AN ABSTRACT OF THE THESIS OF

Tim S. Reid for the degree of Master of Arts in General Science presented on July 6, 1995. Title: A Second Look at Alexander Pope and Newtonian Science.

Abstract approved: Redacted for Privacy

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"This Long Disease, My Life": Alexander Pope and the Sciences by Marjorie Nicolson and G.S. Rousseau has been the standard work on Alexander Pope and Newtonian science ever since it was published in 1968. Literary scholars and biographers continue to be swayed by its influence. Unfortunately, the work they so often rely upon is in need of some revision.

The literary evidence offered by Nicolson and Rousseau suggests that Pope was a staunch Newtonian. However, this is an exaggeration. They also claim that his scientific references were almost exclusively Newtonian. Once again, this is not entirely correct.

The evidence contained in this thesis attempts to amend the inaccuracies in their work. It suggests that Pope was not as staunch a Newtonian as was formerly believed. Other philosophies influenced Pope's work almost as much as Newtonian science. Pope also participated in scientific satire and voiced some reservations against the new science.

This evidence suggests that Pope was a transitional figure. He lived in a world where Newton and his science were beginning to be appreciated; however, many other philosophies continued to be influential and Newton had not yet become the cultural icon that he would later become in the late-eighteenth century. A second look at Alexander Pope and the sciences reveals the actual nature of the period in which he lived.

In order to prove this thesis, the first chapter begins by defining the problem. The next two chapters then create a solid foundation upon which the rest of this work is based. Chapter Two discusses the enigmatic nature of Newton's philosophy and the different versions of Newtonian science that emerged as a result. Chapter Three attempts to define a consistent version of Newtonian science. Once defined, this version will be used as the standard throughout the work. Chapter Four will present the evidence that suggests that the literary works of Alexander Pope were influenced by this version of Newtonian science. Chapter Five will exibit evidence that suggests that other philosophies in general and the work of Bernard Fontenelle in particular also influenced the work of Alexander Pope. Chapter Six will give a short history of the Scriblerus Club and explain how Pope sanctioned the scientific satire of its members. This approach will reveal a man who was influenced by many different ideas and had many different facets to his complex personality.

A Second Look at Alexander Pope and Newtonian Science

by

Tim S. Reid

A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Master of Arts

Completed July 6, 1995
Commencement June 1996

Master of Arts thesis of Tim S. Reid presented on July 6, 1995

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Tim S. Reid, Author

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A SECOND LOOK AT ALEXANDER POPE AND NEWTONIAN SCIENCE

1. INTRODUCTION

In 1968, Marjorie Nicolson and G.S. Rousseau published *"This Long Disease, My Life": Alexander Pope and the Sciences*. To this day, it remains the most comprehensive attempt to determine the extent to which Sir Isaac Newton's natural philosophy influenced Alexander Pope's literary imagination. It has become the standard authority on this subject. As late as 1993, R. Paul Yoder argued that Nicolson and Rousseau's work continues to be one of the most influential books in the field of Pope scholarship. According to Yoder, it is still the definitive work on Pope and Newtonian science.[1] Other scholars tend to agree with Yoder. They see Nicolson and Rousseau as the unchallenged experts in the field. When dealing with Pope and Newtonian science, biographers and literary scholars usually prefer to yield to Nicolson and Rousseau. Since *"This Long Disease, My Life"* continues to stand unequaled, scholars often continue to defer to its authority.[2]

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[1]R. Paul Yoder, "An Essay on Pope Criticism," in Critical Essays on Alexander Pope, ed., Wallace Jackson and R. Paul Yoder (New York: G.K. Hall & Company, 1993), 8-9.

[2]For example, see George S. Fraser, Alexander Pope (London: Routledge & Kegan Paul, 1978), John Christie and Sally Shuttleworth, Nature Transfigured: Science and Literature, 1700-1900 (Manchester: Manchester University Press, 1989), and Larry Stewart, The Rise of Public Science: Rhetoric, Technology, and Natural Philosophy in Newtonian Britain, 1660-1750 (Cambridge: Cambridge University Press, 1992).

Unfortunately, Nicolson and Rousseau's work is often lopsided and one-dimensional. They claim, for example, that Pope was singularly devoted to Newton; after all, Newton had unlocked the secrets of the universe for all to see. As a result, Pope refused to take part in the scientific satire of his friends.

This, however, is a faulty conclusion. The historical record indicates that Pope fully sanctioned the satire of his friends even though he did not participate in its actual composition. Although Pope believed that Newton was a great man, Newton had not yet become the unassailable legend that Voltaire would later portray in his *Letters on England*.[3] As a man, Newton was subject to the same follies as other men. Pope acknowledged this and indirectly participated in the satire written by his friends.

Nicolson and Rousseau also argue that Pope was a convert to Newton's natural philosophy and as such, was a staunch Newtonian. They offer an abundance of evidence to support this thesis, listing several remarkable similarities that exist between Newton's work and Pope's poetry.[4]

Once again, this is only one piece of a larger picture. A close examination of the historical record indicates that Pope was influenced by other philosophies, specifically that

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[3]Voltaire, Letters on England (London: Penguin Books, 1980), 69 & 112.

[4]These similarities will be discussed in Chapter Four.

of Bernard Fontenelle. Several remarkable similarities exist between Fontenelle's version of Cartesian philosophy and Pope's literature. This should not be surprising considering the fact that Newtonian science was still in its infancy and had not yet eclipsed all of its rival philosophies. Newtonian science continued to compete with viable alternatives well into the eighteenth century.

A closer look at Pope's life and works suggests that he was a transitional figure. He belonged to an England that was not yet thoroughly convinced of the ascendancy of Newtonian science. In the final analysis, it would seem that Pope is not as easily pigeonholed as Nicolson and Rousseau would have us believe.

In order to prove this thesis, we must first begin by creating the foundation upon which the rest of this work can be built. The next chapter sets the stage by giving the necessary historical background. It deals with the enigmatic nature of Newton's philosophy. In the late-seventeenth and early-eighteenth centuries, many different versions of Newtonian science co-existed as a result of this ambiguity. It is to Newton's philosophy and the resulting versions of Newtonian science that we now must turn.

2. THE ENIGMATIC NATURE OF NEWTON'S BELIEFS AND LACK OF A UNIFIED NEWTONIANISM

In the early eighteenth century, Newtonian science had not yet developed into a coherent philosophy. In fact, there were just about as many different forms of Newtonianism as there were Newtonians. Ernan McMullin has argued that this confusion is a direct result of Newton's refusal to offer any clear physical explanation of how the universe actually worked.[1] In the *Principia,* Newton makes his intentions perfectly clear. He states point blank that he intends only to give a "mathematical notion" of the forces of nature "without considering their physical causes and seats."[2] In the second edition of the *Principia,* Newton seems to take this notion even further when he writes:

> But hitherto I have not been able to discover the cause of those properties of gravity from phenomena, and I frame no hypothesis; for whatever is not deduced from the phenomena is to be called a hypothesis, and hypotheses, whether metaphysical or physical, whether of occult qualities or mechanical, have no place in experimental philosophy."[3]

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[1]Ernan McMullin, Newton on Matter and Activity (Notre Dame: University of Notre Dame Press, 1978), 1-4.

[2]Sir Isaac Newton, Principia (Berkeley: University of California Press, 1962), 5.

[3]H. S. Thayer, ed., Newton's Philosophy of Nature: Selections From His Writings (New York: Hafner Press, 1974), 45.

Newton intentionally restricted the *Principia* to the mathematical analysis of the laws of motion. He believed that the laws of motion should be successfully completed before natural philosophers could begin to discuss philosophical issues such as first cause or prime mover.[4]

Unfortunately, Newton was not content to leave well enough alone. In the "General Scholium" appended to the *Principia*, he hints at what he actually believed. He enigmatically writes:

> [God] is omnipresent not virtually only, but also substantially; for virtue cannot subsist without substance. In him are all things contained and moved; yet neither affects the other: God suffers nothing from the motion of bodies; bodies find no resistance from the omnipresence of God.[5]

Wilhelm Leibniz believed that Newton was cautiously revealing his belief in a God who permeates the entire universe. According to Leibniz, Newton believed that the universe is the "sensorum" of God. This relationship of God to the universe is similar to the mind/body relationship. God exists in his sensorum and controls the objects in the universe in much the same way the extremities are controlled by the mind.[6]

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[4]McMullin, 2.

[5]Thayer, 44-45.

[6]Samuel Clarke and Wilhelm Gottfried Leibniz, The Leibniz-Clarke Correspondence, ed. Henry Gavin Alexander (Manchester: Manchester University Press, 1956), 11, 16-17 & 28-29.

This thesis seems even more plausible when considering the concluding paragraph of the General Scholium where Newton writes that "a certain most subtle spirit . . . pervades and lies hid in all gross bodies"[7] and is responsible for physical attraction as well as numerous host of other phenomena.[8] Statements like these generally caused confusion since they contradicted what Newton had already said about restricting his work solely to the mathematical analysis of motion without offering any hypotheses as to its physical causes or seats.

Newton's *Opticks* only added to this general confusion. In the "Queries" appended to the general text, Newton published his most comprehensive and candid theories on the mechanical operations of the universe, but once again he leaves the reader in doubt as to what he actually believes. As their name implies, these theories are hidden in the form of a question. For example, Newton attempts to postulate a physical cause of gravity in the following way:

> *Qu.* 21. Is not this Medium [æther] much rarer within the dense Bodies of the Sun, Stars, Planets and Comets, than in the empty celestial Spaces between them? And in passing from them to great distances, doth it not grow denser and

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[7]Newton, Principia, 547.

[8]Newton's philosophy bears a remarkable resemblance to that of the Cambridge Platonists. Richard Westfall and Ernan Mcmullin both argue that Newton was influenced Henry More and the other Cambridge Platonists while Newton attended college. See Richard Westfall, The Life Of Isaac Newton (New York: Cambridge University Press, 1994), 25, and, McMullin, 43.

> denser perpetually, and thereby cause the gravity of those great Bodies towards one another, and of their parts toward the Bodies; every Body endeavoring to go from the denser parts of the medium towards the rarer? . . . [And] if the elastick force of this Medium be exceeding great, it may suffice to impel Bodies from the denser parts of the Medium towards the rarer, with all that power we call Gravity.[9]

Obviously, a scientific hypothesis disguised in the form of a question lacks assertiveness; it is not as authoritative or convincing. Newton makes things worse by adding a disclaimer. He writes that these queries are designed merely to facilitate further research that should be made by others.[10] McMullin believes that this "avowedly tentative form marks these [queries] off from the rest of Newton's published works" and inevitably leads to even more confusion on the part of his followers.[11]

It is interesting and useful to contrast this form of hypothetical reasoning with the more assertive tone Newton uses in his private correspondence. In a letter to Robert Boyle written nearly ten years before the first edition of the *Principia* was published, Newton writes, "At first, I suppose that there is diffused through all places an ætherial substance, capable of contraction and dilatation, strongly elastic, and, in a word, much like air in all

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[9]Sir Isaac Newton, Opticks (New York: Dover Press, 1968), 351.

