Acknowledgment of a Glorious GOD" (12), thus making it "Evangelical" (9), while effectually subordinating science as "gloriously subservient unto the Illustration of the Scripture" (*Diary* 1: 170). In his "Advertisement" for the "BA," Mather underscores the accessory role of science to religion by summoning "Natural Philosophy . . . to serve Scriptural religion" (*Bonifacius* 161). In doing so, Mather embraces the Enlightenment thought of recognizing and utilizing the human faculties of reason and empirical observation, while emphasizing their religious function and significance. Well aware of his role as a minister, he clearly positions himself as a humble servant of God reminding the reader that "if men so much admire Philosophers, because they discover a small Part of the Wisdom that made all things; they must be stark blind, who do not admire that Wisdom itself!" (*TCP* 13). Mather cautions the scientist, consistent with his mission of "enkindling piety," not to ignore the most reasonable conclusion that the process of empirical science elicits, the evidence of a creator.[24] In this regard, Mather aligns himself clearly with such scientific heavyweights as Robert Boyle and Isaac Newton, advocating that "The God who could create a mechanical universe which obeyed laws [is] … more to be admired than a God who create[s] a universe without scientific laws" (Solberg 388).

Cotton Mather's acceptance and promotion of Newtonian science

In his article "Prodigies, Puritanism, and Natural Philosophy" (1994), Michael Winship states that "Newtonianism, with its God-directed regular laws of nature, stilled Mather's anxieties about science (93). Upon reading *TCP* and his comments on the Hexaemeron in "BA," it appears that Mather professes no such uneasiness. In *TCP*,

[24] Mather writes "*Hear now the Conclusion of the Matter*. To enkindle the *Dispositions* and the *Resolutions* of PIETY in my Brethren, is the *Intention*, of all my ESSAYS, and must be the *Conclusion*, of them" (*TCP* 308).

Mather celebrates Isaac Newton through such phrases as "the discoveries of the great Sir Isaac Newton" (20) and "the Perpetual Dictator of the learned world" (65), echoing Alexander Pope's famous expression: "God said, 'Let Newton be,' and all was light (qtd. in Westfall 199).[25] And yet, the very illumination that Newton's science brings to the natural world does, at the same time, introduce an unintended diminishment of the role of God. Thus, concern arises over Newton's theories, most notably his theory of attraction, in which there is the charge that gravitation is substituted for Providence (White 1: 15-16). Some theologians believe this theory is alarming because it offers no explanation for the cause of gravitation. The German philosopher Gottfried Wilhelm Leibniz (1646-1716) is particularly unsettled by Newton's persuasion that God must, at times, insert himself into his creation to correct or restore a naturally occurring deviation.[26] Famously analogizing Newton's conception of God to a "bumbling watchmaker" (Westfall 201), Leibniz interprets Newton as implying that God insinuates himself into his creation for regular repair and maintenance and is thus an inept creator in an inefficient creation. Leibniz, however, believes in the inherent goodness and rationality ever-present in the

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[25] Though taken from Richard Westfall's influential *Science and Religion in 17th century England* (1973), this quote is originally recorded in Alexander Pope's famous epitaph for Sir Isaac Newton. The full quote reads "Nature and Nature's Laws, lay hid in Night. God said, Let Newton be! And All was Light."

[26] The famous dispute between Leibniz and Newton originates from the quarrel over who first invented the calculus and eventually culminates in a philosophical debate in which Leibniz vocally and persistently criticizes the philosophical and theological implications of Newton's work. The main point of contention between Leibniz and Newton concerns the Newtonian theory of gravity. Leibniz argues that Newton's concept of gravity is compromised by his argument that God can offset the laws of nature at will to bring about a miracle. To Leibniz, God intervening in his creation means that God is an incompetent Author of a flawed creation. In his famous epistolary dispute with Samuel Clarke—who defends Newton's theory of gravity and special providence—Leibniz expresses his fundamental disagreement: "Sir Isaac Newton, and his followers, have also a very odd opinion concerning the work of God. According to their doctrine, God almighty wants to wind up his watch from time to time : otherwise it would cease to move … Nay the machine of God's making is so imperfect … that he is obliged to clean it now and then by an extraordinary concourse." Leibniz, "To Samuel Clarke," November 1715, letter 1 of the *Leibniz-Clarke Correspondence*, ed. H.G. Alexander, (New York: Manchester UP, 1956) 11-12. The exchange of papers between Leibniz and Clarke lasted from 1705 to 1716 and is the most frequently cited of all 18th century philosophical controversies.

natural world; any intervention by God into his creation is therefore unacceptable because it bespeaks a flawed creation by an equally imperfect creator (Westfall 6). Ironically, Leibniz recognizes that Newton's belief in God's freedom to interject himself into his creation (his providence) is contrary to a mechanical cosmology, whose very foundation and process operates independent of God. Newton responds to Leibniz by glorifying God's providence and dominion:

> He is eternal and infinite, omnipotent, and omniscient; that is, his duration reaches from eternity to eternity; his presence from infinity to infinity; he governs all things and knows all things that are or can be done. He is not eternity and infinity, but eternal and infinite; he is not duration or space, but he endures and is present. He endures forever and is everywhere present. (*Principia* 2: 545)[27]

This rapturous praise of God's supreme authority could have easily been written by Mather himself. And yet, there exists, within its very words, an underlying anxiety that Newton the Scientist and Newton the Christian were somehow irreconcilable. Newton's rhapsody seems grounded in a recognition that his mathematical demonstration of the mechanical processes of the universe does—by its very nature—diminish the role of God (Westfall 202-03).

Newton is troubled by his inability to find the cause of gravity: "Hitherto I have not been able to discover the cause of those properties of gravity from phenomena, and I frame no hypotheses" (*Principia* 2: 547). The implication of this confession—as Newton

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[27] The excerpted text appears in "The General Scholium," which was published for the first time as an appendix to the second edition (1713) of the *Principia* and subsequently reappeared in the third edition (1726) with some amendments and additions. Newton intentionally inserted "The General Scholium" to counter the Cartesian theory of vortices and answer Leibniz's criticisms without mentioning Leibniz directly. Probably the most famous part of the entire *Principia*, "The General Scholium" articulates Newton's design argument, which he believed was furthered by the contents of the *Principia*.

is well aware—are profound because the theory of attraction (gravity) finds no cause underlying its movement. It is only explainable by mathematical terms of matter and motion and thus no different from the atheistic philosophies that exclude God (Dampier 170). Newton's system does in time replace the atomism of the ancient "atheistic" philosophers of Democritus (460/457-357 B.C.) and Epicurus (341-270 B.C.) to become the foundation of a materialism that by its very nature excludes God (175). In this manner, Newton lays the foundation for the deists of the early Enlightenment (219).[28] Newton seems aware of this inevitable conclusion to his mathematical demonstrations and again attempts to assuage concerns by noting that "Gravity … is not any accidental Effect of Motion … but an original and general Law of all Matter impressed upon it by God" (*Opticks* 378).[29] And yet, Newton's own professed desire to identify the cause of gravity increases his restlessness, revealing that he is unwilling to and ultimately dissatisfied with simply, and unscientifically, ascribing it to God (Westfall 209-10). In a contrary fashion, Newton's inability to find a cause to gravity intensifies Mather's conviction that Newton's scientific principles are in harmony with Christianity, allowing Mather to ascribe the wonder of God's mystery to Newton's theory: "Gravity is an Effect insolvable by any philosophical Hypothesis; it must be religiously resolved into the immediate Will of our most wise creator" (*TCP* 90). The mystery, in and of itself, is empirical proof to Mather "That the Power of Gravity perpetually acting in the present

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[28] Prominent deists critical of the Newtonian interpretation of special providence –the sovereignty of God to intervene in his creation at any time for any reason—include Charles Blount (1654-1693) , John Toland (1670-1722), and Anthony Collins (1676-1729).

[29] This excerpt is taken from "Query 31" –an attempt to further elucidate the inexorable question of the forces of gravity—as recorded in "Book Three" of *Opticks*. The 31 Queries that conclude the text are championed as an illuminating exploration of the unresolved scientific questions dogging Newton and his speculative attempt to answer them. Highly dissimilar from the forbidding mathematical language that constitutes the bulk of the *Principia*, *Opticks* enables an amateur (much like Cotton Mather) to "look" into Newton's mind and understand his experimental methods and conclusions.

Constitution of the System of the Universe, is an Invincible Argument for the Being of a GOD ("BA" 76).

To Mather and his contemporary physico-theologians, whatever is not explainable by science is attributed to God. Thus, whatever cannot be understood by secondary causes (the revealed will of God) is assigned to the first cause, the secret will of God (Solbergy 18n1). If science cannot enumerate the antecedent, then the theological or providential answer is summoned as Mather does rhapsodically in *TCP* (41): "Great is the LORD, and greatly to be praised, his greatness is unsearchable" (Ps. 145.3). If science cannot provide the answer, then Mather is ready, and willing to provide the ultimate and infallible truth as found in the Scriptures (De Levie 364). Through "BA" and *TCP*, Mather positions himself as a believer in the Newtonian Science of first and secondary causes and thus accepts the Newtonian philosophic conceptualization of "a benevolent deity presiding over a regularized and mechanized world" (Winship 96).[30] To Mather, this mechanism is visible proof of God's primary causes in operation (Vartanian 213). His enthusiastic reception of Newtonian Science attains even more significance when we realize that such colonial New England contemporaries as Samuel Sewall

[30] The tenet of first and secondary causes defines the teleological principle of the seventeenth-century virtuoso. Although humankind cannot always comprehend the first cause, understood as the secret or invisible will of God, it is through the secondary cause—the revealed will of God through a study of his natural world (creation)—that humankind can most approximate an understanding and appreciation of God. The secondary causes underlying the processes of the natural world are understood as the laws of nature, designed by God, by which the material world is governed. These laws, particularly the origin and arrangement of the universe, were mathematically described by Newton and others.

[31] Copernicanism refers to the Heliocentric (sun at the center of the universe) theory named for Nicolaus Copernicus (1473-1543) whose ideas espoused in *On the Revolutions of Heavenly Spheres* (1543) replaced the widely held and revered doctrine of geocentrism (the earth at the center of the universe). I discuss Copernicanism in more depth at the end of Chapter One.

(1652-1730) thought Copernicanism "inconvenient" (Sewall, *Diary* 2: 779)[31] when publicly preached about "the Sun being in the centre of our System" (Miller 221).[32]

What is remarkable about Cotton Mather is that the very science he embraces and celebrates ultimately did away with the old theological conception of the creations. The God who hangs out "signs and wonders," "hurls comets," and "casts forth lightning" to scare the wicked and "shakes the earth" in his wrath is reinterpreted by a rational science that explains these phenomena as innate effects of nature, and not as impenetrable mysteries of God (White 1: 15). Mather accepts this explanation, but like his father and grandfather before, he still retains relics of the old thought. Similar to Isaac Newton, Mather, in effect, has one foot clearly planted in the realm of theology and the other in science. Reiner Smolinski describes this integration of the two methodologies of thought as Mather "maintaining a double consciousness" in which he comfortably and logically "submits" to the primary and secondary causes of Newtonian Science ("Authority and Interpretation" 203). His method of negotiating them is through reconciliation. This "balancing act" is demonstrated in Mather's thoughts on thunder and lighting in *TCP*. Mather begins the essay by noting that even reason can shed some light on this confounding phenomenon: "HIS powerful Thunder, who can understand? Yet our philosophy will a little try to see and say something of it" (70). After this scientific investigation, Mather brings attention to another observation: "The natural Causes of the Thunder do not at all release me from considering the Interest and Providence of the Glorious GOD, concerned in it" (71). Although it appears that both a rational and providential approach is irreconcilable, the reason and piety manifested in Cotton

[32] See also Cohen 130.

Mather's writings are not in competition, but coalesce to form his philosophy (Vartanian 217). In other words, piety informs his reason and reason improves his piety. Mather accepts both theology and science, similar to many intellectuals in the early Enlightenment, and sees God's participation, as expounded in Newtonian Science, in the form of authoring and maintaining these phenomena (215). Mather's view of the earth and the heavens remains "God's exclusive creation," but he acknowledges and promotes the idea that man's understanding of the world can be improved by reason (215).

Objective and Scope of Thesis

Cotton Mather's relationship to science as delineated in *TCP* and his comments upon the Hexaemeron in "BA" are the subject of this thesis. Its objective is to appreciate Cotton Mather's position as a natural philosopher in the early Enlightenment. Mather's treatment of science does much to shed light on this transitional period. He lived during an intellectual revolution in which all manners of cosmological, scientific, and textual challenges undermined the belief in the inerrancy of the Bible ("BAP"). Mather presents an "immense treasury of knowledge" (Solberg xv) that is designed to confront head on such debates as Copernican heliocentrism versus Ptolemaic Geocentrism, Newtonian physics against theological literalism, and the Peripatetic theory of the universe against the orthodox position that God created the universe out of nothing (Smolinski, "BA" 1n3). Unlike many of his peers in New England and Europe who dismissed any knowledge outside of the Scriptures, Mather seriously considers and contemplates these challenges. Mather describes science as being inspired by God: "The Light of Reason is the Work of God; the Law of Reason is the Law of God; the Voice of Reason is the

Voice of God" (*Diary* 2: 144). In both his comments on the first chapter of Genesis in the "BA" and *TCP*, Mather explains the biblical narrative of creation by the observed facts of science. Although Mather is not a scientist by vocation, he draws the constitutive elements of both texts from a wide variety of sources, all of which contribute to his multilayered response to the Mosaic creation account. His receptiveness to their ideas tellingly reveals his position on a number of controversial theological and scientific issues, among them Mather's acceptance of the Heliocentric theory, views on the so called "neotericks" (William Whiston and Thomas Burnet), the possible existence of life on other planets, and celebration of Newtonian Science.[33] From these ideas, we can discern Mather's position within this debate (Smolinski, "Authority and Interpretation" 180). As a minister, Mather is motivated to celebrate the teleology of the new science as a vehicle to "dispatch the atheist" (*TCP* 309), "To Glorify GOD" (8), and to "make it evident, that it could be no other than an Infinite God, who by His Wisdome hath founded the Earth, & by His Understanding hath established the Heavens" ("BA" 70). Through the multiple and diverse material culled from "all the Learning in the World," we can gain a comprehensive view of Mather the physico-theologian (*Diary* 2: 169).

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[33] Although not the primary scope of the thesis, Mather's opinion of potential life on other planets speaks volumes about the openness of his mind to novel and consequently dangerous ideas. While never publicly declaring his belief that there is life on other planets, the extra-terrestrial discussion nonetheless intrigues him. True, Mather couches this subject (in his "BA") through an admonishment to the reader that it is impossible to ever know the ways of God, and thus remains consistent with his theological aim of "enkindling piety." Still, Mather chooses to incorporate this dialogue, and in doing so illustrates his tendency to entertain, and perhaps even accept, novel ideas. Mather's treatment of this subject also discloses his possible familiarity with Fontenelle's (1657-1757) *Plurality of Worlds* (1686) and Christiaan Huygen's (1629-95) *Celestial Worlds Discover'd* (1698). Excerpted texts from "BA" follow: "And yet wee may not conclude, That *no Creatures* do Inhabit them" (32). "But if any one think, How then can any thing live in *Mercury*, or in *Saturn*? Lett him also think, That the Matter of each *Planet*, may have a Texture very different, which will dispose the same to bee acted on, by greater or smaller Degrees of *Heat*, according to their several Scituations, & that the Lawes of Life, and Vegetation & Propagation, are the Arbitrary Pleasure of God, and may vary in every *Planet*, as Hee pleases, to us Incomprehensibly" (64).