[10]Ibid., 339.

[11]McMullin, 3.

respects, but far more subtle." Throughout the universe, this æther runs through "all intermediate degrees of density" with this density dependent upon the relative proximity of the æther to the material substance of the universe. According to Newton, the phenomenon of gravity occurs since material objects tend to move from the densest æther to a form more subtle. This movement is facilitated by the of elasticity of the æther.[12]

This is essentially what Newton hypothesizes in "*Qu. 21*." However, the clarity and assertiveness of the Boyle letter indicate that this is what Newton actually believed. His private correspondence, however, was not readily accessible in the early eighteenth century.

Newton left room for many different interpretations of his mathematics because of the enigmatic nature of his published works. The two most important questions the remained were: What role, if any, does God play in the universe? And how does gravity actually work?

Self-proclaimed Newtonians in the late seventeenth and early eighteenth century had many different answers to these questions. Some Newtonians believed that God played an active role in the universe. It was his power that initiated and sustained action at a distance. Newton's laws were really God's laws. They occur because God wills them

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[12]Thayer, 113-116.

to occur. Without the constant intervention of God, the order of the universe would be reduced to anarchy.[13]

This was the position that Samuel Clarke defended in his famous correspondence with Wilhelm Leibniz. Leibniz argued that a perfect God would make a perfect universe. Newton's universe could not be perfect since God needed to intervene in order to maintain its present form. If God was like a watchmaker as Clarke suggested, then the watch he created was imperfect since it constantly needed winding. This meant that Newton's God must be imperfect since he created an imperfect machine. However, Clarke insisted that an active God was a perfect God since he presided over the affairs of a universe that he created.[14]

On the opposite end of the spectrum existed those Newtonians who were heavily influenced by mechanical philosophy. Newton's work had confirmed their suspicions that the universe was purely mechanical and could be reduced to mathematical laws. This version of Newtonian science is similar to our own. God plays a minimal role in his creation or none at all. The universe is regulated solely by law. Whether or not God created these laws and set the universe in motion is essentially irrelevant since the

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[13]The Newtonians who contributed to the Boyle Lectures often espoused this philosophy. Richard Bentley's, Eight Boyle Lectures on Atheism (New York: Garland Publishing, 1976), is the best source for the most relevant lectures addressing this subject.

[14]Clarke and Leibniz, 11-14 & 18.

universe will continue on course without constant intervention.[15]

Those Newtonians who felt obliged to go beyond purely spiritual explanations of action at a distance or refused to believe that God played an active role in his creation often had different versions of the necessary mechanism or mechanisms that were responsible for the phenomenon of gravity.[16] Generally speaking, these mechanical explanations also varied according to the individual philosopher or philosophy.

On every spectrum there exists intermediate shades somewhere between the two extremes. A compromise between differing concepts--such as Newton's attempt explain action at a distance with a modified version of the æther theory--adds yet another layer of complexity to an already convoluted picture.[17]

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[15]An excellent discussion of early eighteenth century mechanical philosophy based on Newton's work can be found in Robert E. Schofield's, Mechanism and Materialism: British Natural Philosophy in An Age of Reason (Princeton, NJ: Princeton University Press, 1970).

[16]These Newtonians believed, as did Leibniz, that the Newtonian concept of action at a distance could easily qualify as an "occult quality." These qualities were often espoused by the ancients and rejected by many modern philosophers. It seemed to them that accepting this concept of action at a distance constituted a giant step backwards. These Newtonians also agreed, as did Leibniz, that some sort of medium was necessary to push the planets along in their orbits. See Clark and Leibniz, 16, 28, 30, 37, 39-40, 43, and 94.

[17]According to McMullin, Newton, in an attempt to silence his critics, devised an æther "in which bodies could move and float without resistance." This æther "endowed material paticles with the properties of attraction and repulsion." It could exist as an actual physical force between two bodies without creating the physical resistance caused by a more traditional æther. McMullin describes this in great detail in Newton on Matter and Activity, pages, 96-98.

From this quick overview of early Newtonian science, it becomes clear that an understanding of Pope's own particular version would greatly facilitate this study. Once defined, this version can be used as a standard throughout the remainder of this work.

It is possible to recreate Pope's particular version of Newtonian science. Even though no comprehensive statement of his scientific beliefs exists within the pages of his work, Pope admits that his knowledge of Newtonian science comes almost exclusively from William Whiston. It is reasonable to assume that Pope's version of Newtonian science is relatively similar Whiston's. This being the case, we can use William Whiston's particular version as our standard. This is the logical choice considering the fact that Pope learned more from Whiston than any other Newtonian. It is also the standard that Nicolson and Rousseau use in their work. Therefore, it has the added advantage of putting both works on common ground. Once we understand Whiston's version of Newtonian science, we will then be able to understand Pope's particular version. Subsequently, we will be able to recognize the Newtonian influences that color his work as well as the non-Newtonian influences. In order to effectively analyze Pope's work, it is imperative that we study Whiston first. Having said this, we now turn to William Whiston and his own unique version of Newtonian science.

3. WILLIAM WHISTON AS THE SOURCE OF ALEXANDER POPE'S NEWTONIANISM

William Whiston was born in Leicestershire, England, twenty years before Newton's *Principia* was published in 1687. He was first tutored by his father at home and later attended school at Tamworth. In 1686, he continued his education at Clare Hall, Cambridge. While at Cambridge he took a B.A. in 1690, was elected to a fellowship one year later and received an M.A. in 1693. That same year, he was ordained to the ministry and made the decision to remain at Cambridge where he intended to take on private pupils who were interested in mathematics or religion.[1] It was during this time that Whiston wrote:

> After I had taken Holy Orders, I returned to the College [Clare], and went on with my own studies there, particularly the Mathematics and the Cartesian philosophy which was alone in vogue with us at the time. But it was not long before I, with immense pains, but no assistance, set myself with the utmost zeal to the study of Sir Isaac Newton's wonderful discoveries in his *Philosophiae Naturalis Principia Mathematica*, one or two of which lectures I had heard him read in the public schools though I understood them not at all at the time.[2]

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[1]James E. Force, William Whiston, Honest Newtonian (Cambridge: Cambridge University Press, 1985), 10-11.

[2]W. Whiston, Memoirs of the Life and Writings of Mr. William Whiston (1749), 36, quoted in Maureen Farrell, William Whiston (New York: Arno Press, 1981), 191.

Shortly after he had taken Holy Orders and become a convert to Newtonianism, he became chaplain to the Bishop of Norwich and in 1698, he was appointed vicar in Suffolk.[3]

William Whiston had been recognized as a bright new star on the scientific horizon early in his career. His first publication, *A New Theory of the Earth*, published in 1697, gave him almost instant notoriety because of the role it played in the Burnet controversy.[4] In *The Sacred Theory of the Earth* (1680), Thomas Burnet had argued that the earth's topography -- which he believed to be originally uniform and level -- was the result of the Biblical deluge. In *A New Theory of the Earth*, Whiston went on to argue that a comet had collided with the earth causing the flood. Both works were controversial since they inadvertently reduced God's active role in the universe. If Whiston and Burnet were right, then God worked through natural causes as opposed to direct intervention.

Three years before *A New Theory* was published, Whiston asked Newton to read the manuscript. In his personal correspondence, Whiston claims that it won Newton's approval since both men tended to think alike. It is clear that Whiston also approved of Newton. Soon after their initial contact, Whiston became one of the most articulate spokesman

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[3]William Whiston, Astronomical Lectures Read in the Schools at Cambridge, ed. I. Bernard Cohen (New York: Johnson Reprint Corporation, 1972), v.

[4]Farrell, 185.

for Newtonian science. Secretly, the two men may have also shared other more unorthodox views; after all, Newton and Whiston were both anti-Trinitarians. In any case, it should not be surprising that Whiston was appointed deputy for Newton's professorship in 1701. Two years later, Newton resigned his position as Lucasian Professor of Mathematics and the position was given permanently to Whiston.[5]

Whiston was unable to keep his unorthodox ideas about the Trinity private for long. Frank Manuel correctly states that Newton was careful not to broadcast his theological views while his disciple and predecessor as Lucasian professor shrieked them out in the marketplace.[6] In 1708, Whiston announced his Arian beliefs in an essay entitled *Upon Apostolical Constitution.* Shortly after he published this heretical tract, Whiston was summoned to Canterbury for a meeting with the archbishops of England. He boldly told them that he believed the doctrine of the Trinity to be a false and degenerate version of true Christianity. His audacity deprived him of his professorship at Cambridge and he was effectively banished from the school in 1710.[7]

Soon after Whiston's expulsion from Cambridge, Joseph Addison and Richard Steele took a chance on this apostate

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[5]Richard Westfall, The Life of Isaac Newton (New York: Cambridge University Press, 1993), 204.

[6]Frank E. Manuel, Isaac Newton, Historian (Cambridge, Mass.: Harvard University Press, 1963), 143.

[7]Whiston, Astronomical Lectures, vi.

and arranged to have Whiston give popular lectures on astronomy at Button's coffee house in London.[8] These lectures enabled him to earn a living and support his family. Whiston writes:

> Mr. Addison . . . with his friend Richard Steele brought me upon my banishment from Cambridge to have my astronomical lectures at Mr. Button's Coffee House near Covent Garden, to the agreeable entertainment of a good number of curious persons and the procuring me and my family some comfortable support under my Banishment.[9]

The evidence provided by Nicolson and Rousseau suggests that Pope attended almost all of Whiston's coffee-house lectures.[10] Because Whiston's coffee house version of Newtonianism influenced Pope's subsequent literary works, it is imperative to explore their basic composition. Even though the actual lectures no longer exist, their basic content can be determined from clues scattered throughout the historical record.

The circumstances surrounding the establishment of Whiston's lectures provide some important evidence. Addison and Steele were concerned with Whiston's potential drawing power. Whiston's controversial work was already familiar to

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[8]Marjorie Nicolson and G.S. Rousseau, "This Long Disease, My Life:" Alexander Pope and the Sciences (Princeton, NJ: Princeton University Press, 1968), 141

[9]Whiston, Memoirs, 302, quoted in Farrell, 210.

[10]Nicholson and Rousseau, 137-235.

the public and his trial for heresy was pending. Steele was also concerned that Whiston might not be able to limit his lectures to science; he feared that Whiston might use this opportunity to profess his unorthodox religious beliefs. In light of these facts, it is not surprising that the first coffee house lecture in 1713 was designated as nothing more than a trial run.[11]

The historical record indicates that, to the relief of Addison and Steele, Whiston drew a substantial crowd and refrained from theological speculation. On the basis of positive public response, Addison and Steele arranged for an extended series of lectures that began in January 1714.

Addison had undertaken considerable financial risks in the establishment of this lecture series. In order to protect his investment, the terms of agreement explicitly forbade Whiston from discussing religion; he was to focus exclusively on Newtonian science. Steele personally made sure that Whiston would stay within the realm of respectability. After introducing the lecturer, he remained in the audience in order to see to it that Whiston would refrain from religious speculation. Steele even "felt free to interrupt whenever he feared that Whiston was about to ride his heretical hobby horse."[12]

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[11]Ibid., 144.

[12]Ibid., 147.

It is reasonable to assume that Addison also protected his investment in other ways as well. Addison knew that Whiston's most recent works--*Astronomical Lectures Read in the Public Schools at Cambridge* and *Sir Isaac Newton's Mathematick Philosophy More Easily Demonstrated*, published in 1707 and 1710 respectively, were both highly successful. It is not unreasonable to assume that Addison wanted Whiston to lecture on his most popular works. After all, it was economically expedient to do so. Giving the people what they wanted insured the success of Addison's enterprise as well as Whiston's own financial solvency.

Whiston must have kept his part of the bargain since the lectures proved to be an economic boon to both Whiston and Addison. An advertisement in a periodical called *The Englishman* reported in 1713 that "Mr. Whiston's . . . lectures will be this day removed from Mr. Button's Coffee House to a larger room close by."[13] Whiston must have refrained from religious speculation since controversy and religious heresy surely would have driven most people away.

In the *Guardian*, Addison substantiates this conclusion. He writes that we have been lately obliged to hear the work of William Whiston "with that noble plan, intituled, 'A Scheme of the Solar System,' with the orbits of the planets and comets belonging thereto, described from Dr. Halley's accurate Table of Comets, Philosoph. Trans. No. 297." This

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[13]Ibid., 146.

noble system "founded on Sir Isaac Newton's wonderful discoveries" was being summarized and demonstrated by Whiston at Button's Coffee House.[14]

Whiston's *Astronomical Lectures* and *Newton's Mathematick Philosophy* contain the essentials of his Newtonianism. According to Nicolson and Rousseau, Whiston's lectures at Button's were probably the coffee house version of these works.[15] This conclusion seems highly probable since the *Astronomical Lectures, Newton's Mathematick Philosophy* and the coffee house lectures all focus exclusively on science. This, combined with the fact that Whiston never varied his scientific beliefs, also adds credence to this assumption.[16] In short, these works were the embodiment of fundamental views that lasted throughout his life. This being the case, an analysis of these works will add further insight into that version of Newtonianism taught to Alexander Pope in London. It is this version of Newtonian science that will be used throughout the remainder of this work.

The *Astronomical Lectures* and *Newton's Mathematick Philosophy* were conceived as "a fundamental course on

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[14]John Calhoun, ed., The Guardian (Lexington, KY: The University of Kentucky Press, 1982), 371.

[15]Nicolson and Rousseau, 148 and 189.

[16]I.B. Cohen suggests that Whiston revised later editions of his work without substantially changing its content. See William Whiston, Sir Isaac Newton's Mathematick Philosophy More Easily Demonstrated, ed. I. Bernard Cohen (New York: Johnson Reprint Corporation, 1972), xvii-xx.

natural philosophy incorporating Newtonian principles suited for undergraduates."[17] No doubt a similar version was effectively used to teach the laymen in Whiston's scientific congregation.

In his *Astronomical Lectures,* Whiston leaves no room for doubt that he is a devout Newtonian as far as he understands Newtonianism. Throughout the these lectures, Whiston continually praises Newton for his contributions to astronomy. He often refers to him as the "Great" or "the very Sagacious" Sir Isaac Newton.[18] He unhesitatingly declares that the "illustrious" Newton in a "Mathematical Way" has discovered the "Physical Causes" of all terrestrial and celestial phenomena.[19] He spares no praise when he writes that "the famous Sir *Isaac Newton* . . . hath this to glory in: . . . he hath brought more Light into this dark and intricate [abyss of astronomy], than all the Volumes of the past ages had done."[20]

More practically speaking, Whiston lays the observational foundations for Book Three of Newton's *Principia* in his lectures. I. Bernard Cohen writes that it is "also an index to the state of astronomical teaching in Newton's University, just after Newton left Cambridge."[21]

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[17]Farrell, 190.

[18]Whiston, Astronomical Lectures, 114, 140 & 141.

[19]Ibid., 207.

[20]Ibid., 96.

Whiston's first lecture simply deals with the size and the shape of the earth. He then moves on to discuss the size of the universe. He argues that the universe must be immense since little or no stellar parallax is observable from the face of the earth. He uses easy-to-understand diagrams to help explain the concept of parallax. He then proceeds with a discussion on the appearance of new stars and the reasons behind the variable brightness of the fixed stars. Lectures Six and Seven describe how astronomers calculate the respective distances of the planets from the sun using diurnal parallax. He provides those who may have had a difficult time with the discussion with "A Table of the Distances of the Planets from the Sun; Together with their Diameters, and Periodic Times." Lecture Eight explains the methods astronomers use to determine the precise moment of the solstices. Lunar theory and the causes of the moon's unique motion is explained in Lecture Nine and attributed to Newton. Lectures Ten and Eleven explain how astronomers calculate the positions of the sun and the moon. Lectures Twelve to Fifteen deal with lunar and solar eclipses. Whiston begins by explaining how eclipses occur. He also explains how astronomers calculate solar eclipses. Whiston devotes lectures Sixteen through Thirty to planetary astronomy. In these lectures, Whiston explains why the orbits of the planets are necessarily

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[21]Ibid., xx-xxi.

elliptical and why they appear to retrograde. He ends his discourse with an overview of Newton's lunar theory along with a series of astronomical tables compiled by Cassini, Street, Flamsteed and Halley.[22]

From this quick overview of the *Astronomical Lectures* it is clear that Whiston's subjects become increasingly complex. However, like all good teachers, Whiston has a talent for explaining difficult concepts. He begins by constructing a firm foundation. He then builds upon this foundation, stone by stone, until seemingly difficult concepts become clear to those with patience and the capacity to follow. It seems more than likely that his ability to simplify was one of the reasons behind his success as a lecturer and it is not unreasonable to assume that his audience understood most of the concepts he presented. An educated and intelligent man like Pope probably understood at least most of the lectures.

As is the case with Whiston's *Astronomical Lectures*, *Newton's Mathematick Philosophy* is simple and easily understood. The ease with which it explains complex mathematical constructs helped to make it popular with students and others who were interested in Newton's scientific work. I. Bernard Cohen has written, "For anyone wanting to know what Newton was actually saying in his *Principia*," Whiston's work is an invaluable tool.[23]

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[22]Ibid., 344-502.

The introduction of Whiston's *Sir Isaac Newton's Mathematick Philosophy More Easily Demonstrated* makes it clear that it is meant to be a companion volume to the *Astronomical Lectures*. The *Lectures* were designed to describe the physical phenomena explained by Newton in the *Principia*. They are thus the foundation upon which Whiston builds his analysis of Newton's mathematic philosophy. In his introduction, Whiston writes, "After having dispatch'd the Matters of Pure Astronomy, we proceed unto the other Part of our Work, the Philosophy of the Famous Sir Isaac Newton." Whiston's purpose is to "trace the steps of the great man and to set forth his principal and most notable philosophical inventions in a more easy method; that so we may bring that divine philosophy within the reach and comprehension of those who are indifferently perhaps exercised in the Mathematicks."[24]

Whiston's main sources for *Newton's Mathematick Philosophy* were Newton's *Opticks*, the first edition of the *Principia*, and a manuscript of *Lectiones Opticae* or *Lectures on Optics* that Newton had deposited in the library at Cambridge in fulfillment of the university requirement. Whiston's own explanations are infused with direct quotations from Newton. In fact, he relies so much on the *Principia* that it would be difficult to separate Newton's

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[23]Whiston, Newton's Mathematick Philosophy, v.

[24]Ibid., 1.

own words from those of Whiston.[25] In the twentieth century, the practice of using someone else's words without quotation marks is unconditionally considered to be plagiarism. However, in his introduction to *Newton's Mathematick Philosophy*, I.B. Cohen writes that this was not the case in the eighteenth century when the practice was apparently quite common.[26] Whiston writes:

> In the setting forth of . . . [Newton's] Noble Inventions, we shall generally make use of the very Words of that great Man; but yet so, that every where we shall endeavour to explicate, demonstrate, and to make clear and plain to all, what either Words or Things seem more obscure and difficult.[27]

Even though Whiston's work closely follows the format of the *Principia* and includes its most important proofs and arguments, it must not be mistaken for a direct translation or even a close paraphrase of Newton's work. On several occasions, Whiston unhesitatingly augments the original. For example, Whiston lists 27 laws of motion whereas Newton only lists three.[28] Many of Whiston's laws are similar to Newton's corollaries and scholium concerning the laws of

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[25]Farrell, 200.

[26]Whiston, Newton's Mathematick Philosophy, vi.

[27]Ibid., 24.

[28]Ibid., 46-87. See also, Newton, Principia, 13.

motion while others are deduced from Newton's original three by taking specific conditions of impact even further.[29]

Clearly then, Whiston does not strictly confine himself to the text of the *Principia*. Both the *Astronomical Lectures* and *Newton's Mathematick Philosophy* are colored by other influences as well. For example, Whiston cites Christiaan Huygens and other prominent scholars throughout both works.[30] Even a slight bent towards the Cartesian philosophy is disclosed when Whiston introduces into his own "Definition One" in *Newton's Mathematick Philosophy* the Cartesian concept of matter being

> an extended substance, solid, or impenetrable, of itself merely passive, and indifferent to Motion or rest; but capable of any sort of Motion whatever and of all figures and forms. I call it a substance extended, because it possesseth some part of extended space.[31]

I. B. Cohen points out that "Newton carefully avoided any such questions of the identification of space and extension."[32]

Whiston's science was also colored by his religious agenda even when it was politically expedient to avoid any such references. Margaret C. Jacob argues that Whiston was

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[29]Whiston, Newton's Mathematick Philosophy, viii.

[30]Ibid., 88, 92, 94, 101, 118, 119, 269-70 & 330.

[31]Ibid., 25.

[32]Ibid., vii-viii.

a fervent proponent of Newtonianism since it created a foundation upon which his religious beliefs could be built. After all, Newton's orderly universe was clearly a reflection of the mind of God.[33]

Alexander Pope easily understood and quickly digested the coffee house version of Newton's philosophy. His own work proves that Whiston's lectures influenced his imagination. In our continuing quest to find out exactly what Pope learned from Whiston, it will prove useful to examine the actual text of *Sir Isaac Newton's Mathematick Philosophy More Easily Demonstrated.*

Newton's Mathematick Philosophy begins with an elementary discussion of conic sections and the laws of motion since

> it is necessary for anyone that would undertake this Philosophy, that besides some Knowledge of Geometry, Arithmetic, and Astronomy, he should also be furnish'd with the Knowledge of the true Laws of Motions; and especially should understand something of the Nature and Properties of those Curve Lines, which are called the Conic Sections. . . . Therefore 'tis requir'd of us, that we should in the Beginning touch upon, and in some measure explicate, as well the conic sections, as the of late demonstrated Laws of Motion.[34]

The lectures go on to discuss circular, elliptical and projectile motion. He describes "the Force of Gravity . . .

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[33]Margaret C. Jacob, The Newtonians and the English Revolution: 1689-1720 (Ithaca, New York: Cornell University Press, 1976), 131-133.