More specifically, the scope of this thesis is limited to Mather's relationship to the cosmogony of the Hexaemeron as illustrated in the "BA" and *TCP*. Thus, only knowledge addressing the origin (cosmogony) and ordering (cosmology) of the universe are presented. Accordingly, the first (Gen. 1:1-5, Gen. 2:4), second (Gen. 1:6-8), and fourth day (Gen. 1:14-19) in addition to the segment of the third day involving the formation of the earth and the seas (Gen. 1:9-10) are discussed. The Biblical passages that concern this thesis follow:

Gen: 1:1:	In the beginning God created the heaven and the earth.
Gen. 1:2:	And the earth was without form, and void: and darkness was upon the face of the deep. And the Spirit of God moved upon the face of the waters.
Gen. 1:3	And God said, Let there be light: and there was light.
Gen. 1:4	And God saw the light, that it was good: and God divided the light from the darkness.
Gen. 1:5	And God called the light Day, and the darkness he called Night. And the evening and the morning were the first day.
Gen. 1:6	And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.
Gen. 1:7	And God made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament: and it was so.
Gen. 1:8	And God called the firmament Heaven. And the evening and the morning were the second day.
Gen. 1:9	And God said, Let the waters under the heaven be gathered together unto one place, and let the dry land appear: and it was so.
Gen. 1:10	And God called the dry land Earth; and the gathering together of the waters called the Seas: and God saw that it was good.
Gen. 1:13	And the evening and the morning were the third day.
Gen. 1:14	And God said, Let there be lights in the firmament of the heaven to divide the day from the night; and let them be for signs, and for seasons, and for days, and for years:
Gen. 1:15	And let them be for lights in the firmament of the heaven to give light upon the earth: and it was so.
Gen. 1:16	And God made two great lights; the greater light to rule the day, and the lesser light to rule the night: he made the stars also.

Gen. 1:17	And God set them in the firmament of the heaven to give light upon the earth,
Gen. 1:18	And to rule over the day and over the night, and to divide the light from the darkness: and God saw that it was good.
Gen. 1:19	And the evening and the morning were the fourth day.
Gen. 2:4	These are the generations of the heavens and of the earth when they were created, in the day that the Lord God made the hearth and the heavens.

The remainder of the Mosaic creation account—Genesis 1:11-12 (the creation of plants on the third day), Genesis 1:20-23 (the creation of marine creatures), and Genesis 1:24-31 (the creation of animals and man)—are excluded from analysis. In addition, the further exposition of the creation account as extended in Genesis 2:5-25 is left out. It is important to note that Mather died before the publication of Jean Astruc's (1684-1766) *Conjectures sur les Memoires originaux* [*Conjectures on the original documents that Moses appears to have used in composing the Book of Genesis, With Remarks that Support or Throw Light Upon These Conjectures*], published in 1753, and therefore saw no contradiction between the two separate creation accounts as compiled from the two independent documentary traditions, the Elohist and Yahwist traditions (Smolinski, "BA" 1n3).[34]

Yet, if Mather had read Astruc's *Conjectures*, he certainly would have vigorously considered and possibly even have accepted Astruc's reasoning. Mather considers similar philological challenges to the Pentateuch in "BA" including those raised by Benedictus de Spinoza (1632-77), Thomas Hobbes (1588-1679), Richard Simon (1638-1712), and Jean LeClerc (1657-1736) concerning the authorship of the Pentateuch. Their argument, put simply, is that Moses did not write the entire first five books of the Bible.[35] After conducting his own thorough research, Mather reveals in his "Essay for further COMMENTARY on the Sacred Scriptures"—the final segment of the "BA"—that he willingly accepts the Spinozist argument that interpolations and lacuna exist evidencing

[34] Jean Astruc argues that the duplicate creation narratives (Gen. 1:1-2:3 and Gen. 2:4-25) are a result of the two designations for the name of God. In his essay "Authority and Interpretation," Reiner Smolinski identifies Astruc's surprising philological find. "Genesis was compiled of two major and nine minor parallel memoirs distinguishable through their use of God's appellation "Elohim" and "Jehovah" (178).

[35] For a more thorough discussion of this debate see Reiner Smolinski's "Authority and Interpretation: Cotton Mather's Response to the European Spinozists" (2006). Full citation is in my Works Cited at end of thesis.

that Moses is not the sole author of the Pentateuch. In this regard, Mather shows, in his rational pursuit of Scriptural truth, that he is not above agreeing with those whom others, including himself, have branded as atheists (Smolinski, "Authority and Interpretation"). He is inclined to probe the truthfulness of their thoughts even if he is irritated by the motivations for their criticisms: "It is not from a Religious Contempt of this World, but because the spirit of Irreligion in them, too often, designs a Contempt of the Great God, & of his Works" ("BA" 59). The precedent for this systematic investigation of the Scriptures begins with Mather's scientific interpretation of the Mosaic creation account. In the aforementioned philological controversy as well as throughout the "BA" and *TCP*, Mather's objective is to show that the knowledge of the philosophy cited harmonizes with the Bible.

The words that constitute the six days of creation, as transcribed by Moses, are rich in religious resonance. Mather, no doubt, is satisfied with their explanation. He notes that "The History of the Creation, all good Men do and must Beleeve, in the Literal Sense" ("BA" 79). However, he reminds the reader that "it is one thing to be above reason, it is another altogether to be against it" (28).[36] He is inspired by the scientific challenges to the Mosaic creation account, trusting "That the Scriptures contain more in them, than we commonly or easily suppose" (12). Yet, he also acknowledges that "It cannot bee deny'd, That the common Glosses, wherein the Mosaic Account of the Creation, is dressed out unto our Understanding are full of Difficulties" (23). The motivation to answer these "Difficulties," or more accurately to reconcile them with his literal belief in the Mosaic creation account, is the stimulus underlying both "BA" and *TCP*. The essays that constitute both texts, assembled from "the Scattered books of learned Men" (*Diary* 1: 170), represent his religious duty to "rescue the inspired Writings of Moses" ("BA" 23).

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[36] I am not entirely faithful to Mather here. Mather is quoting from William Whiston's *New Theory* "But then, 'tis one thing to be above, and another to be repugnant to reason" (Part I. v. 42). The full quote in "BA" reads "Nevertheless, hee thinks, tis one thing to bee *Above* Reason, and another thing to bee *Against* it." The "hee" that Mather inserts is a direct reference to William Whiston. Or to both Whiston and the Dutch philological critic Spinoza (who criticizes the pious desire to see providence in all of God's miracles while ignoring the capacity of man's reason to understand it) as expressed in Chapter 6 "Of Miracles" of *Theological Political Tractate* (Smolinski, "BA" 17n95-96). Whiston is clearly receptive to Spinoza's criticism. Mather, on the other hand, carefully inserts the "hee" to excuse his assocation with such dangerous company. Still, the spirit of "BA" and *TCP* acknowledges and promotes Mather's acceptance and even celebration of man's reason.

CHAPTER ONE
The Newtonian View

Mather's use of Thomas Pyle's *Paraphrase*

Mather begins his exposition of Genesis with a scientific interpretation of the creative acts as described in Thomas Pyle's (1674 – c. 1756) *Paraphrase with Short and Useful Notes* (1717), an Anglican commentary for the common preacher. Mather's excerpt indicates that he was still working on his "BA" in the year 1717, as this was when the first edition of Pyle's *Paraphrase* was published (Hornberger, "Annotations" 114). Considering that Mather began his "BA" "Towards the latter End of the Summer [of the year 1693]" (*Diary* 1: 169) illustrates the unique importance that Mather attributed to "one of the greatest Works, that ever I undertook in my life" (169). Private letters that Mather sent to contemporaries continue his sense of the great worth of the "BA": "I can without Vanity assure you, that the Church of God, has never yett had so rich an Amassment of the most valuable Things together tendered unto it" (*Diary* 2: 413). Mather's continued effort "To write some Illustrations for the most part every Day" (2: 162) accounts for the six manuscript volumes currently housed at the Massachusetts Historical Society and his overwhelming desire to maintain the authority of the Bible in the midst of "tremendous intellectual and religious turmoil" ("BAP"). No doubt, Mather felt Pyle's distinctively Newtonian philosophy was an ideal springboard for introducing early Enlightenment knowledge conforming to the Mosaic creation account and thus preserving the truth of Moses' narrative.

The significance of excerpting Pyle's commentary first becomes clear when we examine Pyle's exegesis of the Hexaemeron. Juxtaposing devotional expressions like "Religious Acknowledgment of the Great Creator" ("BA" 1) and the "wise Purposes the Creator intended them for" (2) with scientific terminology such as "regular, & proper Motions" (1) combines to give the selection a distinctly Newtonian flavor. The Newtonian style and substance of the piece continuously remind the reader that the world is crafted by a God who designed the universe on rational and universal principles. There is not a sentence in Pyle's interpretation in which God is not established as the glorious

author who by his providence "continually Support[s], govern[s], and preserve[s]" his creation (5). Pyle's celebration of God's creation coupled with his minimal insertion of scientific language appeals to Mather as a point of departure for his discussion of science because it "never seriously compromises conservative exegesis of the Mosaic creation" (Smolinski, "BA" 2n3). Even the first sentence in Pyle's commentary declares his orthodoxy:

> The World did not exist from all Eternity, by Necessity of Nature, nor did it, or any Part of it, come into being by chance and Fortune, but all things whatever, whether Visible or Invisible, Material, or Immaterial were in the beginning created, by the Power of that infinitely Wise, Good, and Alsufficient being whom we call GOD. ("BA" 1)

Through Pyle, Mather clearly aligns himself against the Peripatetics who believe in the eternality of the world as "uncreated and indestructible."[37] *Creatio ex nihilo*—the creation out of nothing—rejects the doctrine of *ex nihilo nihil sit*—nothing comes from nothing—as untrue because it is in conflict with the creation doctrine as illustrated in the first chapter of Genesis (Pojmin 242). Likewise, Mather calls into question the beliefs of the Necessitarians like Thales (of Miletus) and Tully (Cicero) (106-43 B.C.) who believe that an Efficient cause formed the universe out of the pre-existing, eternal matter, and the atheistic beliefs of Democritus, Epicurus, and Lucretius (c. 94-55 B.C.) who, though denying the eternity of the universe, insist that the universe came about through blind chance and accidental coalescence of atoms (Smolinski, "BA" 2n3).

Thus, Mather's first excerpt is light on the scientific side and heavy on the devotional side. Pyle deals with Newton's theories in a simple, general, and easy-to-understand manner revealing Mather's intent not to discourage the reader. Nevertheless, Pyle's *Paraphrase* is "agreeable to the modern discoveries" ("BA" 1) of Newtonian science and his candid style echoes Newton's philosophy in affirming that "Nature is pleased with simplicity" (*Principia* 2: 398). Pyle repeatedly addresses Newton's theory of gravitation as the main, or first, cause of the creation by explaining the first three creative days in terms of Newton's scientific principles of attraction. Pyle identifies the

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[37] The *Peripatetics* is the name of the followers of Aristotle. Aristotle's contention of the "eternal preexistence" of the world was understandably met with great resistance by followers of the Christian faith, who believe that there was nothing before God created the "Heavens and the Earth."

"Powerfull Operation of the Divine Spirit" ("BA" 1) as commencing the previously inexplicable movement that separated the "Irregular Mixture of Solids and Fluids thrown together" (1). Through Pyle, Mather immediately declares his belief that Isaac Newton's gravitational philosophy naturally accommodates itself to the first creative days in Genesis 1.

Mather is pleased with Pyle's explication of the Hexaemeron but not completely satisfied with it. For example, Pyle mentions the "Preexisting Matter of the Water" (4), but provides no further explanation of how it came about. Pyle seems to take this shortcut because he wanted to keep things simple for his reader. Mather, however, recognizes that the "waters" as described in Genesis 1:2 required further explanation to conform their "pre-existence" to the Mosaic creation.

William Whiston and Thomas Burnet

To do this, Mather first turns to William Whiston (1667-1752), an Anglican clergyman, Lucasian professor of mathematics, and close friend of Isaac Newton. Before we can appreciate Whiston's hypothesis about the "Preexisting Matter of the Water," it is important to say a few words about him. William Whiston is most famous for *New Theory of the Earth* (London, 1696), in which he endeavors to explain the creation of the world, Noah's flood, and the ultimate fate of the world. The subtitle continues by stating that these events as recorded in the Bible "Are shewn to be perfectly agreeable to REASON and PHILOSOPHY." This, of course, is the same motivation for Mather's "BA" and *TCP* and speaks both to Mather's interest in Whiston and to the popularity of harmonizing science with religion. As noted in the introduction, Isaac Newton was troubled by an inability to find a cause in nature explaining his most famous discovery, the theory of attraction (gravitation). Although Newton addresses God as the creator and preserver of the world in both his *Principia* (1687) and *Opticks* (1704) he nevertheless portrays the universe only in its present state by mathematically explaining the mechanical operation of the world as authored and governed by God. A more complete exposition of Newton's science in harmony with the Scriptural narrative is undertaken by William Whiston in his *New Theory of the Earth*. Whiston's study is a response to

Thomas Burnet's (1635-c. 1715) *Sacred Theory of the Earth* (1691), whose cosmogony Whiston tries to make "more complete and more probable" (Collier 110).

Burnet's *Sacred Theory of the Earth* constructs a cosmogony that attempts to fuse Cartesian vortices with a providential God. In doing so, Burnet's objective is to harmonize Descartes's theory of vortices with God as its cause (Force 34-35).[38] Burnet's continued belief and reliance upon Descartes provides clear evidence to the enduring popularity of Descartes, particularly in mainland Europe. Therefore, in a historical context, Newton's natural philosophy competed with Descartes' theory of vortices; Descartes' theories enjoyed considerable influence throughout Newton's lifetime and did not begin to dissipate until well after Newton's death in 1727 (Janiak xvii-xviii). In the "General Scholium" of his *Principia*, Newton indicates that his mathematical demonstrations "should be read as providing a replacement for the Cartesian conception" (xix). Newton's opening conveys his disagreement with Descartes: "The hypothesis of vortices is pressed with many difficulties" (*Principia* 2: 543). Newton proceeds to elaborate on the impossibility of Descartes' theory of in relation to the revolutions of the planets about the sun and to Descartes' misunderstanding of comets. Newton writes "The motions of the comets are exceedingly regular" (543) and operate "with a freedom that is incompatible with the notion of a vortex" (543). In his essay *Of Comets*, Mather again makes known his admiration for Newton, "from whom 'tis a difficult thing to dissent in any thing that belongs to Philosphy" (*TCP* 50). Thus, the reason Mather embraces the Newtonian philosophy as opposed to the Cartesian science is because of his close ties to the Royal Society of London, which had elected him in 1713.[39] To Mather then, Burnet's reliance upon Descartes is simply unscientific and he mocks Descartes's continuing popularity in *TCP*:

> Very various have been the Sentiments of the Curious, what cause there should be assign'd for this great and catholick Affection of Matter, the Vis Centripeta: I shall wave them all, and bury them in the Place of Silence, with the Materia

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[38] For a more complete explanation of Descartes' theory of vortices, see Katherine Collier's *Cosmogonies of our Fathers*, Chapter III, 33-43. Newton's law of attraction refuted Descartes' vortex theory.

[39] Mather became a Fellow (F.R.S) in the year 1713, joining the distinguished colonial names of John Winthrop (1606-1676), William Penn (1644-1718), and William Byrd (1674-1744).