[34]Whiston, Newton's Mathematick Philosophy, 2.

which is the Cause of Descent" in all material bodies. In Lecture Eleven, Whiston combines projectile motion with the force of gravity. He argues that if the "Force of the Horizontal Projection . . . is not hinder'd by some other Force" it will continue in its horizontal motion (Newton's inertia). But "then let the Force of Gravity surpervene [*sic*]," which draws the body towards the "Center of the Earth."[35]

Further lectures go on to discuss how the combination of centripetal force and projectile motion can be used to explain the motions of the planets and the satellites of Jupiter and Saturn. He argues that the total mass of a homogeneous sphere should be considered its acting center when dealing with astronomical phenomena. Each planet is captured by the sun's gravitational pull. The sun's gravity in combination with the satellite's inherent projectile force insure that the satellite will persist in its elliptical orbit.

While discussing orbital motion, Whiston goes so far as to throw a third body into the mix. His intention is to illustrate how the immensity of the sun effectively subdues the attractive force of its smaller satellites. He writes:

> If two Bodies drawing each other by any Force whatever, and which are not moved from anything else, nor impeded, be moved in any sort whatever; their Motions will be the same in effect as if

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[35]Ibid., 120.

> they did not attract each other, but they were both attracted with the same Force by some 3d Body placed in the common Centre of Gravity: And the Condition of the attractive Force will be the same, in respect of the Distance of the Bodies from that common Center, and in respect of their whole Distance betwixt themselves.[36]

Whiston also takes time to explain the basic principles found in Newton's *Opticks*. I. B. Cohen quotes Whiston as saying:

> But since it hath seem'd good to that great Man, to propose certain Propositions in that Book without their Demonstrations; it will be worth our while to bring in this place the Demonstrations of them, which have been either lately found out, or elsewhere delivered by the by the same Author; that so there may be nothing in that Famous Treatise, which beginners may stumble at, as not having it demonstrated before them.[37]

Whiston believed that the evidence provided in his lectures inevitably destroyed the archaic system espoused by Aristotle and Ptolemy. In fact, he gave these lectures because he felt that it was his duty to destroy these ancient fantasies once and for all. Astronomers knew the true system of the universe but the general public needed more education. Whiston was one of the many pioneers that gave lectures that were designed to educate the general public.[38] He declares solemnly that it is his purpose to

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[36]Ibid., 195-196.

[37]Whiston, Astronomical Lectures, xiii or 267-268

> produce the true Solutions, that is, those which are grounded upon the *Copernican* System; and not thinking it worth the while to set our selves to explain either the *Ptolemaic* or *Tychonic* Hypothesis. . . . The Copernican Hypothesis is beyond all rational Contradiction establish'd to be the true System of Nature. Before this indeed, to expound one of those Hypotheses, the latter especially, (for the former was otherwise found to be insufficient,) was a thing excusable; but to go about to do it operously at this time, now the Truth is found, to puzzle our Brains with fictitious Schemes, is an Undertaking both unworthy of, and somewhat unaccountable in any Reader of Astronomy.[39]

Whiston was sincere in his beliefs. He knew that the Newtonian system was the only "true system of the world."[40] His desire to convert the world to Newtonianism, his skill as a lecturer, his ability to simplify difficult mathematical concepts and his fervent belief in the truth of the system all combined to convince Alexander Pope that what Whiston was saying was true. It is to Alexander Pope that we now must turn in order to ascertain the extent to which this version of Newtonianism influenced his literature.

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[38]See Larry Stewart's The Rise of Public Science: Rhetoric, Technology, and Natural Philosophy in Newtonian Britain, 1660-1750 (Cambridge: Cambridge University Press, 1992) for a comprehensive study of the early popularizers of Newtonian science.

[39]Whiston, Astronomical Lectures, 195.

[40]Farrell, 202.

4. EVIDENCE OF POPE'S NEWTONIANISM

Alexander Pope was born in 1688 -- the same year James II was exiled making room for William of Orange to assume the throne. Unfortunately for Pope and his family, this was not a good time to be Roman Catholic. A consequence of his family's religious inclination was his exclusion from public schools.

His family, however, taught him the skills he needed and gave him the encouragement to educate himself. An aunt living with the Pope family taught the young poet how to read and he soon taught himself how to write.[1] Pope explains, "I had learned very early to read and delighted extremely in it. I taught myself to write very early . . . by copying from printed books with which I used to divert myself, as other children do with scrawling out pictures."[2]

According to his mother, the family recognized young Pope's poetic genius at an early age. She claims his father "used to set him to make English verses when he was very young. He was pretty difficult at being pleased and used often to send him back to new turn them."[3]

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[1]Maynard Mack, Alexander Pope: A Life (New York: WW. Norton & Company, 1985), 47.

[2]Joseph Spence, Observations, Anecdotes, and Characters of Books and Men: Volume I, ed. James M. Osborn (Oxford: Clarendon Press, 1966), 11.

[3]Ibid., 7.

He did have some formal education at a Catholic school but most biographers agree that the beatings administered to the students in order to facilitate learning had the opposite effect on the young poet.[4]

By the time he was twelve, Pope's school days were over. However, his education was only just beginning. Pope soon developed a love for books that lasted throughout his life. He excitedly explored the family library and read all that he could get his hands on. His sister remembers the young poet-to-be primarily spending his time reading or writing under his favorite tree. Pope writes:

> when I had done with my priests I took to reading by myself, for which I had a very great eagerness and enthusiasm. . . . This I did without any design but that of pleasing myself. . . . I followed everywhere my fancy led me, and was like a boy gathering flowers in the woods and fields just as they fall in his way. I still look upon these five or six years as the happiest part of my life.[5]

Felicity Rosslyn correctly assumes that 'the young Pope's education probably owes more to this . . . than anything else."[6]

During the Restoration period, laymen were more scientifically conscious than at any time since Galileo's

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[4]Felicity Rosslyn, Alexander Pope: A Literary Life (New York: Macmillan and Company, 1990), 12. See also, Mack, 52.

[5]Spence, 12.

[6]Rosslyn, 11.

Sidereus Nuncius was published in 1610, and Pope was no exception. In England, the publications of the Royal Society were partially responsible for this revived interest in the sciences. During Pope's childhood its *Transactions* related the discovery and explorations of a world hitherto unseen by the naked eye.[7] Laymen were also becoming increasingly aware of the possible pragmatic uses for new scientific discoveries.[8] No doubt, some of the materials Pope studied during his years of self-education were highly scientific, a fact attested to by some of his earliest writings.

Pope was interested in science well before he heard William Whiston lecture at Button's. In *The Rape of the Lock*, Pope hints as to the extent of his scientific knowledge when he writes about viewing "cloudless Skies" through "Galileo's eyes."[9]

Pope reveals the extent of his scientific knowledge in a letter to Henry Cromwell written the year of Whiston's banishment from Cambridge. Cromwell had earlier confessed to Pope that "the System of Tycho Brahe" was entirely "novel" and he necessarily had reservations as to its truth. In Pope's written reply, he defends the Copernican system at

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[7]Nicolson and Rousseau, v.

[8]Kenneth O. Morgan, The Oxford Illustrated History of Britain (New York: Oxford University Press, 1984), 392.

[9]Alexander Pope, The Rape of the Lock, II.179-180 & V.137-138, quoted in Nicolson and Rousseau, 135.

the expense of the "Ptolomaick." Pope goes on to write, "tis a mercy that on this occasion I do not give you an account of [Brahe's] life and conversation, which perhaps I know a little more than you imagine."[10]

At about this same time, it is clear that Pope had gotten wind of the notorious William Whiston's controversial religious ideas. In a early poem, Pope condemns this apostate:

> To Brocas's Lays no more you listen
> Than to the wicked Works of Whiston;
> In vain he strains to reach your Ear,
> With what it wisely, will not hear:
> You bless the Powers who made that Organ
> Deaf to the Voice of such a Gorgon.[11]

A few years after he had written this condemnation of Whiston, Pope was introduced to Newtonian science at Button's Coffee House. George Sherburn believes that Pope attended Whiston's lectures as early as 1713.[12] Rousseau and Nicolson believed that Alexander Pope "may indeed have heard the first coffee house lecture he gave in London."[13] Regardless of the first date of attendance, it is clear that

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[10]Alexander Pope, The Correspondences of Alexander Pope, ed. George Sherburn (Oxford: Clarendon Press, 1956), I.102-105.

[11]Ibid., I.26.

[12]George Sherburn, "Pope and 'The Great Shew of Nature,'" in The Seventeenth Century: Studies in the History of English Thought and Literature from Bacon to Pope, ed. Richard Foster Jones (Stanford: Stanford University Press, 1951), 306-315.

[13]Nicolson and Rousseau, 142.

Pope did attend and was profoundly influenced by Whiston and his lectures. In a letter written to John Caryll on August 14, 1713 he praises the wonders of the universe:

> You can't wonder my thoughts are scarce consistent, when I tell you how they are distracted! Every hour of my life, my mind is strangely divided. This minute, perhaps, I am above the stars, with a thousand systems above me, looking forward into the vast abyss of eternity, and losing my whole comprehension in the boundless spaces of the extended Creation, in dialogues with Whiston and the Astronomers; the next moment I am below all trifles, even groveling with Tidcombe in the very center of nonsense. Good God! what an Incongruous Animal is Man? What a bustle we make about passing our time, when all our space is but a point? What aims and ambitions are crowded into this little instant of our life? . . . Those animals whose circle of living and date of perception is limited to three or four hours, as the naturalists assure us, are yet as long-lived and possess as wide a scene of action as man, if we consider him with an eye to eternity. Who knows what plots, what achievements a mite may perform, in his kingdom of grain and dust? . . . Who that thinks in this train, but must see the world and its contemptible grandeurs lessen before him at every thought? 'Tis enough to make one remain stupefied in a poise of inaction, void of all desires, of all designs, of all friendships.[14]

Obviously, a great change had occurred in Pope's thinking. The man who Pope had considered to be a vile apostate five years earlier was now the brilliant revealer of the universe. Pope's subsequent works would often proclaim the magnificence of the Newtonian universe as interpreted by Whiston.

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[14]Pope, Correspondences, I.185-86.

Pope continued to attend the lectures given at Button's. Eighteen months after the original letter to Caryll, Pope and his friend John Gay sent him another letter. Gay writes:

> There is a grand revolution at Will's Coffee house. . . . The knowledge I gain . . . is entirely in painting and poetry; and Mr. Pope owes all his skill in astronomy and particularly in the revolution of ellipses to . . . Mr. Whiston, so celebrated for his late discovery of the longitude in an extraordinary copy of verses which you heard when you were last in town.[15]

In *This Long Disease, My Life,* G.S. Rousseau and Marjorie Nicolson document the literary evidence that suggests Pope's world view had dramatically changed. Newton had become a great hero. After all, he was the one who lay bare the true nature of the universe for all to see. In his famous couplet Pope writes:

> Nature and Nature's Laws lay hid in Night.
> God said, Let Newton be! and All was Light.[16]

Similar praise also appears in Pope's personal correspondence. After Newton's death in 1727, Pope was approached by Newton's literary executor, John Conduitt. Conduitt wanted Pope's opinion concerning a posthumous dedication to Queen Anne that would accompany an addition of

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[15]Ibid., I.288.