> Striata of Descartes, which our Keill has very sufficiently brought to nothing. (89-90).

The principle reason why Mather ignores Burnet's theory and incorporates Whiston's *New Theory* into his "BA" is Whiston's embrace of Newtonian physics. Through Whiston, Mather dismisses Descartes' vortex theory by concluding that "there is now no Room for such an Imagination" ("BA" 27) because Newton's law of gravitation seemed so much more convincing. Mather is charmed by Whiston's refutation of Burnet's *Sacred Theory* insofar as it is "most conformable to the Mosaic History and [thus] gloriously vindicat[es] it from the Cavils of the Deists ("BA" 29).

Neverthess, Burnet's *Sacred Theory* is worth a cursory glance insofar as it lays the foundation for Whiston's *New Theory* and influences Cotton Mather. Burnet elaborates his inspiration for *Sacred Theory of the Earth* as an attempt to rationally explain the Cartesian philosophy of vortices while admonishing the reader not to misconstrue "this theory [as] detract[ing] from the power of God, by which that great judgment was brought upon the World in a Providential and miraculous manner" (88). Burnet provides additional substance to differentiate himself from the "pure, and purely theoretical, mechanism of Descartes" (Force 35) by re-asserting the centrality of the divine:

> In him all things live, move, and have their being; Things that have Life and Thought have it from him, he is the Fountain of both: … And these are not only deriv'd from God at first, but every moment continued and conserv'd by him. So intimate and universal is the dependence of all things upon the Divine Will and Power. (*Sacred Theory* 88)

Burnet argues that the earth in its most pure state, before the universal flood and original sin, was quite different than the world as it appears now. Drawing from the Second Epistle of Peter—"Whereby the world that then was, being overflowed with water, perished:" (3:6)—Burnet notes that there was "a difference between the Ante-diluvian Earth and the present Earth, as to their form and constitution" (49). Burnet identifies this antediluvian earth as "smooth, regular, and uniform; without mountains, and without a Sea" (53). He continues an exposition of the uniqueness of the earth before the flood by describing it as enjoying "a perpetual spring or Equinox," contributing to the "Longevity

of Animals," and "the great fertility of the soil" (134). Mather makes known his disagreement with Burnet's idea of the antediluvian spring first through Pyle, for he notes in his hexaemeron that even in the first days the earth possessed "that Gratefull Variety of Seasons, Spring, Summer, Autumn, & Winter of which the Year Consists" ("BA" 2). In a rhetorical question entitled "Will you allow me to ask, At what Season of the Year, the World was created" (14), Mather conclusively refutes Burnet's idea of the "perpetual spring" in a surprisingly "modern" answer: "The Question is too ungeographical and unreasonable. Tis impossible that Spring & Autumn should happen throughout the whole Earth at the same time" (14). Likewise, Mather provides a decidedly scientific solution to the hotly debated seventeenth-century question of when the earth was created. Mather further disagrees with Burnet's idea of "a smooth, regular, and uniform earth" by relying upon yet another Newtonian scientist, Richard Bentley, who discredits Burnet as demonstrating a "small skill in the Mathematicks" ("BA" 69) in his belief of "The Irregular Surface of the Earth" (69).

Burnet's Cartesian theory of planets as retired comets and their natural development precipitating the universal deluge (Force 35) is shared by Whiston.[40] Whiston echoes Burnet in his speculation "That a Comet, or more peculiarly the Atmosphere thereof, was that very Chaos, from whence that world arose, whose Original is related in the Mosaic History" (*New Theory*, Part I, 33). Whiston goes on to further describe "that a Planet is a Comet form'd into a regular and lasting constitution" (*New Theory* 2: 74). Although Newton does not clearly identify a planet as a former comet, he does elaborate a connection between the two. Cotton Mather summarizes Newton's theory of comets in *TCP*, arguing that according to "the Spirit … which is necessarily requisite unto the Life and Being of all things, comes chiefly from Comets" (52). Newton further addresses the irregular behavior of comets and their potential to affect

[40] In his *Sacred Theory of the Earth*, Burnet traces Earth (a retired comet) through the stages of its natural development, which ultimately culminates in the Universal Deluge, or the Great Flood. Prompted by Gen. 7:11 ("… the fountains of the great deep [were] broken up …. ") Burnet argues that the oceans were all below ground and washed away the supports that held up the earth's crust. When the supports collapsed, the earth's surface fell into the subterranean oceans causing the Flood. Burnet's own words follow: "When the exterior Earth was broke, and fell into the Abysse, a good part of it was cover'd with water by the meer depth of the Abysse it fell into" (69). "*That the disruption of the Abysse, or dissolution of the primeval Earth and its fall in the Abysse, was the cause of the Universal Deluge, and of the destruction of the old World*" (71).

planetary bodies in his *Principia*. Comets, Newton hypothesizes, assist in the constitution of planets by "fall[ing] into the atmospheres of the planets by their gravity … and from thence, by a slow heat, pass gradually into the form of salts, and sulphurs, and tinctures, and mud, and clay, and sand, and stones, and coral, and other terrestrial substances" (2: 542). Since Mather omits, both in his "BA" and *TCP*, Whiston's theory of comets developing into planets, but includes Newton's "surprising theory" in *TCP* (51), we can infer that Mather finds Whiston's conception of comets less credible than that of Newton. Mather argues that comets affecting the constitution of planets are vastly different from planets being former comets. Mather's appropriation of Newton's conclusion "That the Bodies of Comets are solid, compact, fixed, and durable, even like those of the other Planets" (*TCP* 50) is in direct opposition to Whiston and Burnet's idea "That a Comet … was that very Chaos, from whence that World arose" (*New Theory* 33). Ultimately, Mather prefers Newton. Nevertheless, Mather hesitates to commit himself one way or the other, suggesting that he was uncertain about the true nature of comets. Perhaps that is why he continues his equivocal treatment of Whiston in the spirit of giving no "Judgment upon this Description of the Creation" ("BA" 40). Moreover, the inconclusiveness of science to interpret accurately the true nature of comets leads Mather to fall back on the old idea that comets are signs and omens of God's displeasure.

> I think it most probable, that these frightful Bodies are the Ministers of Divine Justice, and in their Visits lend us benign or noxious Vapours, according to the Designs of Providence; That they may have brought, and may still bring about the great Catastrophe of our System; and, That they may be the Habitation of Animals in a State of Punishment, which if it did not look too notional, there are many Arguments to render not improbable. (*TCP* 53)

Whenever science fails to provide a conclusively rational explanation of natural phenomena, Mather resorts to the traditional interpretations to which he was accustomed from his youth.

A particularly interesting, albeit controversial, element of Thomas Burnet's philosophy centers around Moses speaking in parables to accommodate the creation account to the "vulgar" capacities of the Jews (Collier 74).[41] Burnet states, "observations

[41] In this context, "vulgar" means relating to the common people.

upon the Six-days work … further assure us, that 'tis a narration suited to the capacity of the people, and not to the strict and physical nature of things" (*Sacred Theory* 408). Burnet believes that the Mosaic creation account only conveys information that can be easily understood and accepted by the ancient Jews. He rhetorically wonders "whether Moses did either Philosophize or Astronomize" (407) in presenting the creation account so that he would not interfere with and thus be perceived as "repugnant to clear and uncontested Science" (408). Consequently, Burnet argues that Moses accommodated his knowledge of natural science to the "vulgar" capacities of the Jewish people. He laments that "This vulgar style of Scripture in describing the nature of things, hath been often mistaken for the real sence" (408). Essentially, Burnet argues that Moses adapted the creation account to the sensibilities and understandings of the illiterate Jews, thus the story of creation in Genesis 1 should not be literally embraced as a complete exposition of the creation, but instead understood as tailored "to the conceptions of the People" (408). Thus, if Genesis 1 is not a true description of what happened, then it is a didactic account of what an eyewitness might have seen (Smolinski, "BA" 16n87). By indirectly suggesting that Genesis 1 is fictional, Burnet calls into question the "sacred authority" of the Scriptures. Burnet finds Moses' account of the creation incompatible with the cosmogony of a Cartesian vortex (Force 40). Burnet's assertion that the Bible's "vulgar style" (*Sacred Theory* 408) is "not compatible with the divine nature, according to truth and Science" (408) are later adopted by such deists such as Charles Blount, John Toland, and Anthony Collins. They perceive Burnet's mechanistic emphasis of explaining natural phenomena through secondary causes and his skepticism about the Mosaic creation story as "naturally suited to the deist attempt … to eliminate the specially provident, universe-preserving, miracle working, prayer-answering deity there revealed" (Force 39). Consequently, Mather finds Burnet simply too dangerous for inclusion into his two major treatises on science.

Mather's first citation of *New Theory* in "BA" is "worthy of entertainment" (*Manuductio ad Ministerium* 44) insofar as it directly addresses Whiston's theistic attempt to reconcile the scientific explanations of the Hexaemeron with Moses' literal creation account. By affirming "That the Mosaic Creation is not a Nice and Philosophical Account of the Origin of All Things; but an Historical and True

Representation" ("BA" 23), Mather introduces Whiston's careful revision of Burnet's "vulgar" hypothesis. Like Burnet, Whiston agrees that Moses' creation narrative was written to suit the vulgar capacities of the Jews; however, he differs from Burnet in that Moses' creation account is not fictional, but a "Historical and True Representation" (23) of what one would have seen if he had been observing the works of Genesis 1 as they happened (Smolinski, "BA" 16n87). Mather declines to cite further exposition from Whiston in his "BA" explaining how the Hexaemeron is literally true but not intended to be scientifically accurate. Whiston elaborates the grand design and purpose of his *New Theory of the Earth* because he wants to secure "revelation from deist ridicule" (Force 41). By interpreting the creation narrative "as sufficiently close to the Letter of Moses, and yet … far from allowing what contradicts the Divine Wisdom, Common Reason, or Philosophick Deductions" (*New Theory* 2-3), Whiston has his cake and eats it too. This way, Whiston can both defend the literal account of Moses and—through the discoveries made by Isaac Newton—harmonize Genesis 1 with the "Common Reason" (2) so prevalent in early Enlightenment thought (Force 41). By stating that the "Mosaic Creation is not a Nice and Philosophical account" (*New Theory* 3), Whiston situates himself within the paradigm of natural philosophy and its objective to explain natural phenomena through secondary causes (Force 41). In short, Whiston's argument is that Moses' creation narrative can be interpreted scientifically and thus is in harmony with the new science. Accordingly, Mather finds Whiston's correction of Burnet satisfying and thus (at least in small doses) worthy of incorporation into "BA." However, Mather's indirect and concise incorporation of Whiston's "vulgar" adaptation becomes understandable upon reading deeper into *New Theory*. In teasing out the philosophical meaning of the creation, Whiston comes to the realization that "The Vulgar Scheme of the Mosaic Creation, besides the disproportion as to time, represents all things from first to last so disorderly, confusedly, and unphilosophically, that 'tis intirely disagreeable to the Wisdom and Perfection of God" (*New Theory* 64). Mather is, no doubt, troubled by these Scripturally destabilizing claims and terms these remonstrations as "Complaints, of the Irregular, and Unbecoming Proceedure … which for some Reasons, I choose to omit" ("BA" 29). These "Reasons" are that Whiston ironically subverts his own clearly stated purpose to show that the philosophical interpretation of Genesis "is alike agreeable to the

Design and Stile of the Sacred Penman in the first Chapter of Genesis (*New Theory* 2). Thus, Whiston provides "grist for the mills of the Deists" by calling into question the authority of divine revelation (Smolinski, "BA" 17n97). This is simply too much for Mather and helps explain why he is highly selective about what aspects of Whiston's theory he incorporates in "BA." Nevertheless, through the role of editor, Mather can control what goes into his scientific illumination of Scripture, and thus can simply leave out any potentially dangerous theories. This further corroborates why Mather deems Whiston as "safe" because Whiston ultimately embraces Newtonian Science. Burnet's *Sacred Theory*, on the other hand, is generally received by the scientific community, particularly physico-theologians, as "most Romantick and Antiscriptural" (qtd. in Taylor 107).[42] Mather echoes this sentiment by declaring that "the *Burnettian* Romance [has] come to nothing" (*Triparadisus* 94). It is important to note, though, that Mather agrees with Burnet's *Sacred Theory* concerning the impossibility of finding the Garden of Eden in the post-deluvial world: "a Terrestrial Paradise cannot be found: It is no more to be look'd for, It is gone like a great Milstone thrown down into the Sea" (*Triparadisus* 8, 110). This recognition illustrates that Mather was ever aware and attentive to the faculties of reason in improving his understanding of Scripture.

Mather further fleshes his mindfulness of the burgeoning philological criticism of the Bible in his allusion to Spinoza's echo in Whiston. Mather seems to accept Spinoza's alarmingly reasonable argument that "Tis a Dishonourable Reflection on God … to ascribe those Things to Him, which to the Free Faculties of Mankind, would among us, bee look'd on as Marks of Unskilfulness, Foolishness, & Imprudence" ("BA" 28). Especially in *TCP*—at least concerning this portion of Spinoza's argument contained within his chapter "Of Miracles" in *Theological-Political Treatise* (1670)—there is evidence that Mather agrees with Spinoza's assessment that humankind is too much inclined to ascribe mere natural phenomena to supernatural effects. Compelled to stabilize the truth of Scripture in light of potentially subversive charges, Whiston disagrees with Spinoza's contention that reason contradicts the understanding of the Scriptures. Where Spinoza argues that "miracles were wrought according to the

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[42] Original source for this secondary citation is Matthew Mackaile's *Terrae Prodromus Theoricus: Containing Animadversions upon T.B.'s Theory of His Imaginary Earth*, Aberdeen, 1691.

understanding of the common people who were quite ignorant of the principles of science" (*Complete Works* 446), Whiston responds that "the Measure of our present knowledge ought not to be esteem'd the … test of Truth; or to be oppos'd to the Accounts receiv'd from Profane Antiquity, much less to the inspir'd Writings" (*New Theory* 379). Although Mather does not incorporate this specific quote into his "BA," he does cite Whiston's belief in the unreasonableness of believing that science itself can comprehend everything: "It is not unreasonable, that the most common Effects of Nature, or usual Accidents of Humane Affayrs, bee ascribed unto the Supream Being" ("BA" 32). Whiston's rejoinder to Spinoza's complete confidence in reason captures the objective of Mather's "BA" as rescuing and maintaining the sacred authority of the Scriptures from its detractors. The "common Glosses" ("BA" 23) that "are full of Difficulties" are only so, Mather believes, because they are beyond humankind's understanding.

The mere fact that Mather chooses to incorporate (in "BA") Whiston's quotation of Spinoza out of the ninety-four pages where Whiston deals with the Hexaemeron evidences Mather's agreement with its contents.[43] Spinoza's argument is perceived by Mather as harmoniously in accord with the reason of the new science, and thus of consequence for rational minds. This is not to say that Mather accepts Spinoza's arguments wholesale; however, Mather, like Whiston, seems charmed by Spinoza's attempt to find the truth of Scripture. His main opposition to Spinoza deals with the "spirit of Irreligion" ("BA" 59) in Spinoza, a concern that Whiston does not appear to share.

In his *Theological Political Treatise*, Spinoza comes remarkably close to Newton's beliefs: "For whatever is contrary to Nature is contrary to reason, and whatever is contrary to reason is absurb, and should therefore be rejected" (452). Newtonian science affirms Spinoza's argument to the point where man can understand Nature. Where man cannot understand nature, Newton ascribes the general and special providence of God; the clearest example of this is Newton's unfulfilled desire to find the cause of gravity (Force 57). To Newton, gravity is a fundamental law and thus essential

[43] Whiston's Hexaemeron comprises Book I of *New Theory* titled "A DISCOURSE Concerning the Nature, Stile, and Extent of the Mosaic History of the CREATION" (1-94).

to Nature; however, Newton's unscientific attribution of it to an "intelligent agent" (*Philosophical Writings* 100) brings attention to how his theology colors his science. Consequently, Newton's science affirms and mathematically demonstrates Spinoza's comment that "whatever is contrary to Nature is contrary to reason" (*Theological-Political Treatise* 452); however, Newton's theology compels him to dismiss the Dutch philosopher's notion that "whatever is contrary to reason is absurd, and should therefore be rejected" (452). As a believer in the special and general providence of God, Mather shares Newton's view, but where Newton is more equivocal about God's need to intercede in his creation, Mather, as a minister first and foremost, shares no scientific misgivings about the providence of miracles. If the miracles Spinoza speaks of cannot be explained rationally through a Newtonian exegesis of natural phenomena, then, to Mather, they are clear and undisputed miracles. In this regard, Mather's belief in the divine revelation is upheld and in the spirit of Newton and the early Enlightenment, he accepts the God-given faculty of reason to demystify previously inexplicable and thus inaccurately perceived supernatural events.

Burnet's argument that the Mosaic creation narrative is a parable conforms to Spinoza's belief that some events in the Bible—especially those that are contrary to reason and thus cannot be rationally explained—are merely "symbolical representations, adapted to the beliefs of those who have transmitted them" (453). Critics, conscious of Burnet's unintended diminishment of the truthfulness of Scripture, allege that Burnet re-wrote the Scriptures to suit his own whim and imagination. Burnet applies the same argument that is used against him by invoking the greatness of God; "Now as there is nothing so great, so large, so immense, as the works of Nature, and the methods of Providence, men of this complexion must needs be very unfit for the contemplation thereof" (*Sacred Theory* 15). Burnet strengthens his own interpretation of God by blaming his critics with the same errors committed by the Church fathers who could not conceive of the earth's spherical shape having poles: "Then, several of the Christian Fathers contended, that there were no Antipodes: and made that doctrine irreconcileable to Scripture. But this also, after a while, went off, and yielded to reason and experience" (408).

There is no doubt that Mather studied Burnet's *Sacred Theory of the Earth*, pondering its theoretical probability and relation to the Scriptural truths; Mather half-heartedly praises Burnet and Whiston as "learned Men" who "have of late used several Essayes, all not with aequal Success, to rescue the Inspired Writings of Moses" ("BA" 23). Mather is charmed with Burnet's attempt to "see God and his works in a pure and naked light" (*Sacred Theory* 409), yet uneasy with Burnet's "mak[ing] too bold with the Mosaic, and Inspired History thereof" ("BA" 40). Although calling him a "Neoterick," Mather incorporates Burnet's ideas through the lengthy citation from Whiston's *New Theory*, which indirectly presents many of Burnet's arguments. In this way, Mather casts a wide net to defend the Mosaic creation account from its detractors (Smolinski, "BA" 19m122). However, Mather ultimately finds Burnet too "fanciful and presumptuous" (*TCP* 97). Displeased with Burnet's unrestrained novelty, anti-Newtonian fusion of Cartesian vortices with a providential God, and a theory of the earth that ultimately empowers deism, Mather realizes that Burnet's *Sacred Theory* is far from sacred as it drastically subverts the harmony of Scriptural revelation.

Assuaged by Whiston's reputation as a Newtonian and a mathematician, Mather chooses him for inclusion in "BA." Whiston's mathematical mind, vastly different from Burnet's "romantic" approach to cosmogony, inclines him to dwell considerably on numbers, formulas, and proportions. It is this utilization of mathematics that assists him in a correction and improvement of Burnet's *Sacred Theory* into his *New Theory*.[44] Or, more exactly, Mather is emboldened by Whiston's attempt to harmonize Burnet's "romance" with Newtonian science while upholding the sanctity of Scripture. Nevertheless, Mather is unsettled by Whiston's argument, perhaps more because of Whiston's outspoken Arianism than his *New Theory*.[45] Thus, Mather's ambiguous introduction to Whiston's *New Theory of the Earth* in the "BA"—"you must not expect, that I declare myself, how far I concurr, with every Point, that shall be offered" (23)—is

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[44] See Katherine Collier's *Cosmogonies of our Fathers*, Chapter XII, esp. p. 110. See also James E. Force's *Wiliam Whiston Honest Newtonian*, Chapter 2, pp. 32-40.

[45] Arianism is the denial of the Trinity (God the Father, the Son, and the Holy Spirit) named for Arius (250/256 – 336), who taught that the God the Father and the Son did not exist together eternally and called into question the divinity of Christ. Whiston advocates this extremely sensitive religious and political argument. To Mather, this platform is not only heterodox, but dangerous, and helps to explain his "tip-toeing" around Whiston. I discuss Whiston's Arianism in more depth in Chapter Three of this thesis.

understandable considering the controversial nature of Whiston and his publications.[46] Whiston's theories, like those of Burnet, challenge traditional views of the creation account (Smolinski, "BA" 15n82). However, Mather is mollified by Whiston's Newtonian revision of Burnet's Cartesian theory of the earth's creation. Mather finds favor with Whiston's embrace of the Newtonian natural philosophy as the best defense against deism (Force 100).

It is worth repeating that Mather knows who he is dealing with. Thus, Mather's equivocal comment prefacing his lengthy citation of Whiston's *A New Theory of the Earth* invariably excuses Mather from culpability of association with the controversial William Whiston.[47] Consequently, the reader cannot discern, as can be done with all the other philosophers cited (in *TCP* and "BA"), that Mather is advocating a viewpoint via association or disassociation. Instead, he leaves the reader to guess at his own intent since he hides behind the mask of an objective compiler. The mere fact that Mather incorporates Whiston's cosmogony into his "BA" bespeaks the charm that Whiston's ideas have on Mather. Although it cannot be said with complete accuracy that Mather accepts Whiston's *A New Theory of the Earth*, it is a safe assumption that he is fascinated by him. Through Whiston, Mather evidences that he does not shy away from extracting controversial, or novel, theories of creation. Mather seems to address Whiston explicitly in his original formulation of "BA" as instrumental in "giv[ing] the Church of God, such Displays of His blessed Word, as may bee more entertaining for the Novelty and Raritie of them, than any that have been hitherto seen together" (*Diary* 1: 170). It is worth noting that Mather's diary entry comes between the publication of Burnet's second edition of his *Sacred Theory* (1691) and Whiston's *New Theory* (1696). We can thus reasonably contend that the ongoing debate considerably influenced Mather's decision to begin "BA." Whiston's *New Theory* assuredly captures the "Novelty and Rarities" that Mather finds entertaining and thus dissimilar from "any that have been hitherto seen together, in any Exposition" (170).

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[46] Whiston's Arian publications include "Advice for the Study of the Divinity" published in *Sermons and Essays* (1709), *Primitive Christianity Reviv'd* (1711), and *Athanasius Convicted of Forgery* (1712).
[47] "You must not expect, that I declare myself, how far I concur, with every Point, that shall be offered" ("BA" 23).

Similar to the equivocal introduction to Whiston, Mather concludes his treatment of Whiston by saying: "As for a Judgment upon this Description of the Creation, I will praesume to make None, at all; I leave it unto Men of Judgment" ("BA" 40). Mather's ambidextrous comment about Whiston reveals his ambivalence. Mather knows that he is playing with fire. Mindful of this, he cleverly extracts the less dangerous aspects of Whiston's theories. In his ever-present desire to connect knowledge to Scripture in "find[ing] out the True Origin and Source" (25) of philosophical theories, Mather reveals his penchant of cherry-picking to assist in his argument. This is clearly evidenced by Mather "passing over" or omitting a notable comment by Whiston in explaining why the Mosaic creation account is full of so many difficulties (Smolinski, "BA" 16n87). In the spirit of Burnet, Whiston argues that the creation process is not scientifically accurate because "the Capacities of the People could not bear any such things … [T]hose who believe the true System of the World, are forc'd among the Vulgar" (*New Theory* 20). Hence, Mather does, at times, rise in opposition to Whiston, but this opposition manifests itself in an oblique fashion through carefully selected circumlocutions such as "for some Reasons, I choose to omit" ("BA" 40), "I shall pass by" (40), "inserting here and there" (32), and "which are not here to bee Repeted" (39). Mather couches his true sentiment in indirect terms, and yet his verbal trickery—though rhetorically designed to convince the reader of his indeterminacy—gives credence to the speculation that he accepts much of Whiston's theories cited in his "BA."

Genesis 1:2 "The Spirit of God moved upon the face of the waters"

Returning to the question of the eternity of the world, which Genesis 1:2 seems to suggest, Mather first summarizes Whiston's reasoning for the pre-existing "waters" mentioned in the biblical account. Whiston hypothesizes that

> The very first words of Moses plainly imply, that the Production of the World out of nothing, which we usually style Creation, was precedaneous to the Six dayes Works, given account of, in the same Chapter. In the Beginning God created the Heaven & the Earth. q.d. "Tho' the History of the Origin of the World, which shall now bee given you, do not extend any farther than that Earth wee live upon, and the Bodies that belong unto it. ("BA" 23)

Here, Whiston affirms the doctrine of *creatio ex nihilo* [creation out of nothing] by declaring that Moses only presents the "creation" of earth and not the origin of the entire universe. Hence, the "waters" that "the Spirit of God moved upon" are pre-existing not because they are before God; instead, they are already established by God himself, only "void" and "without form" (Gen. 1.2) because God has not yet begun the process of their organization. Thus, Whiston explains the nagging question about the pre-existence of the "waters" by insisting that the Mosaic creation account does not relate to the origin of the entire cosmos, but merely of the "sublunary … Earth" ("BA" 27). In this regard, Whiston accomplishes a dual purpose of relegating the "waters" to a pre-existing event while affirming their creation by God. True, they existed "In the beginning" (Gen. 1.1), but their "beginning" was before their formation while their actual and literal "beginning" is only known as happening before the creation of the earth.

After satisfying the argument of the detractors who point to the "waters" as evidence of the eternality of the universe, Whiston identifies these "waters" as a "Confused Mass … [an] Ancient Chaos [that] was doubtless the single Source … of the Six Dayes Productions" ("BA" 26). Here Whiston identifies the "waters" as "mass" that follow the "Rules of Matter, and Motion … Impress'd and Ordered at first by the Spirit of God moving on the Face of the Waters; and by His Concurrence they are still preserved" ("BA" 34). Although Whiston's limiting the creation to the formation of the earth alone is equivocally received by Mather, he completely agrees with Whiston's attribution of this matter to the primary cause of God, echoing Isaac Newton's connection of matter forming and taking shape through the process of gravity. A sizable majority of Mather's excerpt deals with the Newtonian Science as a scientific explanation for the arrangement of matter. As Whiston himself prominently notes, his *New Theory* is constructed as an affirmation of the literalness of the Mosaic creation story.[48] Where Burnet had misinterpreted the Mosaic creation story as "no more to be accounted for or believ'd, than the fabulous representations of Aesop" (*New Theory* 2), Whiston seeks to re-interpret the creation story through Newtonian natural philosophy as literally true and thus "secure revelation from deist ridicule" (Force 41). Whiston's integration of

[48] The sub-title of *New Theory* makes clear Whiston's intent to demonstrate that "The CREATION of the World in Six Days, The Universal DELUGE, and the General CONFLAGRATION, As laid down in the Holy Scriputres, Are shewn to be perfectly agreeable to Reason and Philosophy."

Newton's laws and principles throughout *New Theory* ultimately finds favor with Mather and sheds significant light on why Mather chooses him for such lengthy incorporation (18 pages) into "BA." His denial, then, to openly declare his support for Whiston's theory probably has more to do with Whiston's "radical" hypothesis that the Mosaic creation story only applies to the earth, or perhaps to Whiston's professed Arianism.

Towards the end of Mather's annotations on the Hexaemeron in "Biblia Americana" appear excerpts from Richard Bentley's *Confutation of Atheism* (1693), which "is one of the earliest theological applications of Newtonian science" (Hornberger, "Annotations" 119). As one of the earliest promoters of the new science and as a result of Bentley's extensive correspondence with Newton, Mather finds Bentley of great value and thus brings in his words to conclude his Newtonian illumination of the Hexaemeron.[49] Mather professes no such misgivings nor reservations with Bentley as he did with Whiston, and thus the reader can sensibly extrapolate that Mather is in complete agreement with Bentley's thoughts, mainly because the bulk of Bentley's material is culled from Newton's principle scientific works, the *Principia* and *Opticks* (Smolinski, "BA" 27n170). Again, Mather uses the same approach he employed when he introduced Thomas Pyle at the beginning of "BA." Mather's synopsis of Bentley continues his celebration and popularization of the new science of Newton as an effective vehicle to conclusively answer the challenges of "the silly Atheists" ("BA" 71). Through Bentley, Mather narrows his focus to the general and special providence of God as demonstrated through gravity.[50] Bentley's discourse on the inexplicable positioning of the planetary

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[49] For a sampling of the Newton-Bentley correspondence (1692/3), See Newton's *Philosophical Writings* (94-105). For an excellent analysis of this correspondence that explores Newton and Bentley's positions on the cause and nature of gravity see John Henry " 'Pray do not ascribe that notion to me': God and Newton's Gravity," *The Books of Nature and Scripture: Recent Essays on Natural Philosophy, Theology, and Biblical Criticism in the Netherlands of Spinoza's Time and the British Isles of Newton's Time*, ed. James E. Force and Richard H. Popkin (Dordrecht: Kluwer Academic Publishers, 1994) 123-147.

[50] Newton and his compeers (Bentley, Clarke, and Whiston) exerted considerable effort articulating and defending their understanding of God's behavior (dominion). The general providence of God is God's revealed will as demonstrated through the perfect operation of the natural world (creation). Special providence is God's power to intervene, through miracles, into his perfect creation. For a discussion of the relationship between general and special providence see James E. Force "Newton's God of Dominion," *Essays on the Context, Nature, and Influence of Isaac Newton's Theology*, ed. James E. Force and Richard H. Popkin (Dordrecht: Kluwer Academic Publishers, 1994) pp. 75-102, esp. 86-87.

bodies about the sun[51] arises from Newton's affirmation of the first cause: "but though these bodies may, indeed, continue in their orbits by the mere laws of gravity, yet they could by no means have at first derived the regular position of the orbits themselves from those laws" (*Principia* 2: 543). To Mather, Newton's mechanistic explanation of the laws of planetary orbits and, in effect, his entire cosmology, grounded in divine causation, gives further substance to the truth of his belief. Newton's stunning and unprecedented explanation of the laws of nature through mathematics is seen by Mather—as conveyed by Bentley—as the laws of God (Solberg xxxiii). In Newton, Mather understands more clearly and exactly the corporeal events of the "spirit moving over the surface of the waters" (Gen. 1.2).