[16]Quoted in Nicolson and Rousseau, 234.

Newton's *Chronology of Ancient Kingdoms Amended.* In his reply to Conduitt, Pope urged less praise of the Queen since she seemed to overshadow Newton.[17] He wrote:

> It takes very much from the Praise of Sir I. N. and I fear unjustly, to imagine Any Prince's Reign can Make Newtons, however it might encourage, or admire them. . . . I am sincerely of opinion that your Dedication is very just, and decent, and well-judg'd. I could wish it were Enlarged with some Memoirs & Character of him [Newton], as a private Man: I doubt not his Life & Manners would make as Great a Discovery of Virtue, & Goodness, & Rectitude of Heart, as his Works have done of Penetration and the utmost Stretch of human knowledge.[18]

If imitation is the sincerest form of flattery then this was Pope's highest praise. Many modern commentators have emphasized the similarities between Newton's work and Pope's poems. Nicolson and Rousseau believe that this similarity exists as a direct result of Whiston's lectures. "There is little question that the magnificent first Epistle of *An Essay on Man* would never have been written had Pope not heard Whiston's coffee house lectures." After all, several stanzas from the *Essay* are clearly inspired by Whiston's work.[19] For instance, Pope's fascination with the immensity of space, found not only in the *Essay* but many other poems as well, is clearly inspired by Whiston who

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[17]Nicolson and Rousseau, 222.

[18]Pope, Correspondences, II.457-459.

[19]Nicolson and Rousseau, 228-230.

estimated the universe to be "three Sextillions, or three Millions of Millions of Millions of Millions of Millions of Millions of Cubical Miles. An amazing Space this, and . . . scarcely to be distinguish'd from Infinite Space it self!"[20]

A book entitled *Astronomical Principles of Religion, Natural and Reveal'd,* published by Whiston shortly after he finished his coffee house lectures, influenced Pope's literature as well. As its title indicates, *Astronomical Principles* combines astronomy and religion--something expressly forbidden under the watchful eye of Addison. Pope used this work as a handy synopsis of the coffee house lectures.[21] Several passages contained in Pope's *Essay on Man* are clearly interpretations of the *Astronomical Principles.*

In the *Astronomical Priciples,* Whiston writes that the natural order of the physical world is proof of God's existence. In the "Natural or Astronomical" world "there is plainly and every where Marks of such Exactness, Harmony, Prudence, Sagacity, Wisdom, and Conduct, that not only perfectly Convinces, but Amazes and Astonishes us." He goes on to say that "all of us, who thoroughly consider the particular Instances . . . in every Part of the Universe . . . must be stupid to the utmost degree" if we have taken courses in "Mechanicks, Anatomy, Botanicks, and especially

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[20]William Whiston, Astronomical Principles of Religion, 121-122, quoted in Nicolson and Rousseau, 228.

[21]Nicolson and Rousseau, 223.

Astronomy" without coming away with a "satisfactory Conviction" that God is the creator of all.[22]

Like Whiston, Pope sets out to prove that the existence of God is manifest in creation. According to Pope, God's power is apparent in both the terrestrial and celestial spheres; there can be no other conclusion drawn from the evidence given to man.[23] If one can observe how orderly every "system into system runs" he must confess that "Wisdom" or God created it all and formed "the best" possible universe.[24]

Whiston also believed that in order to maintain the clockwork system of the universe, God must be omnipresent. He writes:

> If the Almighty should supersede or suspend his constant Providential Power for one single Hour, all the World would be dissolved and dissipated, and all the noble Bodies therein, Suns, Planets, Comets, Vegetables, and Animals would be once destroyed.[25]

In his *Essay on Man*, Pope echoes Whiston's sentiments; he argues that God's continual intervention is necessary in

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[22]Whiston, Astronomical Principles, 118, quoted in Nicolson and Rousseau, 229-230.

[23]Mack, 525.

[24]Alexander Pope, "An Essay on Man," in The Works of Alexander Pope: Volume II, ed. Rt. Hon. John Wilson Croker (New York: Gordian Press, 1967), I.23-46.

[25]Mack, 526.

order to sustain the universe.[26] In *The Dunciad*, Pope describes the consequences of a withdrawal of God's providence. According to Pope, a universe without the omnipresence of God is a universe that would simply "Indulge dread Chaos, and eternal Night . . . To blot out order, and extinguish Light."[27]

Since Whiston's work was initially based on the *Opticks* and the *Principia*, it is interesting to follow a particular idea as it moves from the mind of Newton to the pen of Pope via the lectures of Whiston. Important ideas often remained remarkably intact. For example, in his "General Scholium," Newton writes:

> This most beautiful system of the sun, planets, and comets, could only proceed from the counsel and dominion of an intelligent and powerful Being. And if the fixed stars are the centres of other like systems, these, being formed by the like wise counsel, must be all subject to the dominion of One; . . . lest the systems of the fixed stars should, by their gravity, fall on each other, he hath placed those systems at immense distances from one another.

The "One" who holds the universe together is omnipotent and omnipresent. "In him are all things contained and moved."[28]

Whiston later addresses a similar theme. In his *Astronomical Principles* he argues that it is God's constant

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[26]Pope, "An Essay on Man," III.10-27.

[27]Alexander Pope, The Dunciad, ed. James Sutherland (London: Methuen and Company, 1943), IV.13-14.

[28]Newton, Principia, 544-545.

intervention that holds the universe together. Any mechanical explanations are inherently erroneous since God is solely responsible for the phenomenon of gravity. Whiston argues that the entire universe would essentially dissolve into chaos if God were ever to withdraw his presence. All the heavenly bodies would crumble into dust and their respective atoms would fly off in straight lines away from their former center of rotation.[29]

Pope continues with his own variation on this theme. He writes:

> And if each system in gradation roll,
> Alike essential to th' amazing whole;
> The least confusion but in one, not all
> That system only, but the whole must fall.
> Let earth unbalanc'd from her orbit fly,
> Planets and Suns run lawless thro' the sky,
> Let ruling Angels from their spheres be hurl'd,
> Being on being wreck'd, and world on world,
> Heav'n's whole foundations to their centre nod,
> And Nature tremble to the throne of God:
> All this dread ORDER break -- for whom? for thee?
> Vile worm! oh Madness, Pride, Impiety![30]

This shared conviction that God constantly preserved the universe through his omnipotence and omnipresence helped to keep Newton's original philosophy intact throughout the stages of transmission.

Nicolson and Rousseau argue that other evidence of Pope's Newtonianism exists throughout his work. He readily

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[29]Whiston, Astronomocal Principles, 223, quoted in Nicolson and Rousseau, 227.

[30]Pope, "An Essay on Man," I.247-258.

accepted several aspects of the new Newtonian world view while rejecting non-Newtonian concepts. For instance, Pope makes it perfectly clear that he has no patience for *a priori* reasoners like Descartes and several modern Aristotelians since they often seemed to deny the existence of God. Pope argues that those who take the "high Priori Road" reason downward until they doubt the existence of God.[31] "Instead of Reasoning" -- as did Newton -- "from a visible World to an invisible God" they reasoned downward from an

> invisible God (to whom they had given attributes agreeable to certain metaphysical principles formed out of their own imaginations) reasoned downwards to a visible world in theory, of Man's Creation; which not agreeing, as might be expected, to that of God's, they began from their inability to account for evil which they saw in his world, to doubt of that God.[32]

This statement should not be surprising considering the fact that Pope had earlier praised the empiricism of Newton in *An Essay On Man.* According to Epistle One, the only things that man can be sure of are the things he has experienced for himself.[33] Pope believed that Newton

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[31]Pope, The Dunciad, IV.471-472.

[32]Ibid., 387.

[33]Pope, "An Essay on Man," I. See also, Mack, 527-528.

destroyed the archaic system of *a priori* reasoning once and for all by proving the superiority of empiricism.

In the *Dunciad*, Pope satirizes all those who continued to cling to ancient ideas. Among those satirized are many academics at Cambridge and Oxford who are mired in tradition. According to Pope, they are afraid of the new philosophy. He writes:

> Tis yours, a Bacon or a Locke to blame,
> A Newton's genius, or Milton's flame:
> But oh! with One, immortal one dispense,
> The source of Newton's Light, of Bacon's sense!
> Content, each Emanation of his fires,
> That beam on Earth, each Virtue he inspires,
> Each Art he prompts, each Charm he can create,
> Whate'er he gives, are giv'n for you to hate.[34]

The dons who hate Newton, Bacon, Locke and Milton pay homage to the goddess "Dulness" who brings darkness into the world by extinguishing the truth. The academics of Cambridge and Oxford surround the Goddess in their full academic regalia -- "Broad hats, and hoods, and caps, a sable shoal" -- and worship at her feet. As true disciples of Dulness, they share her willingness to hide the truth and "let the [dark] curtain fall; [until] Universal Darkness buries all."[35]

The tool they use to deceive the minds of men and to hide the truth is Aristotle's doctrine. Pope describes the

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[34]Pope, The Dunciad, III.215-222.

[35]Ibid., IV.655-656

anti-Newtonians who are dedicated to the mistress of darkness as "Aristotle's friends." Their spokesman, Richard Bentley--an obvious error of Pope's since Bentley was a Newtonian and the first Boyle Lecturer--is master of Trinity College, Cambridge. He approaches his mistress and suggests that she "dismiss" all the Newtonian "rabble" that competes with the darkness they wish to establish. He then assures her that the Aristotelians who surround her throne will freely do her will. Bentley promises to make the philosophy of Aristotle live again. If successful, the work of Bentley and his fellow advocates -- who Pope describes as "sheep" or "cattle" -- will act as a successful "blockade" to the continued propagation of the light offered by Newton and his science.[36]

Bentley tells Dulness that he and his advocates will attempt to accomplish this subterfuge by taking care to give their students mere "fragments" of the truth which they will "murder first, and mince . . . all to bits."[37] Much like the medieval scholastics, they promised that their charges would be lost in "the pale of Words" until death overtakes them.[38] It is the duty of the scholars who follow Dulness to "nitpick among hairs and pores; and to congratulate

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[36]Ibid., IV.189-250

[37]Ibid., IV.120 & 230.

[38]Ibid., IV.160.

themselves . . . on minute eccentric explications."[39] According to Pope, they ". . . explain a thing till all men doubt it, And write about it . . . and about it."[40] Such an education has the power to "petrify a Genius into a Dunce" and to "bring to one dead level ev'ry mind."[41] Unfortunately, for Newton and his followers, the success of Dulness and her puppet Bentley could ultimately lead to a world where:

> . . . skulking Truth to her old Cavern fled,
> Mountains of Casuistry heap'd o'er her head!
> Philosophy, that lean'd on Heav'n before,
> Shrinks to her second cause, and is no more.[42]

It is clear from the preceding passages that Whiston had won over the heart of the poet. The literary evidence suggests that Newtonian ideas had influenced his work. However, not all of Pope's works are thoroughly Newtonian. Other philosophies colored his prose. It is to these philosophies that we now must turn.