The Heliocentric Theory

In "BA" and *TCP*, we discover Mather's life-long effort to see the truth of God more clearly and exactly. It finds its most equivocal expression in Mather's acceptance of the heliocentric theory. His ambiguous treatment of the heliocentric theory as seen in "BA" and *TCP* is understandable considering the anxiety that resulted from it, mainly "the incompatibility between Scripture, literally interpreted, and the independent conclusions of scientific investigation" (McColley 153-54). By ultimately accepting the heliocentric theory as true, Mather reveals his exceeding reliance upon the powers of reason to trump long-standing orthodox positions. In his essay "The Judgment upon Copernicus in Puritan New England" (1964), Donald Fleming argues that Copernicus' theory was almost universally embraced by educated New Englanders throughout the seventeenth century. Basing his conclusion on Harvard Almanacs from the period, Fleming postulates that educated New England Puritans embraced Copernicanism mainly because his theory "drew deep and welcome drafts upon their faith in reason" (169).[52] It seems that Fleming could have strengthened his argument sufficiently if he had included

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[51] "Now, that all these Distances, and Motions, and Quantities of Matter, should bee so accurately & harmoniously adjusted, in this great Variety of our System … must certainly flow, from the Disposals of that infinitely Wise and Good Being" ("BA" 63).

[52] For further discussion of the Harvard Almanacs acceptance and promotion of Copernicanism in addition to their purveyance of the emerging science of the early Enlightenment see Samuel Eliot Morison's "The Harvard School of Astronomy in the Seventeenth Century," *New England Quarterly* 7.1 (1934): pp. 3-24, esp. p. 7. See also Rose Lockwood "The Scientific Revolution in Seventeenth Century New England," *New England Quarterly*. 53.1 (1980): 76-95.

one of Puritan New England's most dependable believers in the new science as begun by Copernicus: Cotton Mather. Mather may have been exposed to the Copernican theory first by these very Harvard Almanacs or as a student at Harvard; however, his acceptance of the heliocentric theory probably stems more from its mathematical demonstration in Newton's *Principia* than from Copernicus' *Revolutions of the Heavenly Bodies* (1543), or Galileo's *Discorsie e Dimonstrazioni Matematiche* [*Dialogues Concerning Two New Sciences*] (1638), or Kepler's *Mathematici Olim Imperatorii Somnium* [*The Dream*] (1634).[53] Fleming's essay is correct insofar as it captures the spirit of reason infiltrating New England as a result of the early Enlightenment (especially through Cotton Mather), but it fails to address how the Copernican system effectively met and continued to meet resistance within Christendom, including the New England Puritans.

Samuel Sewall, a prominent New England contemporary of Mather and fellow graduate of Harvard in 1671 (Smolinski, *The Kingdom* 186), probably read the same Harvard Almanacs that Donald Fleming claims illustrate the wholehearted Puritanical embrace of Copernicanism. In his famous *Diary*, Sewall records a provocative comment: "Dr. C. Mather preaches excellently from Ps. 37. Trust in the Lord … only spake of the sun being in the centre of our System. I think it inconvenient to assert such problems" (2: 779).[54] Sewall's remonstrance in 1714 evinces that tension concerning the implications of heliocentrism were widespread, even into the eighteenth century, and even in Puritan New England. In his influential *History of the Warfare of Science with Theology in Christendom* (1896), Andrew D. White captures how all branches of Christianity "vied with each other in denouncing the Copernican doctrine as contrary to Scripture" including "at a later period, the Puritans, [who] showed the same tendency" (1: 126). The

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[53] The work of Copernicus (1473-1543), Kepler (1571-1630), Galileo (1564-1642), and Newton (1642-1727) are intimately linked. Kepler was the first astronomer to prove Copernicus' speculative theory with scientific arguments. Building upon Copernicus' *Revolutions of the Heavenly Bodies*, Kepler writes *Astronomia Nova* (1609), in which his three laws of planetary motion are composed. Kepler incorporates religious arguments and reasoning in his celestial physics. His astronomical observations, particularly his "three laws," greatly influence Newton. Kepler's *Somnium* (1634) contains comments that certainly would have intrigued and presumably been accepted by Cotton Mather. An example follows, "Everybody suffers his own injustice. The chief injustice to Copernicus' work on the *Revolutions* comes from people who know nothing about astronomy … they believe that this work must not be read unless the motion of the earth is first eliminated." Johannes Kepler, *The Dream* trans. Edward Rosen (Madison: Wisconsin UP, 2003) 38. As *TCP* and "BA" demonstrate, Mather seeks to "know" astronomy.

[54] *The Diary of Samuel Sewall, 1674-1729* is a two-volume work first published in 1973. Volume 1 contains the diary entries from the years 1674-1708 with Volume 2 including the years 1709-1729.

profound implications that Copernican cosmology introduced most notably deals with its repercussions upon the traditional Biblical interpretation of the sun revolving around the earth, which is both affirmed by a surface appearance of the sun's movement, and with vastly greater importance, by the holy authority of Scripture. The most damning evidence from Scripture is in the Book of Joshua: "Sun, stand thou still upon Gibeon; and thou, Moon, in the valley of Ajalon" (10.12). Further Scriptural evidence is seen in the Book of Psalms: "the world also is stablished, that it cannot be moved" (93.1). The Mosaic creation account begins with the earth. The sun is not created until the fourth day, further substantiating the supreme importance of the earth over the sun. Hence, at least superficially, the Copernican system does seem to be in direct contradiction with Scripture. If it were not for Newton and his mathematical confirmation of the earth's movement about the sun, Mather may have simply ignored Copernicus in light of inconclusive evidence. However, as a result of Newton's *Principia*, a proliferation of works attesting to the harmony of the Copernican cosmology with Scripture begins.

Among these is William Whiston's *New Theory of the Earth*, whom Mather first cites in defense of Newton and thus Copernicus as well. Mather seems to bring special attention to Whiston's words by including them as the final incorporation of Whiston's *New Theory* in his "BA." The substance of Mather's introduction of Whiston's final discourse deserves attention: "All that I shall further transcribe from him is, a Mathematical and Incontestable Demonstration, of one Point, relating to the System of the World, which hath hitherto been undetermined" (39). Through a lengthy and heavily math-oriented discussion, Whiston puts to rest "which hath hitherto been undetermined," the truthfulness of the heliocentric model. Interestingly, Whiston's summation that "the Controversy between the Ptolemaic and Pythagorean Systems … is … forever unquestionably established" substitutes the pre-Socratic philosopher Pythagoras (c. 580-c. 500 B.C.) for Copernicus (39). True, the heliocentric theory is first hypothesized by Pythagoras (White 1: 120), but Whiston chooses to acknowledge, in like manner, the predecessor to Ptolemy (c. 100-c. 170), who is the astronomer Hipparchus (c. 190-c. 120 B.C.), from whom Ptolemy developed most of his work (Dampier 43-46). And yet Copernicus' revival of Pythagoras' heliocentric theory and announcement of it as truth (White 1: 121) led to its eventual mathematical demonstration by Whiston's illustrious

mentor, Isaac Newton. Unlike Whiston—who presumably respected Pythagoras' foundational philosophy as grounded in the laws of mathematics and thus finds his election of Pythagoras over Copernicus of no consequence—Mather treats both Copernicus' theory and his name with sensitivity. The one glaring exception to Mather's caution is his excerpt of Whiston. With Whiston, Mather empowers heliocentrism with force and conclusiveness by declaring "the Earths annual motion forever unquestionably established" ("BA" 40). Yet, Mather couches this avowal through Whiston and reminds the reader throughout his citation that "As for a Judgment upon this Description … I will praesume to make None, at all" (40). Elsewhere, Mather evinces a contrary style of circumspection. In his essay "Of the Sun" in *TCP*, there is no mention of Copernicus nor for that matter Pythagoras, nor even Aristarchus.[55] Mather even declines to name Copernicus' monumental book that explains planetary motion around the sun (Solberg lxxv), *Revolutions of the Heavenly Bodies*. His omission of Copernicus' name and book in his essay "Of the Sun" deserves attention because it is historically recognized that Copernicus and his heliocentric theory begins the scientific revolution of the Enlightenment that Mather so readily and enthusiastically embraces.[56] Thus, an inference can be drawn that Mather, even though he accepts the heliocentric doctrine, is aware that he must treat the issue with careful concern, thereby reflecting the ongoing controversy of the sun at the center of the universe. In this same essay, Mather contributes a scientific observation of his own. In relating various scientific conclusions about the property and behavior of light and heat, Mather argues "that the Sun had a Beginning; it could not have been from Eternity; Eternity must have wasted it: It had long ere now been reduced unto less than the Light of a Candle" (*TCP* 40). In doing so, Mather shifts from a passive to an active participant in the new science in providing a disarmingly logical answer to the Peripatetic idea of the eternity of the universe.

Further examples of Mather's guarded treatment of the heliocentric doctrine appear later in his hexaemeron. Mather implore the reader to "Come then; Laying aside the Prejudices of our Youth, Lett us consider … The concentric Revolutions of the Planets about the Sun" ("BA" 62). Here, Mather relies on Richard Bentley's *Confutation*

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[55] Sometimes referred to as the "Ancient Copernicus," Aristarchus of Samos (c. 310- 230 B.C.) hypothesized the earth's movement around the sun. See Dampier 44.

[56] See White 1: 15 and Dampier 109.

of Atheism, who himself culls his material from Newton's *Principia* and not the astronomer who laid the foundation for Newton's work, Copernicus (Smolinski, "BA" 27n170). However, Mather directly names Copernicus in his essay "Of the Terraqueous Globe" in *TCP*. "The Copernican Hypothesis is now generally preferred, which allows a Diurnal and an Annual Motion to our Globe, rather than to the Sun" (84). Yet still, Mather carefully chooses the word "preferred" as opposed to emphatically and clearly stating that the Copernican system is accurate as demonstrated by Isaac Newton.[57]

Samuel Sewall's objection—"I think it inconvenient to assert such problems" (*Diary* 2: 779)—to Mather speaking of the sun at the center of the universe from the pulpit further points to the anxiety involved with the heliocentric system. Like Mather, Sewall may have accepted the heliocentric theory as accurate, but Sewall's comment illustrates that it is one thing to believe it and yet another to promote its teachings from the pulpit. Mather himself evidences similar apprehensions by removing any reference to the heliocentric doctrine in the published from of his sermon in *Pascentius* (1714). The motivations for Mather's careful editing illustrate the palpable uneasiness that heliocentrism elicited, especially how it impacted traditional biblical interpretations (Smolinski, "BA" 19n120). Mather accepts the Copernican hypothesis as true but addresses it carefully so as not to unsettle traditional conservative circles who continued to favor the old Ptolemaic cosmology (27n168).

In this regard, Mather's embrace of the new science and its implications are revealing insofar as they illuminate Mather's relationship with the new science. True, Mather's acceptance of the heliocentric doctrine is empowered by the Puritan belief in reason, but to argue, as Donald Fleming does, that "almost the whole body of educated New Englanders from 1659 forward proclaim their allegiance to Copernicanism" fails to address the turmoil that this "allegiance to Copernicanism" brought about. Perhaps Andrew White captures the prevailing attitude of these same educated New Englanders more accurately when he says that "Cotton Mather accepted … the modern astronomy fully, with all its consequences (1: 149). These consequences are, of course, the weakening of literal Scriptural authority.

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[57] Copernicus' theory is accurate except that the planets do not revolve around the sun in circles but in ellipses. This correction was provided by Kepler and is known as the first law of planetary motion.

CHAPTER TWO

The Pre-Newtonians (Atomists)

In his effort to assemble "a Number of golden Keyes for his precious Word" (*Diary* 1: 170), Mather calls attention to Dr. Edmund Dickinson (1624-1707) and his presentation of the philosophy of atomism in *Physica Vetus et Vera* (1702). In doing so, he deliberately shifts attention away from the mathematically inclined science of Newton, as interpreted by Whiston, to a distinctively non-mathematical system of ideas that is predicated in the ancient debate over the origin of atomism. Here, Mather illustrates the prevailing methodology of the humanists of the Renaissance, who direct attention to the ancient Greek philosophers as important chroniclers of the study of nature (Dampier viii). Mather's return to the teachings and recordings of these Greek philosophers parallels his interest—and that of almost all physico-theologians—that the Greeks borrowed their ideas, including the atomic philosophy, from Moses. More disconcertingly, these celebrated Greek thinkers corrupted and distorted the true philosophy of Moses (Sailor 8). Mather laments the perversion of Moses by the Greeks throughout his commentary of Genesis 1 in "BA": "tis only because the True Notions of the Mosaic Philosophy are lost, and Men, like Harpaste in Seneca, cry out upon the House as Dark, only because they themselves are Blind, or have used none but Peripatetical Spectacles" (41). Mather employs a whole set of philosophers to implicate the impropriety of the ancient Greeks. Drawing on Nehemiah Grew's *Cosmologia Sacra* (1721), Mather provides ample proof that "Passages of the Sacred Oracles, [were] imitated in the Pagan Writers" (19).

The architecture of Mather's hexaemeron alternates between Newtonian science and pre-Newtonian science, or more precisely, Newton is succeeded by a philological investigation aiming to demonstrate the supremacy, and therefore authority, of the Mosaic philosophy. Accordingly, Thomas Pyles' conservative description of Newtonian science is immediately followed by a parade of scholars such as Simon Patrick (1626-1707), John Edwards (1637-1716), and Nehemiah Grew (1641-1712), who mine the writings of Greek and Hebrew thinkers as well as those of the early Church Fathers and the Scriptures to maintain that the Hebraic tradition precedes its imitation by the Greek pagans. After presenting a historical apparatus for the verity of the Mosaic philosophy, Mather again returns to the new science of Newton as extolled by Newton's disciple,

William Whiston. Although Mather clearly expresses his discomfort with Whiston, Mather finds solace in the historical weight of Dickinson's identification of Moses as an atomist. In shifting between Whiston and Dickinson, Mather makes known that he has more confidence in Dickinson than in Whiston:

> The Theories of the Creation, (particularly what I last offered you,) invented by our Modern Philosophers, do certainly make too bold with the Mosaic, and Inspired History thereof. It were a noble, and a Worthy Work; to illustrate that History, and rescue it from the praesumpteous Glosses, that many Neotericks have made upon it. ("BA")

Mather proclaims the significance of history as the consequential factor that informs Dickinson, a historical grounding notably absent in Whiston. Mather prefers the traditional knowledge of atomism, as synthesized by Dickinson, to the novel theory of Whiston's rendition of Newtonian cosmogony. Furthering the alternation from Newtonian science to pre-Newtonian science, Mather fortifies Dickinson with citations from Richard Bentley, whose *A Confutation of Atheism* is anchored in Newtonian science. Remaining attentive to his theme, Mather next cites Sir Matthew Hale (1609-76), whose *The Primitive Origination of Mankind* (1677) takes the traditional orthodox approach of comparing different cosmogonies yet ultimately privileging the Mosaic creation account.

Scriptural exegesis and prophecy

Subsequent to Bentley, Mather abandons the Newtonians and instead introduces scholars with conservative leanings who share Mather's other interests. Through Thomas Parker (1595-1677) and his father Robert Parker (c.1564-1616), Mather introduces his millenarian fervor for prophecy (Smolinski, "BA" 30n301).[58] Following Thomas Parker's Latin excerpt, which Mather chooses not to translate, he incorporates portions of Pierre Jurieu's *The Accomplishment of the Scripture Prophecies* (1687). Here again, Mather continues an exposition of his enthusiasm for prophecy by fully embracing

[58] In "BA," Mather confuses the names of the Parkers, thus incorrectly writing Robert Parker as the author of the Latin passage excerpted. The author is his son Thomas.

Jurieu's "typological reading of the Mosaic Hexaemeron as a mystical foreshadowing of the Church Universal" (Smolinski, "BA" 30n302). A pre-millenialist, Mather suffuses not just his commentary on the Hexaemeron, but the entirety of "BA" with his eschatology (Smolinski, "Introduction to *Triparadisus"* 5).[59] Mather's strong interest in acopalyptic studies compels him to provide a sampling of Thomas Parker and Pierre Jurieu (1637-1713) because their prophetic exegesis places Mather among the seventeenth-century millenarians who were embroiled in the hermeneutic debate over the prophetic signifiers in Daniel and Revelation. Seeking to enlarge on the intent of God's prophetic spirit" (Smolinski, *The Logic* 266), millennialists generated a prolific amount of literature that reinterpreted the visions of Daniel, John, and other Biblical prophets (Smolinski *The Millennial Impulse*). In Mather's time, millennialists generally occupied two different and diverging perspectives: those of the futurists (pre-millennialists) who argued that that the prophetic signs of Christ's Second Coming were yet to be fulfilled and those who adopt the preterite position (post-millennialists) that all signs of Christ's second coming have already been fulfilled many times over (Smolinski, "Introduction to *Triparadisus*" 5). Mather himself came to the conclusion late in his life (1724) that "The glorious Lord has led me into fuller Views than I have ever yett had, … And I am now satisfied, that there is nothing to hinder the immediate Coming of our Savior" (*Diary* 2:733). Henceforth, he turned preterist and argued that this position is in harmony with the "prophetic intent" of the Scriptures (Smolinski, "Introduction to *Triparadisus"* 5). Mather's preterism motivated him to compose *Triparadisus* in part because he felt the need to respond to the philological and historical-contextual challenges to the Scriptures by such philosophers as Hugo Grotius (1583-1645), Thomas Hobbes, Benedict de Spinoza, and others (Smolinski, "Introduction to *Triparadisus*" 5).[60] Mather's *Triparadisus* and "BA" share a desire to reconcile the philological challenges to the authority and divine inspiration of the Scriptures. Similarly, *Triparadisus* and *TCP*

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[59] Pre-millennialism, or millennialism, is the belief that Christ will literally reign on the earth for 1,000 years at his second coming. This position is largely based upon a literal interpretation of Revelation 20: 1-6. Mather's identity as a millenarian and his thoughts on eschatology are also found in *Problema Theologicum* (1703) and *Triparadisus* (1712, 1726/27).

[60] For examples of these philosophers' challenges to the authority of the Scriptures see Hugo Grotius *Annotationes in Vetus et Novum* Testamentum [*Commentaries on the Old and New Testament*] (1642), 1:258, 2: 5-6; Thomas Hobbes *Leviathan* (London, 1651), part III, chs. 33, 37; and Benedict de Spinoza *Theological-Political Treatise* (1670), esp. chs. 1-2, 6-8.

represent the culmination of Mather's interest in both the natural sciences and apocalypticism while "BA" blends both the philological and the scientific debates into a uniform whole in six massive folio volumes.

His participation as both a Christian philosopher and chiliast is shared by several virtuosi of the Royal Society. Taking Joseph Mede's (1586-1638) *Clavis Apocalyptica* (1627) as a point of departure, many physico-theologians embraced eschatology in determining the precise nature and timeline of Christ's millennial kingdom (Smolinski, *The Millennial Impulse* 29). Isaac Newton was deeply influenced by two of Joseph Mede's most famous students, Henry More (1614-87), who worked with but was often at odds on interpreting Revelation (Popkin, "Newton and Maimonides" 1), and Isaac Barrow (1630-77), who taught the young Newton mathematics. Taken as a representative group, they reveal their considerable passion for both natural philosophy and Scriptural exegesis. Newton's eminence in science obscures his equal importance as a theologian. His theological manuscripts give rise to what Richard H. Popkin identifies as the "other" Newton ("Introduction" *Newton and Religion* 1:xvi).[61] The "otherness" of Newton springs from the decidedly "modern" conclusion that Newton's science and his theology reveal two very different and divergent personalities. Modern readers struggle to reconcile the genius of Newton with his "unscientific" dabbling in alchemy, astrology, and interpretation of Biblical prophecies. This bifurcation of Newton as scientist and Newton as theologian led many historians to wonder if there were not "two Newtons" (x). Although this interpretation is still widespread among Newton scholars (x), Newton's parallel interest in theology and science demonstrates his conviction that God reveals himself in the book of Scripture and of Nature (xvi). Hence, to the virtuoso, the study of Nature and Scripture is a unified pursuit that employs alternative methods to comprehend God's message (Popkin, "Newton as a Bible Scholar" 114).

The disparate views elicited by the ostensible complication between a man of science and a man of theology befuddling Newtonian scholars can be carried to an American virtuoso, Cotton Mather. Though Newton and Mather converge in their zeal to understand God's message through his two books of Nature and Scripture, they separate

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[61] For access to some of Newton's theological manuscripts, see *The Newton Project 'Bringing the Works of Isaac Newton to Life,'* ed. Rob Iliffe, 2007, U of Sussex, East Sussex, 15 February 2008. <http://www.newtonproject.sussex.ac.uk/prism.php?id=1/>.

in the popular and critical reception to their works and personality. Where Newton's immense scientific accomplishments overwhelm his arcane and little known reputation as a Bible scholar, Mather's infamy as a superstitious hunter of witches completely overshadows his participation in the scientific debate of the time.[62] Popular culture associates Newton with the mathematical proof of gravity and Mather with Puritan hegemony even though their interest generally overlap. Perhaps, this is a natural consequence of Newton's legacy as a scientist in contrast to Mather's principal occupation as a minister, or the inevitable effect of deep-seated prejudice among historians.[63] Scholarly endeavors, though, are doing much to widen the understanding of both men. Credit is due to James E. Force and Richard H. Popkin for their pursuit of Newton the theologian; in like manner, Winton U. Solberg and Reiner Smolinski deserve recognition for their search of Mather the scientist. With time and likely publication of more of Newton's Yahuda manuscripts and Mather's "BA," a comprehensive assessment of their achievements and struggles as rooted in their historical context and intellectual climate will be realized.[64]

Mather's coupling of Newtonian thinker with pre-Newtonian philosophers demonstrates an internal conflict that surely beleaguered Mather as he continued to compile his "BA." While Mather seems to accept and even celebrate scientific advances, he nonetheless reveals that he was unwilling to abandon theological modes of inquiry in favor of the revolutionary advances of Isaac Newton (Smolinski, "BA" 29n298). Mather's ambidextrous concerns are evinced in his juxtaposition of Pyle with Grew, Whiston with Dickinson, and Bentley with Hale and Hooke. Consequently, an examination of Mather's interest in the pre-Newtonian philosophers is warranted because "BA" and *TCP* clearly show that Mather rested one foot each on either side of the Enlightenment debate.

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[62] History still remembers Mather most from his superstitious publications *Memorable Providences, Relating to Witchcraft and Possessions* (1689) and *Wonders of the Invisible World* (1693).

[63] For an excellent article on Mather's maligned spot in American history see David Levin, "Trying to Make a Monster Human: Judgment in the Biography of Cotton Mather," *The Yale Review* 73.2 (1984): 210-229.

[64] This is not to suggest that Mather was in the same league as Newton. The preceding anecdote was suggested by my thesis director Dr. Reiner Smolinski and grudgingly accepted by me.

Atomism

Mather introduces "the most ingenious Dr. Dickinson" ("BA" 40) and his *Physica Vetus et Vera* (1702) to advance Moses as the true source of the philosophy of atoms. Accordingly, Mather engages "one of the most important and troublesome hypotheses in Western thought" to provide further substance to the authority and authenticity of the Mosaic creation account (Sailor 4). To Mather, atomism is only "troublesome" if it is not harmonized with Scripture; thus, he is delighted with Dickinson's *Physica Vetus et Vera* and its thesis that Moses is an atomist. Mather's excitement over Dickinson's affirmation of Moses as the originator of atomism illustrates his trust in the powerful influence of traditional knowledge. Mather's carefully formulated shift from Whiston's novel celebration of Newton to Dickinson's re-interpretation of the Greek philosophers reveals Mather's reliance upon the authority of history. Mather is displeased with Whiston's "invented" theory and seeks to mollify the reader, and himself, by bringing in "a Noble, and Worthy Work" (40). Mather therefore re-asserts the importance of the Renaissance tradition that "the Ancient Philosophy … was the Daughter of the Mosaic" ("BA" 47 and Sailor 8). Dickinson's aim, like that of his peers, is to defend the supremacy of the Mosaic philosophy from what Grew terms the "imitations" ("BA" 19) and what Hale identifies as the perversions of the vain & various Hypotheses of the Philosophers" ("BA" 77).

Dickinson's theory that Moses "was no other than [a] Corpuscularian" has as its point of origin the philosophy of the ancient Greeks. The source of atomism is widely credited to the ancient Greek philosophers of Leucippus (first half of fifth century BC) and Democritus (460/457-357 BC), whose writing are presented second hand in Aristotle's *Metaphysics*, *De Anima*, *De Caelo*, and *Fragments* (Smolinski, "BA" 20n126). Aristotle (384-322 BC) notes that "Leucippus and his companion Democritus say the elements are the full and the empty, calling them what is and what is not" ("Readings" 18), and that their atomic cosmogony centers around atoms whose "differences are the causes of all other things" (18). In short, Leucippus and Democritus teach that the world is fundamentally composed of atoms. Epicurus (341-270 BC) adopts and contributes to this atomic theory (Pojmin 357) while Lucretius (c. 94-55 BC), in his *De Rerum Natura* further fleshes out the materialism of atomism by arguing that matter is

the only reality, thereby removing the existence and intervention of God (Solberg 422). The philosophy of Epicurus and Lucretius share the irreligious doctrine that the origin of the universe is a result of the evolution of the "random scramble of small, hard particles in a void" (lxxii). The re-emergence of atomism in the Renaissance of the fifteenth and sixteenth centuries is directly linked to the rediscovery and revival of Lucretius' *De Rerum Natura* and Diogenes Laertius' *Lives of the Philosophers* (1583). Before influencing metaphysics, atomism factors in the development of physics, in particular the field of iatrochemistry and its founder Theophrast von Hohenheim, or Paracelsus (Sailor 5-6). Paracelsus' (c. 1490-1541) interest in applying chemistry to medicine leads him to favor his own experimentation over the popular tradition of relying upon the classical authority of Hippocrates (460-c. 370 BC) and Galen (c. 130- c. 200). This early example of personal experimentation trumping the jurisdiction of known and traditional knowledge illustrates the beginnings of modern science and its emphasis on empiricism. Paracelsus' pioneering experiments in chemistry, or iatrochemisty (as it came to be known), evidence a transition in thinking that a return to the teachings of the ancients brought about (Dampier 114-15). The humanists of the Renaissance and their collective shift from the scholastic medievalism predominant in Europe throughout the Middle Ages to an emphasis on the ancient Greek teachings—with their spirit of rationality in "using experimentation and logical argument, rather than religion or intuition alone, to reach its conclusion—paves the way for the revival of science that introduces such names as Paracelsus, Copernicus, Kepler, Descartes, Boyle, and Newton. This long line of premier scholars leads to the name Cotton Mather and his omnipresent desire to connect or harmonize this science of rational investigation with its source, the Scriptures.

Rene Descartes and Cartesianism

Rene Descartes (1596-1650) exemplifies the renewed focus on the philosophy of the ancient Greeks and its eventual progression to the independent investigation of science. Through his philosophy and its impact upon noted thinkers in the seventeenth century, a more complete understanding of the dynamics affecting and constituting the roots of the new science, particularly its marked influence on Cotton Mather, can be

discovered. Descartes captures the spirit of rational investigation underlying the emerging science:

> And similarly I thought that the sciences found in books—in those at least whose reasonings are only probable and which have no demonstrations, composed as they are of the gradually accumulated opinions of many different individuals—do not approach so near to the truth as the simple reasoning which a man of common sense can quite naturally carry out respecting the things which come immediately before him. (*Discourse on Method*; "Part Two," 7-8)

Descartes' confidence in the faculties of the human mind superseding the established authority of ancient philosophy sets the stage for prominent scientific figures who follow him. Descartes' epistemology, anchored in the sovereignty of human reason, diverts attention from the privileged philosophy of Aristotle.[65] Moreover, Descartes' philosophy, as delineated in "Part III (Of the Visible Universe") and "Part IV (of the Earth") of his *Principles of Philosophy* (1644) "cautiously" attempts to explain the origin and arrangement of the universe (Solberg 397). After repeatedly establishing the method and motivation of his thoughts as in obedience to "the laws and customs of my country, firmly holding on to the religion in which, by God's grace, I was instructed from childhood" (Descartes *Discourse on Method*; "Part Three," 13), Descartes, in his illustration of cosmogony, "wholly ignored the Mosaic account" (Collier 33). In doing so, Descartes argues that the universe was created by the movement of matter as it obeyed physical laws. His theory of gravity as resulting from the constant movement of particles in a vortex (his vortex theory) is significant because of its purely mechanistic underpinning (Solberg 397). Although his vortex theory was discredited by Newton, Descartes's belief that "God and the soul are chief among those that ought to be demonstrated with the aid of philosophy rather than theology" challenges the predominant theological view of creation (*Meditations on First Philosophy* 47). As elaborated in his *Principles of Philosophy*, Descartes's discourse on how God may have potentially created the world through secondary causes of nature and its laws introduces

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[65] Aristotle's importance as the greatest collector and organizer of knowledge up to the Renaissance explains the longevity of his philosophy. Dominant Aristotelian scientific conceptions include element, compound, matter, form, the doctrine of contraries, and the four types of change. See Grant 86. See also Dampier 29-36.

the thought that nature primarily obeys its own laws (White 1: 16-17). Accordingly, Cartesian cosmogony threatens biblical literalism (Smolinski, "BA" 7n29). This unintended displacement of God through science has as its roots the philosophy of Rene Descartes and provides justification for his widely accepted standing as "one of the founders of modern thought" (Solberg 396).