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[39]Mack, 789. See also, Pope, The Dunciad, IV.234.

[40]Pope, The Dunciad, IV.251-252.

[41]Ibid., 264 & 268.

[42]Ibid., 641-644.

5. THE INFLUENCE OF OTHER PHILOSOPHIES UPON THE LITERARY WORK OF ALEXANDER POPE

From the correspondence of Alexander Pope it is clear that he was aware of the other philosophies that fought for ascendancy in early eighteenth century England. An example can be found in a letter to Lord Bathurst. In this letter, he shows his knowledge of other systems in the context of building a house. He catalogues the many problems that are inherent in such an enterprise. Chief among these is the ability of the saws and hammers to melt Pope's money away. With tongue in cheek, he blames this phenomenon on the noise that they make. In jest he writes:

> Neither Aristotle nor Descartes can find a method to hinder the noise from having that effect, and though the One should tell you that there was an occult Quality in those Machines which operated in that manner upon Gold and Silver, and the other should say that there were certain Atoms which flow from them adapted to the Pores of those Metals, it would be no manner of use to you towards preserving the coin.[1]

This evidence suggests that Pope had more than just a passing knowledge of the respective philosophies of Aristotle and Descartes.

The fact that Pope's prose was filled with Aristotelian metaphors may seem a bit surprising considering the fact

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[1]Pope, Correspondence, I.488.

that he condemned Aristotelians in the *Dunciad.* In his prose he writes about the "fixt stars," the celestial spheres or orbs and the æther. All of these concepts were integral to Aristotelian cosmology.

However, in the early eighteenth century, these concepts were no longer the sole property of the Aristotelians. Each major philosophy modified these terms to meet their own particular needs. For example, an Aristotelian would define the fixed stars as points of light permanently affixed to a physical sphere surrounding the universe. A Newtonian, such as Whiston, would define the fixed stars as suns burning millions of miles away. They are fixed in the sense that their relative positions remain the same, as opposed to the planets; they are not confined to a physical sphere.

Pope's correspondence to Bathurst also discloses his knowledge of the Cartesian system. A different letter from Pope suggests that his knowledge of Descartes comes primarily from Bernard le Bovier de Fontenelle. Simply put, Fontenelle was William Whiston's Cartesian counterpart. He took it upon himself to popularize Descartes' cosmology in his best-selling book, *Entretiens sur la Pluralite des Mondes* or *Conversations on the Plurality of Worlds*, which, coincidentally, was published one year before Newton's *Principia.* The popularity of Fontenelle's work in France insured that it would soon be translated into English. In 1688, Fontenelle's *Conversations* crossed the channel in the

form of Aphra Behn's translation entitled *A Discovery of New Worlds*. In her introduction to the 1990 edition, Nina Rattner Gelbart declares that the *Conversations* were so popular in England that editions continued to be printed well into the eighteenth century.[2]

Gelbart describes the reasons behind its popularity. She argues that its "high style, clarity, precision, rhetorical grace, and narrative strategies" captivated readers. After all, Fontenelle likened his work to a romance or novel. Anyone who could figure out a plot of a novel or keep its characters straight could easily follow him in his journey through the cosmos. His "genius for inventing apt similes and analogies for explaining natural philosophy in terms of everyday thoughts and experiences . . . allowed him to ease his reader into difficult, sophisticated material." Fontenelle's ability to clearly explain difficult concepts while entertaining his readers combined to ensure that a large portion of literate England would read his book.[3]

It is clear that Alexander Pope was one of these readers. In a letter to Mary Wortley Montagu Pope writes:

> I shall at least be sure to meet you in the next World, if there be any truth of Our new Doctrine of the Way of Judgment. Since your Body is so

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[2]Bernard le Bovier de Fontenelle, Coversations on the Plurality of Worlds, ed. Nina Rattner Gelbart (Berkeley: University of California Press, 1990), x.

[3]Ibid., xx.

> full of fire, and capable of such solar motions as your letter describes, your Soul can never be long going to the Fixt Stars (where I intend to settle) Or Else you may find me in the Milky Way, because Fontenelle assures us, the Stars are so crowded there that a man may stand upon one, or talk to his friend on another.[4]

In his *Conversations*, Fontenelle writes that the Milky Way is "an infinity of small stars." They are so small and close together that they appear as a continuous streak of white to the naked eye. In typical fashion, Fontenelle relates the Stars of the Milky Way to the "Maldivian Islands," which appear as a continuous land mass from a distance. According to Fontenelle, the stars of the Milky Way, like the Maldivian Islands, are so close together that "it seems to me one could talk from one system to the other or even shake hands." At the very least, he concludes, "the birds of one system can cross easily to another, and they can train pigeons to carry letters as one does here in the Levant from one town to another."[5]

It is clear that Fontenelle influenced not only Pope's personal correspondence but his literary work as well. In his *Conversations on the Plurality of Worlds*, Fontenelle writes that "it would be no common pleasure to see many different worlds. The voyage often cheers me immensely even though it's only in my imagination." Intrigued by this

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[4]Pope, Correspondence, I.369.

[5]Fontenelle, 66.

thought, Fontenelle's student, the Marquise, replies, "Well then, let's make our planetary voyage as we please; what's to prevent us? Let's go and visit every different perspective and consider the universe from there."[6]

Their journey leads them to the fixed stars. The Marquise discovers that they "are suns too; our sun is the center of a vortex which rotates around it; why shouldn't each fixed star also be the center of a vortex which move about it? Our sun has planets which it lights; why shouldn't each fixed star have some which it lights too?" She discovers that these planets are inhabited by creatures similar to man. Her reaction to this new revelation is similar to Pope's reaction when he first learned of the immensity of the universe from Whiston. She exclaims, "Here's a universe so large that I'm lost, I no longer know where I am, I'm nothing. [It] confounds me -- troubles me -- terrifies me." The earth now seems so small that the Marquise promises that she will never again be impressed by any of man's achievements. Even the greatest of these pale in comparison.[7]

In *An Essay on Man*, Pope takes the same imaginary voyage and reaches similar conclusions. He begins by confessing that man can only truly known the things that are immediately evident to the senses. However, the power of

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[6]Ibid., 43-44.

[7]Ibid., 62-64.

the imagination can free him from his terrestrial prison and lead him on a journey through the cosmos. Pope's imagination takes him on a adventure that is remarkably similar to the imaginary journey taken by Fontenelle and the Marquise. In his mind, Pope pierces the "vast immensity" of cosmic space and discovers "worlds on worlds [that] compose one universe" and are inhabited be creatures resembling man. He writes:

> Observe how system into system runs,
> What other planets circle other suns,
> What vary'd being peoples ev'ry star,
> May tell why Heaven has made us what we are.[8]

After returning from this cosmic adventure, Pope, like the Marquise, becomes thoroughly convinced that man is relatively insignificant when compared to the vast expanses of the universe. He comments on the arrogance of mankind, thinking that the universe was created for his own personal pleasure. He writes:

> Ask for what end the heav'nly bodies shine,
> Earth for whose use? Pride answers, "Tis for mine:
> Seas roll to waft me, suns to light me rise;
> My foot-stool the earth, my canopy the skies"[9]

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[8]Pope, "An Essay on Man," I.1-28.

[9]Ibid., I.131-132 & 139-140.

According to Pope, believing that the universe was created for sole benefit of mankind is nothing more than ignorance, pride, madness and impiety.[10]

The similarities between these two voyages and the insistence of both authors on the possibility of life inhabiting other planets strongly suggests that Fontenelle was a major influence on Pope. After all, Fontenelle takes great pains to explain the likelihood that life on other planets does, in fact, exist.[11] Both Newton and Whiston refused to speculate on any such possibilities.

Other evidence of Fontenelle's influence exists throughout Pope's entire body of work. He often uses the word "vortex," for example. This word had entered the English vocabulary only after Descartes had published his *Principles of Philosophy* in 1644. Descartes theorized that space was loaded with æthereal matter which surrounded each heavenly body like a whirlpool. The moon was caught in the vortex that surrounded the earth while the earth was caught in the vortex that surrounded the sun. These vortices also

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[10]Ibid., I.258

[11]Fontenelle was not the first philosopher to speculate on the possibility of extraterrestrial life. It is part of tradition that goes back to the thirteenth-century Europe. Nicolas of Cusa was the first to argue that other earths may be scattered throughout the universe. According to Cusa, God would not waste any usable space; he has filled the void with other creatures who inhabit "other stars." See, Nicolas Cusanus, Of Learned Ignorance, trans., Fr. Germain Heron (London: Routledge & Kegan Paul, 1954, 114-115. See also, Alexander Koyre, From the Closed World to the Infinite Universe (New York: Harper Torchbooks, 1958), 22.

drew corporeal bodies towards their centers. This caused heavy bodies to fall towards the center of the earth.

Nicolson and Rousseau argue that in the early eighteenth century, the word was common and often used as a metaphor for Newtonian gravitation.[12] However, even they admit that when Pope uses the word, he sometimes uses it "with Cartesian connotations."[13]

Fontenelle describes the vortices in his *Conversations*. He argues that the vortices are a collection of independent particles that generally move in the same direction.

> This whole mass of celestial matter, which extends from the Sun right to the fixed stars, turns round and carries the planets with it, making them turn in the same direction around the Sun, which occupies the center, but in longer or shorter periods of time according to whether they are closer or farther away. This is the great vortex of which the Sun is like the master.

The planets are carried in this celestial matter in much the same way that a boat is carried downstream by a river. "At the same time the planets make up little individual vortices in imitation of the sun." Moons or satellites circle the planets in much the same way that the planets revolve around the sun.[14]

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[12]Nicolson and Rousseau, 199.

[13]Ibid., 202.

[14]Fontenelle, 53.

The fact that Pope subscribed to the notion of the vortices is especially interesting considering the fact that neither Newton nor Whiston ever gave this concept any credence. Newton writes:

> That the hypothesis of vortices is pressed with many difficulties. . . . That the smaller vortices may maintain their lesser revolutions about Saturn, Jupiter, and other planets, and swim quietly and undisturbed in the greater vortex of the sun, the periodic times of the parts of the sun's vortex should be equal; but the rotation of the sun and planets about their axes, which ought to correspond with the motions of their vortices, recede far from all these proportions.[15]

Whiston believed--as did Newton--that the vortex theory could not account for Kepler's precise laws. He also believed that this theory was "at variance with such astronomical phenomena as the movement of comets across the solar system."[16] After all, any comet passing through a vortex would surely be caught in its power.

Thus, Whiston was determined to replace Cartesianism with Newtonianism. He readily admits that one of the main reasons for writing *Newton's Mathematick Philosophy* was to effectively destroy the remnants of Cartesian philosophy in England. According to Whiston, Descartes was "miserably mistaken" about the "Laws of Motion and Collision . . . when

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[15]Newton, Principia, 543.

[16]Stephen F. Mason, A History of the Sciences (New York: Macmillan Publishing Company, 1962), 205.

he went about to establish them." He claims that Descartes "has so boldly impos'd upon the World false Rules concerning Collision and Reflection of Bodies, that it is worth the while to endeavor to root out of the Minds of Men the Prejudices which have sprung from thence." According to Whiston, Cartesian philosophers are so ignorant of the true laws of motion that all of their labors in the study of "that Philosophy" will necessarily come to naught.[17]

Taking this into consideration, it is difficult to understand how a staunch Newtonian such as Pope could continually write about such an overtly Cartesian concept. Interestingly enough, his first use of this word comes after he had participated in the Whiston lectures. In the preface to his interpretation of the *Iliad* in 1715, Pope writes that Homer's poetry is powerful, "like a powerful Planet, which in the Violence of its Course, drew all things into its vortex."[18]

In Pope's personal correspondence he also uses this term frequently. In one letter he refers to John Arbuthnot's brother as a "Philosopher all of fire; so warmly, nay so wildly in the Right, that he forces all others about him to be so too, and draws them into his own Vortex."[19] In a letter written to Jonathan Swift about his

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[17]Whiston, Newton's Mathematick Philosophy, 2.

[18]Alexander Pope, The Iliad of Homer: Books I-IX, ed. Maynard Mack (London: Methuen & Company, 1967), 5.

[19]Pope, Correspondence, II.253.

possible visit to England, Pope writes that he is happy to see his friend return to the influence of "Our Vortex."[20]

It is clear that Pope is using this term in much the same way a Cartesian would. A passage from the Fourth Dunciad is even more obvious. Pope explains that all those who share the goddess Dulness' love of darkness are drawn towards her and become her sons. He writes, "All her Children, by a wonderful attraction, are drawn about her; and bear along with them divers others."[21] As time goes by, more individuals come under her power and influence. They are inevitably drawn to the center of the vortex that surrounds their mistress. Pope describes her attraction:

> None want a place, for all their Centre found,
> Hung to the Goddess, and coher'd around.
> Not closer, orb in orb, conglob'd are seen
> The buzzing Bees about their dusky Queen.[22]

"The young [and] the old who feel her inward sway" spiral down into her center, quickly becoming a part of the sphere of her attraction. Soon a pack of Aristotelian dunces from the "College or in Town" are "involuntarily drawn to her."

The gath'ring number, as it moves along,

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[20]Ibid., II.331.

[21]Pope, The Dunciad, 337.

[22]Ibid., IV.77-80.

> Involves a vast involuntary throng,
> Who gently drawn, and struggling less and less,
> Roll in her Vortex, and her pow'r confess.
> Not those alone who passive own her laws,
> But who, weak rebels, more advance her cause.[23]

A note in the 1743 edition of the Dunciad makes this Cartesian metaphor even more apparent. It reads, "within the sphere of her attraction . . . they are carried . . . in planetary revolutions round her centre, some nearer to it, some further off."[24]

Pope's use of this Cartesian metaphor is further evidence that he was influenced by agents other than Newton. While Pope admired Newton, he did not espouse his philosophy entirely. In fact, there is evidence that suggests that Pope still had some reservations about Newton and his science.

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[23]Ibid., IV.73-102.

[24]Ibid., 349.

6. POPE'S ROLE IN THE MEMOIRS OF MARTINUS SCRIBLERUS AND OTHER SCIENTIFIC CRITICISM

Even though Pope often seemed to be enamored with Newton and his new science, he still harbored some reservations. One year after the Whiston lectures, Pope approached his friend Jonathan Swift with a proposal for a new monthly periodical. He intended to use this new periodical to criticize all the follies of learning -- science was not excepted.[1]

One year earlier, Pope had sketched out a preliminary plan. It appeared as a proposal in a 1712 edition of *The Spectator*. In this proposal, Pope mentions the success of a monthly abstract called *The History of the Works of Learned*. With tongue in cheek, Pope then proposes a companion volume which will be called, *An Account of the Works of the Unlearned*. He writes:

> Now, Sir, it is my Design to Publish every Month, *An Account of the Works of the Unlearned*. Several late Productions of my own Country-men, who many of them make a very Eminent Figure in the . . . World, encourage me in this undertaking. I may, in this Work, possibly make a Review of several Pieces which have appeared in the Foreign *Accounts* above-mentioned, tho' they ought not to have been taken Notice of in Works which bear such a Title. I may, likewise, take into Consideration such Pieces as appear, from

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[1]Charles Kerby-Miller, ed., Memoirs of the Extraordinary Life, Works, and Discoveries of Martinus Scriblerus (New Haven, CT: Published for Wellesley College by Yale University Press, 1950), 14.

> time to time, under the Names of those Gentlemen who Complement one another in Publick Assemblies, by the Title of the *Learned Gentlemen*. Our Party-Authors will also afford me a great Variety of Subjects, not to mention Editors, Commentators, and others, who are often Men of Learning, or what is as bad, of no Knowledge. I shall not enlarge upon this Hint; but if you think anything can be made of it, I shall set about it with all the Pains and Application that so useful a Work deserves.[2]

Pope's later proposal to Swift was basically the same. He suggested that they combine forces with some of their closest friends and satirize the works of the so-called learned.[3] Swift agreed with this plan and his presence soon encouraged others to join in their scheme. Since Swift had a well-established reputation for contemporary satire, he took over as the effectual head of the club. Under his leadership, Pope's original proposal was drastically changed. By 1714, the original plan had turned into a scheme that would satirize the entire spectrum of human follies. They called themselves the Scriblerus Club. Throughout its existence it included such notable literary figures as Pope, Swift, John Arbuthnot, John Gay, Thomas Parnell and Robert Harley.

The vehicle they used was the fictional Martinus Scriblerus. Through a series of misadventures, Martinus

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[2]Joseph Addison, Richard Steele, and Donald Frederic Bond, The Spectator (Oxford: Clarendon Press, 1965), 205.

[3]Kerby-Miller, 15.

Scriblerus blunders into some of the most significant events of his time. Some of the follies of early eighteenth-century England are revealed through his eyes. The fictional biography of Martinus Scriblerus was used by some of the period's greatest wits as a means of ridiculing contemporary topics; the wicked satire of Swift, Pope, Arbuthnot, Gay, Parnell and Harley all found a voice in this fictional hero.

The new science--which included the respectable empiricists such as Newton and Boyle along with the more easily targeted virtuosi--was one of their primary targets. In Chapter XVII of *The Memoirs*, the Scriblerians describe the experiments of Martinus Scriblerus. In distinctive fashion, the Scriblerians sarcastically boast that "all of his Studies were directed to the universal Benefit of Mankind."[4] Among these studies were the obviously useless calculations designed to determine "how much the Inhabitants of the Moon eat for Supper, considering that they pass a Night equal to fifteen of our natural days." They also included a "Demonstration of the natural Dominion of the Inhabitants of the Earth over those of the Moon, if ever an intercourse should be open'd between them. With a Proposal of a Partition-Treaty, among the earthly Potentates, in case of such discovery." The Scriblerians conclude with

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[4]Ibid., 168.

Martinus' census of London. In order to count the seemingly numberless throngs, Martinus proposes a pseudo-scientific solution. He believes that the population of London can most easily be discovered by first determining the weight of its inhabitants gold and carriages. The amount of food each Londoner consumes is then taken into consideration. Once the weight of the digested food left behind in the city streets and at the bottom of ditches was subtracted from the sum total, the exact population of London is determined. With obvious sarcasm, the Scriblerians declare that any difficult problem can be solved through simple scientific processes.[5]

It is interesting to note that William Whiston was a target of the Scriblerians despite the presence of Alexander Pope. Whiston's deluge theory is particularly singled out. The Scriblerians group his theory along with the other useless accomplishments mentioned above. In their satire, Martinus takes Whiston's theory one step further. According to Martinus, if a comet colliding with the earth causes a universal deluge then a comet merely passing by the earth would create unusually strong tides. The practical result of this hypothesis is a set of "Tide-Tables" designed by Martinus to predict the movement of the oceans when comets pass by.

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[5]Ibid., 167-168.

Whiston's explanation of the Biblical deluge did not stand alone. His method for determining longitude was also attacked. In order explain this attack, a short digression will prove useful.

In 1714, the British government passed an Act offering £10,000 for a "generally practicable and useful" method for finding longitude at sea. Whiston had been proselytizing for just such an act. After all, he claimed to have already discovered the solution to the longitude problem and was willing to disclose it for the right price.[6] In 1713, he wrote to the *Guardian*:

> We are well satisfied that the discovery we have to make as to this matter is easily intelligible by all, and ready to be practised at sea as well as at land. . . . We are ready to disclose it to the world if we may be assured that no other person shall be allowed to deprive us of those rewards which the publick shall think fit to bestow for such a discovery.[7]

The £10,000 reward must have satisfied Whiston. Shortly after the Act was passed Whiston unveiled his plan. In *A New Method for Discovering the Longitude both at Sea and Land,* Whiston writes:

> It was proposed to fix stationary ships or buoys at least at the distance of 600 geographical mile or ten degrees in all parts of the ocean. In

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[6]Farrell, 130-133.

[7]Calhoun, The Guardian, 376.

> these ships, a mortar or great gun was to be exactly fired every midnight, which being heard by the navigating ships, the mariners are supposed to know their distance by the degree of the sound, or for their further assurance bombs were to be thrown up as high as possible, the utmost altitude of which being seen by the fire and observed by the mariners, their distance is found by the difference of the altitude from the known one of the stationary ship; or still further, by firing a gun at the moment the bomb arrives at its greatest altitude, the same distance will be found by observing the difference of the time between hearing the first and that of seeing the last; the same may be done if the sound and light are made at any given interval.[8]

It easy to see why the Scriblerians opted to include this proposal in their list of useless science. To them it seemed just as impractical as weighing gold, carriages and refuse in a feeble attempt to accurately assess the population of London. In the Memoirs of Martinus Scriblerus, Martinus is credited with the useless discovery of "the Method of discovering the Longitude by Bomb-Vessels." He even admits that this idea is not very practical but he will proceed with his plan since the "Potentates of the World" are willing to pay handsomely for any idea that may give them an advantage in warfare.[9]

Marjorie Nicolson and G.S. Rousseau believe that this criticism could not have come from Alexander Pope. According to these two scholars, Pope found himself in a

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[8]Biographia Britannica (1766), 4210, quoted in Farrell, 134.

[9]Kerby-Miller, 167-168.

quandary when his club decided to satirize Whiston. Nicolson and Rousseau believe that Pope "could not have failed to feel loyalty toward a teacher who had opened such worlds to the imagination as Whiston." Because of this fierce loyalty, Pope supposedly protested to any satire involving Whiston.[10] As proof they offer a letter written to John Arbuthnot from Jonathan Swift. Swift writes:

> To talk of Martin in any hands but yours, is a Folly. You every day give better hints [of what subjects are worthy of our satire] than all of us together could do in a twelvemonth; and to say the truth, Pope who first thought of the hint has no genius at all to it, in my mind. Gay is too young; Parnell has some ideas of it, but is idle; I could put together, and lard, and strike out well enough, but all that relates to the sciences must be from you.[11]

Nicolson and Rousseau's argument quickly falls apart when taking the subsequent history of the club into consideration. Perhaps they did not realize that when Arbuthnot received this letter, Swift had already gotten himself into a great deal of political trouble by publishing an anonymous tract entitled *The Publick Spirit of the Whigs*. Since this harsh polemic attacked the Scottish peers the matter was soon taken up by the House of Lords. A reward of 300 pounds was offered to anyone who could discover the

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[10]Nicolson and Rousseau, 171.