As "one of the founders of modern thought," Descartes emblematizes the emerging spirit of observation and experiment characteristic of the new science (Dampier 98). Although almost all of his scientific theories as presented in his *Principles of Philosophy* were inaccurate (Hall 121), his famous maxim of "I think therefore I am" (*Discourse on Method*; "Part Four," 19) represents the early Enlightenment departure from the reliance upon the authority of ancient knowledge characteristic of the Renaissance.[66] Instead of operating safely within prescribed theological limits, science moves toward an acceptance of whatever conclusion, whether in opposition or in harmony with the authority of the ancients or the Scriptures that is elicited by the scientific method of empiricism (Dampier 129, 134). Significantly, Descartes prefaces his philosophical tenets with homages to the glory of God, and yet the actual process of his philosophy seems to exclude God. This contradiction has led many scholars to contend that Descartes is being disingenuous, purposefully providing "lip service" to the religious authorities who may find his ideas dangerous (Collier 33). Descartes bespeaks this fear in his *Discourse on Method*: "But because I have tried to explain these principles in a treatise that certain considerations kept me from publishing" ("Part Five" 23-24). Furthermore, Descartes concludes *Principles of Philosophy* with an awareness of ecclesiastical power: "That, however, I submit all my opinions to the authority of the church" ("Of the Earth" 288). Descartes certainly had in mind the unfavorable treatment of Galileo by the Roman Catholic Church and thus seems to recognize the very real peril that his philosophy would induce (White 1: 140-52). In this regard, Descartes' own apprehensions suggest that he was aware of the potential for his theories to exclude, or at the very best, re-interpret God's role in the terrestrial and celestial phenomena in nature. His repeated and consistent introductions allying his philosophy with God as the "first

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[66] For an excellent discussion of Descartes' role and influence on the emerging science see Rupert Hall *From Galileo to Newton*, Chapter IV "The Method of Science," 103-31, esp. 116-22.

cause of both matter and motion" (Collier 34), and then neglecting to mention God through his hypothesis of secondary causes either implies that he recognized the irreligious nature of his mechanical cosmology and tried to shield himself from scrutiny by insinuating God into his treatise, or that he was sincere in his belief of "the error of those who deny the existence of God (which I believe I have sufficiently refuted)" (Descartes *Discourse on Method*; "Part Five," 33). This irony of claiming that one's own philosophy affirms the existence of God but in actuality unravels it is later echoed by Isaac Newton, who builds upon, revises, and corrects many of the theories begun by Descartes. Descartes' recognition that his mechanical science may diminish the providence and status of God is more clearly discerned in Newton's own hesitation and possible equivocation over the cause of gravity, particularly conveyed by the "General Scholium" of his *Principia* and in his letters to Richard Bentley.[67] Consequently, it is impossible to think of the hypotheses of gravity, light, and magnetism of both Descartes and Newton without recognizing its mechanical underpinnings and the corresponding anxiety that it elicited. Newton's criticism that "The hypothesis of vortices is pressed with many difficulties" (*Principia* 2: 543) in addition to Newton's purposeful naming of his *Mathematical Principles of Natural Philosophy* (1687) as against and superior to Descartes' *Principles of Philosophy* (1644) attest to the foundational effect of Descartes upon the most celebrated scientist of the Enlightenment (Hall 108). Although Newton corrects Descartes, Descartes' shadow is clearly evident in Newton (121).

The Cambridge Platonist Henry More (1614-87) assimilates Cartesian cosmogony in his *An Antidote Against Atheism* (1652), whose thesis is the design argument and thereby discusses the natural world as an argument for the existence of God (Solberg 426). In "The Preface," More praises "Des-Cartes, whose Mechanical wit I can never highly enough admire" and thus the roots of More's *Antidote* lie in the theoretical hypothesizing of the physical universe as elaborated in Descartes's *Principles* (xvi). *An Antidote Against Atheism* is significant because its teleological style influences John Ray's *The Wisdom of God Manifested in the Works of Creation* (1691), whom Mather

[67] One of the most cited examples of Newton's equivocality towards the cause of gravity appears at the end of one of his letters to Richard Bentley. "You sometimes speak of gravity as essential and inherent to matter. Pray do not ascribe that notion to me; for the cause of gravity is what I do not pretend to know, and therefore would take more time to consider of it." Newton's *Philosophical Writings* 100.

specifically credits in the "Introduction" to his treatise on the design argument *TCP* (London, 1720/21). In thanking "the industrious Mr. Ray," Mather also acknowledges Ray's progenitor Henry More and his buttressing of religion in *An Antidote Against Atheism*. Winton Solberg artfully describes More's *Antidote* as the "grandfather" to Mather's *TCP*. However, More's comment that science, mindful of Descartes, has carried "men captive out of one dark prison into another, out of Superstitious into Atheism itself" (1) foreshadows his eventual realization that the cosmology of Descartes—with its emphasis on a mechanistic explanation of the universe—introduces vexing problems that seem to diminish the role of God. In a letter to Robert Boyle in 1665 and in his *Divine Dialogues* (1668), More ultimately renounces Cartesianism, comparing it to the atheistic philosophy of both Spinoza and Epicurus, who seek to explain all natural phenomena through purely mechanical causes without recourse to providence (Force 169n1). In his letter to Boyle, More recoils in disbelief that he ever subscribed to Descartes' cosmology, describing him (Descartes) as "a daring monster" and lamenting his own backsliding as "perfidious to the Church of God, and to the kingdom of his son Jesus Christ" (*Works* 6: 514). More's gradual distrust and eventual recognition of Descartes' philosophy as "prejudicial … to the belief of a God" (514) springs from the influence of Robert Boyle, whose concern for More's credulity in Descartes is noted in the letter and appears to be the critical impetus compelling More to renounce Cartesian cosmogony.

Mather's ambidextrous approach to Hebrew scholarship and philological criticism

In addition to the influence of the prominent scientist Robert Boyle, More identifies the assimilation of Cartesian principles by "that Spinoza, a Jew first, after a Cartesian, and now an atheist" as a crucial factor in his renunciation (514). More's condescension of Spinoza as a Jew and its racist overtone is not unique to More but representative of the traditional slighting of Hebrew scholarship by Christendom. Cotton Mather provides numerous examples of his irritation with Rabbinic learning throughout the body of his published works (Smolinski, "BA" 8n31). In "BA," Mather observes how the "Jewish Rabbis lett their Fancies please themselves, with much Gayetie, upon the First Word in the Bible" (10). Mather's annoyance stems from his view that Rabbinic

scholarship needlessly proliferates "pretty Notions" (10) upon single words that foster and encourage a subversion of theological literalism (Smolinski, "BA" 8n31). However, Mather does cite "One or Two of them" ("BA" 10) "out of those most unlikely helps, the Talmuds and other Jewish writers" (*Bonifacius*; "Advertisement" 161) to assist in a demonstration of the truth of Christianity. In doing so, Mather evidences his inclination (also demonstrated in his "careful" citation of William Whiston) selectively to extract knowledge in support of his argument from problematic sources while altogether ignoring their more controversial elements.

Mather even acknowledges this technique in his treatment of Jean LeClerc (1657-1736), a prominent Dutch Bible scholar, theologian, and professor of philosophy. While registering his regret and disfavor over LeClerc's radical biblical criticism subverting the divine inspiration of the Bible expressed in his anonymously published *Sentimens de quelques Theologiens de Hollande* (1685), Mather, nonetheless, incorporates LeClerc's defense of the Mosaic authorship of the Bible (Smolinski, "BA" 31n313). Before excerpting LeClerc's *Twelve Dissertations* (1696), Mather discloses his criticism of LeClerc: "I wish, Leclerc had never published any worse Thoughts, than those few, which I shall on this Occasion fetch from his Criticism ("BA" 85). Yet, Mather tends to be forgiving toward LeClerc because of the latter's belief in Moses as the sole author of the first five books of the Bible (Smolinski, "BA" 31n313).[68] Certainly impressed by LeClerc's theological prowess, Mather even seems grateful for his Biblical scholarship, perhaps even guardedly affectionate towards its author: "But after all, We may elsewhere discover, some admirable and mysterious references to the affayrs of the Messiah, couched in the Mosaic Writings, which from a Critic of such a Genius as Leclerc, are not to be expected" ("BA" 87). Through LeClerc, Mather reveals his mediation between an eagerness to defend the divinity and authority of the Bible while mildly censuring LeClerc for his vulnerability to the Spinozist and Hobbesian critique of the Bible.

William Whiston's Relationship with Cartesianism

[68] See Jean LeClerc, *Twelve Dissertations* "Dissertation III: Concerning Moses, the Writer of the Pentateuch, and the Design in writing," (1696) 105-141.

Henry More's relationship with Cartesianism characterized by an early admiration for and later eschewal of its fundamental mechanistic nature is echoed by William Whiston. As discussed in Chapter 2, both Thomas Burnet and William Whiston express admiration—even though Whiston later abandons Cartesian principles—for Descartes and his philosophical conception of cosmogony. Thomas Burnet's *Sacred Theory of the Earth* delights in harmonizing Scriptural revelation with the mechanistic underpinnings of "an eminent Philosopher of this Age, Monsieur des Cartes" ("BA" 93). Burnet is motivated to defend Descartes, much like the Christian apologist Edward Stillingfleet in *Origines Sacrae* (1662), from the charges of atheism resulting from the mechanistic nature of his philosophy.[69] Burnet's *Sacred Theory of the Earth* seeks to "retain both the providential deity of the Bible and the mechanistic principles of Cartesian cosmogony" (Force 34). William Whiston, like his earlier contemporary Henry More, was attracted to Descartes' system of the world, particularly Thomas Burnet's attempted revision of its fundamental principles with Scriptural revelation. As More's gradual distrust and eventual recognition of Descartes' philosophy as atheistic is affected by the influence of Robert Boyle, Whiston's renunciation of Burnet's Cartesian inspired narrative is brought about by Isaac Newton, whose scientific quest was deeply influenced by Boyle (Solberg 388). Whiston notes that he, himself, remained Cartesian until his

> deeper researches into Mechanical Philosophy and the discoveries contained in Mr. Newton's wonderful book began to convince me of the indefensibleness of many of the particulars; and that the whole scheme as it then lay, could not be justified by the Principles of sound philosophy, nor did it, upon better consideration agree with the accounts of the Holy Scripture. (*Vindication* 2).

In his treatment of Whiston in "BA," Mather directs attention to Whiston's (and presumably his own) interpretation that the Cartesian cosmogony insidiously removes the

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[69] The question of Descartes' sincerity in the objective of his hypothesis centering upon a better understanding of the works of God is considered by notable natural philosophers. In *Origines Sacrae* (1662), Edward Stillingfleet (1635-99) seems to believe in the genuineness of Descartes' intention to further illuminate the mysterious actions of God. Stillingfleet argues that Descartes is not an atheist because Descartes ascribes God as the creator and mover of matter, remarking "that this great improver and discoverer of matter" (469) is only perceived as an atheist by "persons Atheistically disposed" (466). Edward Stillingfleet, *Origines Sacrae* (London, 1662) *EEBO, Early English Books Online*, Georgia State University Library, 20 February 2008 <http://ezproxy.gsu.edu:4057/search.com/>.

Providence of God, and is thus inferior to Isaac Newton's system as outlined in his "wonderful book," the *Principia*. Whiston's argument that "The Formation of this Earth, or the Change of that Chaos into an Habitable World, was not a meer Result, from any Necessary Lawes of Mechanism, independently on the Divine Power" ("BA" 32) was dangerously close to atheism, and Mather made sure to register his displeasure.

The anxiety elicited by Descartes' mechanistic cosmogony significantly influenced the formation of the Royal Society (1660) and its members interest in natural philosophy. Its founding members, or more accurately physico-theologians (virtuosi) included John Wilkins (1614-72), Thomas Willis (1621-75), John Wallis (1616-1703), John Flamsteed (1646-1719), Robert Hooke (1635-1702), and Robert Boyle (1627-91) (Solberg 410-11). They were united by their opinion that the new science does not threaten nor challenge Christianity (Westfall 21). Christians themselves, the virtuosi of the Royal Society enthusiastically celebrated the discoveries of science as proof of God's existence. Its founding by (among others) the prominent and distinguished Robert Boyle and his legacy of harmonizing science with religion is later continued by his more famous successor Isaac Newton. These two men—connected by piety, enthusiasm for science, and dislike of Cartesian cosmogony—demonstrated how mechanical principles at work in nature are established and perpetuated by God. Boyle, displeased with Descartes' strict mechanism and its corresponding implications on the sovereignty of God sought to re-assert the authority of the First Cause (God) as a "Divine Mechanic constructing his inexorable machine" (5), which Newton later mathematically authenticated.

Boyle's privileging of natural philosophy as a more complete and faithful medium of science over Cartesian principles and Newton's mathematical demonstration of the inaccuracy of Cartesian vortices exerts considerable influence on Cotton Mather. The uniform criticism of Descartes is displayed by their American confrere as well. Mather was elected member of the Royal society in 1713. In his essay "Of Gravity" in *TCP*, Mather directs attention to how his colleagues, including John Keill, Robert Hooke, and Edmond Halley (c. 1656-1743), have "very sufficiently brought to nothing … [the] Materia Striata of Descartes" (90). In his zeal to discredit Descartes, Mather himself errs in ascribing the words "Materia Striata" to Descartes, for this expression is not found in

Descartes's *Principles of Philosophy* (Solberg 340).[70]

In the commentary on Genesis delineated in "BA," Mather reiterates his persuasion that Cartesian cosmogony is conducive to atheism. He, too, is troubled by its mechanism and implications on the providence of God. Perhaps that is why Mather employs Richard Bentley to discredit further Cartesian science—in this case Descartes' suggestion that there is no vacuum in the universe (Smolinski, "BA" 29n286). Likening the "Mechanical" philosophy of Descartes to the "Fortuitous" philosophy of the atomists, Bentley, and Mather (following Newton), demonstrate how the mechanical theory is an "Atheistical Hypothesis" ("BA" 71). Accordingly, Mather relies on the calculations of the "Incomparable Newton" to authenticate the earlier virtuoso suspicion that Cartesian cosmogony promotes atheism (72).

Beyond the scope of science

A particularly revealing reference to Descartes is found in Sir Matthew Hale's (1609-76) *The Origination of Mankind* (1677) in "BA." Here again, Mather agrees with the physico-theologians of his time and criticizes the atheistic implications of Cartesian cosmogony. Mather traces and simultaneously denounces Descartes' mechanism as the spawn of "the Epicurean sect" ("BA" 77). Through his excerpt from Hale, Mather continues to parade numerous philosophical movements, including the schools of Plato and Aristotle as well as the Astrologers, Neoplatonists, Aristotelians, and Transcendentalists (Smolinski, "BA" 29n299). Mather's stated objective, then, is to "[pronounce] a Sentence on the vain & Various Hypotheses of the Philosophers" in his privileging of the literal magnificence of the "Revealed Light of the Holy Scriptures" ("BA" 77). In doing so, Mather discloses an acute anxiety with any knowledge occurring outside of the Scriptures. This glaringly unscientific instance (even his purposeful abandonment of science and the scientific process) is fascinating insofar as it render visible the "other" Mather: the inexorable picture of the cold Puritan hostile to both witches and extra-biblical knowledge. By bringing in Hale's popular clock-work allegory, Mather shifts his focus from a harmonization of secular knowledge to the divine

[70] Since Mather's *TCP* is highly derivative (Solberg xlviii), the source for this error may be in its inaccurate transmission from the sources of either Keill, Hooke, or Halley; although the error could also be a result of a misapprehension by Mather.

Scripture that permeates the entire "BA." True, Mather specifically emphasizes the knowledge of the "Heathen Philosophers to be vain, inevident, and indeed inexplicable Theories" (79). Consequently, an argument can be made that Mather limits his critique to the "Heathen Philosophers." However, Mather's prelude to Hale's *Origination* complicates the interpretation that Mather is only condemning the atheistic schools. By "pronouncing a Sentence on the vain & various Hypotheses of the Philosophers" ("BA" 77), Mather ostenstibly includes all philosophies, including that of the modern physico-theologians and their greatest representative, Isaac Newton. Earlier in the "BA," Mather conspicuously hesitates fully to embrace the new science. Working within Dickinson's *Physica Vetus et Vera*, Mather draws attention to Galileo's *Dialogues* (1632), in which Galileo has Ptolemy, Copernicus, and Descartes hypothetically debate the arrangement of the cosmos. Mather dismisses their arguments as futile and even betrays a hostility to their conceptions: "And for the *Motion* of the *Bodies* in them, the *Ptolomaens*, and the *Copernicans*, & the *Cartesians*, may save themselves the Labour of their several *Hypotheses*. Tis enough, that we are told, Job 37.12. *It is turned about by the Counsels of God* ("BA" 57). Ironically, in relying on the distinctively pre-Newtonian cosmogony of Dickinson, Mather reverts to a rhapsody on the supernatural involvement of the angels in creating both the Heavens and the Earth. Drawing upon both Scripture and the writings of the ancient Greek author Hesiod, Mather advances the traditional notion that angels, the "Fingers of God," assisted in the origin and arrangement of the universe ("BA" 57).

Beyond the scope of science, Mather's treatment of angels through the philology of Dickinson raises questions about Mather's mind-set in regards to the limits of the new science. In raising Hale's pronouncement that "The plain but Divine Narrative by the Hand of Moses full of Sence & Congruity, & Clearness & Reasonableness in itself, does at the same Moment give us a true & clear Discovery of this great Mystery" (79), Mather effectively and conclusively answers that no science nor knowledge provides more enlightenment and understanding than the Scriptures themselves. In this regard, Mather deliberately seems to cast doubt on the stated objective of "BA" to provide a "sweet reflection of light upon the Heavenly Oracles" and to demonstrate "that Philosophy is no Enemy, but a mighty and wondrous Incentive to Religion" (*Bonifacius* 161; *TCP* 7).

Hale's *Origination of Mankind* has as its thesis the strictest devotion to the theory of creation as contained within the Scriptures and consistently points out the inadequacy of all other sources to produce any knowledge concerning the earth's origin (White 1: 213). Thus, Hale's work is a critique of the new science that was shared by such conservative voices as Richard Baxters' (1615-91) *The Arrogancy of Reason against Divine Revelations Repressed (1655)* and *Reasons of the Christian Religion* (1667), as well as Henry Stubbe's (1632-76) *The Plus Reduced to a Nonplus* (1670) and *Censure upon Certain Passages Contained in the History of Royal Society* (1670) (Westfall 21). In this criticism, they were supportive of Alexander Ross (1591-1654), a particularly "vigorous defender of traditional orthodoxy" whose opposition to the new science was notorious (21). Speaking for many who were dismayed that the Heliocentric doctrine of Copernicus contradicted Scripture, Ross wrote *Commentum de Terrae Motu* (1634) to assert his conviction that an acceptance of the Copernican system will prove disastrous to religion (McColley 154). His subsequent disputation with the prominent virtuoso John Wilkins, one of the founders of the Royal Society (Solberg 446), leads to his next defense of theological literalism as elaborated in *The New Planet No Planet* (1646). Attacking the arrogant presumption of the virtuoso that science can bring any more knowledge of God than the Scriptures themselves (Westfall 21), Ross writes "Whereas you say that astronomy serves to confirm the truth of the Holy Scriptures you are very preposterous; for you will have the truth of Scripture confirmed by astronomy, but you will not have the truth of astronomy confirmed by Scripture" (117). Ross is a significant voice that condemns natural philosophy as a threat to religion. Carrying the substance of Ross' "anti" science message, Matthew Hale's *Origination* maintains an unyielding loyalty and reverence for the authority of the Scripture. Mather's glaringly outmoded extract from Hale reveals that Mather wavered over the potentially damaging implications on Scripture that the new science entailed. Although the vast majority of the Hexaemeron in "BA" and almost the entirety of *TCP* has a stated and continually stressed ambition of illustrating how philosophy is a catalyst in apprehending the mystery of God, his reliance on Hale demonstrates that Mather was ill at ease with the challenges the new science posed to a conservative reading of the Bible. Mather's "BA" then belies the much touted harmony between science and religion he celebrates in *TCP*.

CONCLUSION

Not only do Mather's treatises on science and the natural world indicate a shifting of thought brought on by the Enlightenment, it also reveals the nature of his "religious improvement" to scientific discoveries. Re-emphasizing the overarching thematic aim of Mather's interest in science, Winton Solberg notes the overarching thematic aim of Mather's interest in science is to "show the harmony between science and religion" (lxix). Mather accomplishes this goal throughout by direting the reader to the religious overtones of each scientific discovery. Mather's authorial presence, then, is a valuable insight for extracting the meaning and effect of the commentary. Even though both "BA" and *TCP* are highly derivative, Mather continually returns the reader to the omnipresence of God and re-asserts the centrality of the Christian experience in nature. More specifically (and importantly), Mather reminds the reader that "the CHRIST of God must not be forgotten" (*TCP* 311). Mather calls attention to Christ in a similar manner in "BA" : "And before we read any further … Lett us take up this thought: for to bee carried all along with us, in our Minds, That our Bible is the Book of the Messiah" (40). Mather's treatment of Christ in both *TCP* and "BA" points to both his reaction against Arianism and his belief that science alone cannot fully illuminate all elements of the supernatural, particularly the mystery of the Trinity.

Mather's Trinitarianism

Mather was a firm believer in the Trinity; this view attains unique significance when contrasted to both Isaac Newton and William Whiston, both of whom, notably Newton, heavily influenced Mather. Mather's ambiguous introduction to Whiston's *New Theory of the Earth* in "BA"—"you must not expect, that I declare myself, how far I concurr, with every Point, that shall be offered" (23)—is understandable considering the controversial nature of Whiston and his publications. Mather is well aware of whom he is dealing with. Whiston was unable to "keep his mouth shut" on a number of volatile issues, including his rejection of the Trinity as a forgery by Athanasius in the fourth century, which ultimately cost him his job as professor of mathematics at Cambridge (Force 103). Whiston, in both *Primitive Christianity Revived* (1711) and *Athanasius Convicted of Forgery* (1712) claims that fourth century Church Fathers led by

Athanasius, Jerome, and Augustine "conspired to impose an idolatrous fraud upon Christendom" (Force 108). This emphatic pronouncement deeply concerns Mather; he notes "My learned friend Whiston … is likely to raise a prodigious Dust in the world, by reviving the Arian opinions" (*Diary* 2: 106). This "prodigious Dust" may have become a full-fledged dust storm if Mather had been aware of Newton's rejection of the Trinity as well. However, Newton was aware of the consequences of such an avowal and expressed his antitrinitarian sentiments either discreetly in his manuscripts or privately in his personal meditations, always struggling to keep his belief secret (Westfall 212). The very Arian perspective that beleaguers Newton affects Mather too; he laments: "I am likely to have my own Mind shock'd with more than ordinary Temptations to this occasion' (*Diary* 2: 106). The allure of Arianism to Mather, which he quickly overcomes, attests both to the influence of Whiston and Newton upon Mather and to the power of rationalism (which he observes and praises) unsettling previously steadfast beliefs (Silverman 329). Ultimately, Whiston's public renouncement of the Trinity, Newton's clandestine antitrinitarianism, and Mather's temporary flirtation with Arianism has as its source the Enlightenment spirit of rationalism.

James E. Force traces Whiston's denial of the divinity of Christ to Newton himself, effectively positioning Newton—"who inspired its methodology and doctrine"—as the origin and inspiration for Whiston's antitrinitarian theology (*Whiston* 111). Newton applied the same rational process to exegesis of Scripture that he did to the natural world and investigated "primitive, uncorrupted Christianity" (111). He arrived at the conviction that "Jesus is like but not the same as God" (109). In his essay "Advice for the Study of Divinity" (1709), William Whiston describes this "primitive uncorrupted Christianity" as the most reliable source of interpreting and thus understanding God because Athanasius (293-373) and his contemporaries interpolated passages in the manuscripts of the bible in support of their Trinitarian dogma. In effect, they imposed their system on the "free enquirers," or those who can read Scripture and understand God's meaning for themselves (107). "Free Enquirers" defines the Enlightenment movement that Newton, as its most prominent representative, helped accelerate. Yet, Newton's reticence in denying Christ's divinity speaks to his ambivalence towards the implications of the very rationalism that he helped create. In this regard, he is separated

from the Newtonians (deists who rejected miracles) and their all-consuming objective to, through reason, understand everything in the heavens and the earth, including "mysteries heretofore concealed from the light of reason and inquiry" (110).

To Mather, the Trinity is emblematic of the limit of reason in penetrating divine mysteries. True, Mather embraces the Newtonian emphasis on investigating the natural and supernatural worlds; however, he remains ever mindful of his role as a minister and his duty to save souls by both restricting rationality and employing faith when addressing the Author of everything. Shortly after Whiston's "revival" of Arianism, Mather resolves "To explain and maintain the glorious Doctrine of the Trinity" (*Diary* 2: 107). Mather consciously and deliberately incorporates Jesus Christ throughout his two major treatises on science—"BA" and *TCP*. Mather's own commentary affirms and extols the Trinity immediately after his paraphrase of Whiston in "BA" and serves a dual purpose of announcing his disagreement with Whiston's Arian views and marking his belief in a life of faith and service to God. The substance of Mather's Trinitarianism, rich in religious voice and persuasion, follows:

> All that I will add of my own [to Whiston's commentary] is, That if wee apprehend the more peculiar Praerogative of our World, or this Terraqueous Globe, with its Appendages, to bee, That the Soveraignty of Heaven, has pitch'd upon This, as the Peculiar Field for the Glorious Actions of the Messiah, which the Gospel of God ha's Reported unto us, and that from hence the Son of God, would with Soveraign Grace choose the Creature, that Hee would have to subsist forever in One Person with Himself, I beleeve, wee shall entertain a Right Idaea of it. This is, on some singular Accounts, the Messiah's World, tho' all Worlds are His, and were made by Him and for Him. And, before we read any further, the Bible, which begins with the Creation of this World, Lett us take up this Thought: for to bee carried all along with us, in our Minds, That our Bible is the Book of the Messiah. ("BA" 40)

He further illustrates his trinitarianism by returning to the very Church Fathers that both Whiston and Newton charge with interpolation: "No less persons than *Origen*, and *Basil*, and *Jerom*, and *Austin*, and *Bede*, and *Junilius* look upon the Word … *The Beginning*, to bee a Name of the *Messiah*" (10). Ever mindful of the authority of Scripture, Mather sees Christ clearly from the beginning:

> This must bee the Messiah, because Wisdome is called in Prov. 8.22 by the Name of The Beginning. And thus, our Lord Jesus Christ being asked in Joh. 8.25. Who are thou? Answered, The Beginning. Compare Joh. 1.1. and Col. 1.16. Attentively. Thus our Lord is called in Rev. 3.14 The Beginning of the Creation. (10)

Certain scholars, in particular Jeffrey Jeske and Kenneth Silverman, argue that Mather, through his exposition of natural theology, evidences that by applying the powers of reason to religion, its very foundation is undermined. They contend that "In trying to prove God's existence from natural phenomena, and in using new standards of proof and debate [Newtonianism], Mather quietly relegated essential Christian ideas to the background" (Silverman 250). Jeske echoes this interpretation of Mather's unconsciously subversive shift in thinking by arguing that, through natural theology, Mather "inexorably draws Puritanism closer towards deism" (594). This argument that the scientific architecture of Mather's treatises on science slowly and stealthily supplants, even overtakes, religion is recognized by Mather and he takes steps to correct it.

Similar to stressing the Trinity in "BA," Mather, inscribes Christ dutifully as well in *TCP*. In the essay "Of the Light," Mather signifies light as dually representing the light from the sun as well as the light of the world, Jesus Christ: "How miserable should

we be, and in what inexpressible Confusion, if the Light were withheld from us" (24). His resolution that Christ is a "Swiftness beyond that of light" (26) indicates his belief in the impenetrable and unintelligible realm of Jesus Christ. From the beginning pages, Mather makes known his perception of Jesus as an "unknowable," effectively placing him outside of science and reason's capability. He again mentions Christ explicitly in the essay "Of the Rainbow": "But then how can we forget the Glorious CHRIST" (67), and in the essay "Of Snow": "O wash me in the Blood of my Saviour, and I shall be whiter than snow" (69), thereby directing the reader to the centrality of Christ so essential to Mather's constitution. The philosophical meditation that concludes *TCP* directly addresses the mystery of the Trinity. Mather, again, professes his trinitarian position: "it is impossible the SON should be without the FATHER, or the FATHER without the SON, or both without the Holy SPIRIT" (318). Mather clearly announces that the reason of the Enlightenment is an inadequate vehicle for approaching the enigma of the Trinity of Christ: "Thus from what occurs throughout the whole Creation, Reason forms an imperfect Idea of this incomprehensible mystery" (318). The faculty of reason, celebrated and privileged as a productive route to God, is ultimately proven ineffective and worthless when exposed to what he saw as the greatest mystery of all, the Trinity. Mather saw no tension between the Enlightenment amplification of reason in illuminating creation and its silence in approaching heavenly mysteries. His conclusion—"But it is time to stop here, and indeed how can we go any further" (318)—may tantalize the likes of Isaac Newton, with his ever-present desire to "prove to himself that every doctrine of true Christianity was rational and reasonable" (Westfall 220). To Mather, however, it is a fitting tribute to the reality of Christ. In this regard, Mather again demonstrates his role

as a transitional figure by accepting and admiring the Newtonian learning constitutive of the Enlightenment while "still professing the conventional pietism" (Jeske 583). Even though the Trinity may appear entirely irrational and fabricated to some, its very wonder elicits his awe and reinforces his faith. The uncertainty of the Trinity and reason's incapacity to address it shepherds him to his Puritan trenches; he surely, similar to any challenge to the promises of God, attributes its unbelief to "the Fancies & Whimseys [of] the foolish unbeliever" (qtd. in Smolinski, "Authority and Interpretation" 201).[71]

Both *TCP* and "BA" identify Cotton Mather as a natural philosopher who believed that God revealed himself in both the Scriptures and the natural world. Although *TCP* is championed as a unique testimony to Mather's embrace of Enlightenment science, it in no way obviates the significance of "BA" as an equal discourse on the emerging systems of thought that were revolutionizing the old theological conception of the universe. As a superb colonial document of the hermeneutical debates embroiling Europe, "BA" represents Mather's participation in the construction of a new theology that accepts the new science while not completely relinquishing the old and deeply cherished paradigms of orthodox exegesis. All in all, Mather's superseding objective in both *TCP* and "BA" is to bring the prevailing belief of the inerrancy of Christianity in closer accordance with the ascertained facts of the early Enlightenment. As Mather well understood, the reliability of the literal authority of God's word was undergoing unprecedented scientific challenges in the form of Copernican heliocentrism and the physics of Johannes Kepler and Isaac Newton, whose theories explained the supernatural events so commonly ascribed to the mystery of God

[71] The original source for this secondary citation is Mather, "An Essay for a further Commentary," (3).

to the physical laws of nature. In doing so, the almighty caprice of God in the creation and evolution of the universe was replaced by theories of planetary motion and gravity that inexorably follow their own laws. The God who "hurls out comets" to scare the wicked and "shakes the earth" in his wrath was instead interpreted as explainable effects of natural phenomena. Similarly, the traditional belief "God said and it was" concerning the creation of the universe was substituted by scientific theories emphasizing the fundamentally mechanistic nature of the beginning of time.

In effect, science questioned superstition. And yet, science has still not fully supplanted superstition. Many followers of the Christian faith still hold fast to the Bible as a touchstone for all meaning and remain suspicious, even hostile to science. Likewise, many adherents to science regard religion as primitive and even dangerous to the progress of the human race. They both have their arguments. Fundamentalist Christians dissolve any scientific cosmogony by relentlessly proclaiming faith in the words of Scripture as the authoritative answer. The Bible says that "through faith we understand that the world were framed by God" (Heb. 11.1). The "word of God," of course, is predicated in Genesis ch.1 where "God said" is permeated throughout the six creative days and fortified in remaining Scriptures, including Psalms: "By the word of the LORD were the heavens made; and all the host of them by the breath of his mouth … For he spake, and it was *done*, he commanded, and it stood fast" (33.6, 9). The scientific community, on the other hand, puts faith in the empirical methodology of science and the conclusions elicited therein. To religion, the creation is miraculous. To science, it is explainable by method. To Cotton Mather, it is both.

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