[11]Jonathan Swift, The Correspondence of Jonathan Swift, D.D., ed. F. Elrington Ball (London: G. Bell and Sons, 1911), II.162-163.

author of the piece. Although Swift's powerful friends promised to protect him, he was so frightened by the experience that fled to a retreat at Upper Letcombe in Berkshire.[12]

While Swift was in hiding, Arbuthnot wrote him and suggested he divert his attention to the affairs of the club. He entreats Swift to, "remember Martin, who is an innocent fellow and will not disturb your solitude." Arbuthnot then suggests several topics for Swift to work on during his absence.[13]

Fortunately for Pope, Swift was not tempted. He had more weighty matters on his mind. In his reply to Arbuthnot, Swift made it clear that he was no longer interested in the affairs of the Scriblerians. With more important matters to attend to he would be lucky to find the time to rework and edit what the others had written. Not long after his stay at Upper Letcombe, Swift left for Dublin where he remained in exile. With Swift gone, Pope soon regained informal leadership of the club. In a letter written to Swift, Pope promises to make the work of the Scriblerian Club his top priority.[14]

Pope kept the club alive for two more decades. During this time, the Scriblerians produced some of their best

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[12]Kerby-Miller, 36-37.

[13]Swift, II.158-160.

[14]Pope, Correspondence, II.155.

work. Pope, Gay, Arbuthnot, Parnell and Harley all continued to contribute to the *Memoirs*. Even Swift made a few positive contributions in his spare time. Under the leadership of Pope, scientific satire continued to be one of the main targets of Scriblerian satire. There is no evidence that suggests that Pope ever wrote any of this scientific satire; however, the evidence suggests that he did, in fact, sanction it.[15]

After Swift's departure, everything passed through Pope's hands, including the scientific satire primarily attributed to Arbuthnot. All work came under the intense scrutiny of Pope. The surviving manuscripts show numerous revisions in his own hand. However, Pope revised the work of others in order to maintain a reasonably uniform style throughout; the basic content of each individual piece remained intact.[16]

Approximately twenty years after the club began, John Gay, one of its principal members, passed away. Pope prophetically announced to Swift that "I shall never see you again."[17] He was right. Gay's death presaged the official end of the Scriblerian Club. On February 27, 1732, the fictional corpse of Martinus Scriblerus was laid to rest and the club was officially disbanded.[18]

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[15]Kerby-Miller, 42-55.

[16]Ibid., 62-63.

[17]Pope, Correspondence, III.155.

The complete *Memoirs of Martinus Scriblerus* remained unpublished for the next six years. The other Scriblerians had lost interest in the project and Pope was left alone to continue editing and revising in preparation for the final version. As sole editor, he was free to destroy anything he believed to be objectionable. Without fear of reproach from the other Scriblerians who had left the project in his hands, Pope personally destroyed several pieces. A large percentage of everyone's work -- including Swift's -- was eventually burned. Pope even destroyed many of his own contributions. It is interesting to note, however, that most of the scientific satire remained intact and was later published as part of the *Memoirs*.[19]

The fact that Pope chose not to destroy Arbuthnot's work when he had the power to do so is revealing. As editor of the final version, he personally sanctioned every piece that appeared in the first edition. If he had no desire to see science satirized, Arbuthnot's work would have ended up as fuel for Pope's fire.

Chapter XVII of Pope's final version was devoted exclusively to scientific satire. This is the chapter that defames William Whiston. If Pope was truly a devout

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[18]Kerby-Miller, 56.

[19]Ibid., 57-67.

disciple, this section probably would have ended up in Pope's hearth.

Even Newton suffered at the hands of the Scriblerians in Chapter XVII. Once again, the Scriblerians use Martinus as proxy. This time he takes the place of Newton. According to Martinus not only has he "enrich'd Mathematics with many precise and Geometric Quadratures of the Circle" but "He first discover'd the Cause of Gravity."[20]

Martinus first taught that there was no such thing as universal æther. The planets existed in a vacuum. Unfortunately, many of his critics pointed out that his law of gravity bore a remarkable resemblance to the occult qualities of the ancients. After all, Martinus refused to offer any physical explanation for his concept of action at a distance.

In order to appease his critics Martinus conveniently changed his mind. In the end, he opts for a certain kind of subtle matter that pervades the whole universe and explains action at a distance by becoming the mechanism by which the heavenly bodies are moved.[21]

There can be no denying that this passage refers to Newton. The Scriblerians are using him to satirize the scientific community's inclination to invent "most of the modern Systems and Hypotheses . . . without the trivial help

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[20]Ibid., 166.

[21]Ibid.

of . . . Observations."[22] According to the Scriblerians, scientists often vacillate in their theories and freely hypothesize on causes when only their effects are known. Simply put, anything not directly observed is a best guess.

If Nicolson and Rousseau are correct in their assessment of Pope, it would seem more than likely that Pope would have destroyed this section along with the other objectionable material. The fact that he did not suggests that he was not above satirizing two of the men he respected most. He recognized the fact that all men, no matter how great, have their own individual follies. Recognizing this fact does not destroy their greatness but merely serves to keep them human.

The fact that Pope condoned the satire of the Scriblerians may not be enough to convince the cautious reader of the ambiguous feelings Pope sometimes felt towards the new science. However, other evidence strongly suggests that Pope was not always an avid defender of Newton or the new science. In works where he is the sole author, Pope discloses the fact that he still harbors some reservations. In his *Essay on Man*, for example, Pope wonders if mankind would better off without scientific advances. He writes of the pastoral bliss accompanying those who live in simpler times:

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[22]Ibid.

> Lo! the poor Indian, whose untutor'd mind
> Sees God in clouds, or hears him in the wind;
> His soul proud Science never taught him to stray
> Far as the solar walk, or milky way.
> Yet simple Nature to his hope has giv'n,
> Behind the cloud-topt hill, an humbler heav'n;
> Some safer world in depth of woods embrac'd,
> Some happier island in the wat'ry waste.[23]

It should be not surprising, then, that Pope's work often echoes contemporary satires of modern science. For example, Pope echoes some themes of Thomas Shadwell's play, *The Virtuoso* in his own *Dunciad*. Pope groups the virtuosi with the rest of the dunces. The goddess Dulness suggests that they "find proper employment" in the useless collection and study of "Butterflies, Shells, Birds-nests, [*sic*] Moss, &c. but with particular caution, not to proceed beyond Trifles, or any useful or extensive views of Nature, or of the Author of Nature."[24] The virtuosi then disperse and collect items which they bring to their mistress.

> Thick as Locusts black'ning all the ground,
> A tribe, with weeds and shells fantastic crown'd,
> Each with some wond'rous gift approach'd the Pow'r,
> A Nest, a Toad, a Fungus, or a Flow'r.[25]

Again, like Shadwell's virtuoso, Pope's virtuosi also indulge in useless experiments. The Goddess Dulness

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[23]Pope, "An Essay on Man," I.99-106.

[24]Pope, The Dunciad, 338.

[25]Ibid., IV.397-400.

"confers her Titles and Degrees" upon all those who perform worthless experiments such as "impaling a Glow-worm" in order to extract its light.

This worthless science "shone in the dignity of the F.R.S." (Fellows of the Royal Society).[26] The fact that Pope targets the Royal Society as the seat of these trivial experiments should not be surprising. After all, many contemporary satirists--including Shadwell and Swift--also targeted the Royal Society as the source of similar experiments.[27]

Pope also believed that Newton's science destroyed the beauty of the world. After all, it was mystery that made it beautiful and science explained the mystery. Once a physical phenomenon was explained it no longer held its appeal. In the Dunciad Pope writes:

> See Mystery to Mathematics fly!
> In vain! they gaze, turn giddy, rave, and die.[28]

Pope's greatest reservation was that the new astronomy had some very important limitations. After all, Newtonian science dealt primarily with physical phenomena. Questions

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[26]Ibid., IV.566-570.

[27]Thomas Shadwell, The Virtuoso, ed., Marjorie Hope Nicolson and David Stuart Rodes (Lincoln: University of Nebraska Press, 1966), xxii, IV.iii.240-249 & V.ii.31-32. See also, Jonathan Swift, Gulliver's Travels (New York: Bantam Books, 1986), 177-184.

[28]Pope, The Dunciad, IV.412-413.

of a more spiritual nature could only be answered by religion. Pope wrote:

> Could he, whose rules the rapid Comet bind,
> Describe or fix one movement of his Mind?
> Who saw its fires here rise, and there descend,
> Explain his own beginning, or his end?
> Alas what wonder![29]

Isaac Newton could not answer such questions. After all, he was a man and could only aspire to the knowledge of a man. The knowledge of God that could answer such theological questions could only be given through divine revelation.

This philosophy was not shared by all. Many Englishmen believed that science would eventually answer all questions and eventually tame the natural world and put an end to the human suffering that existed in the eighteenth century. As a result, the admirers of Newton dared to raise the father of modern science to the "throne of Deity, displacing God Himself."[30] Pope reproaches the poets who went to this extreme in their adulation of Newton. He addresses them when he writes:

> Go Wond'rous creature! mount Science guides,
> Go, measure earth, weigh air, and state the tides;
> Instruct the planets in what orbs to run,
> Correct old Time, and regulate the Sun . . .

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[29]Pope, "An Essay on Man," II.35-39.

[30]Nicolson and Rousseau, 234.

> Go, teach Eternal Wisdom how to rule --
> Then drop into thyself, and be a fool!
> Superior beings when of late they saw
> A mortal Man unfold all Nature's law,
> Admired such Wisdom in an earthly shape,
> And shew'd a NEWTON as we shew an Ape.[31]

A.D. Nuthall takes this argument even further when he suggests that Pope is ridiculing Newton as well as his followers. He believes that

> the general form of [Pope's] argument is that the [superior beings or] angels, looking down on humankind, marvel at the best of us (Newton) only as we marvel at a performing ape. . . . The great Sir Isaac, who reduced to order the motions of the comet, could not understand the first thing about his own mind. The presumption seems to be that Newton and human science are reduced to absurdity.[32]

In conclusion, it is clear from this and the preceding evidence that Pope was not part of that England which believed that "Isaac Newton . . . was the greatest man" in history. "A man whom is scarcely to be found in ten centuries, . . . who rules over minds by the power of truth, . . . who understands the universe and . . . was buried like a king who had done well by his subjects." The legend of Newton was not yet complete. Voltaire's description of

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[31]Pope, "Essay on Man," II.19-22 & 31-34.

[32]A.D. Nuthall, Pope's Essay on Man (London: Allen and Unwin, 1984), 86.

England was more typical of the second half of the eighteenth century.[33]

[33]Voltaire, 57 & 69.

7. CONCLUSION

The evidence contained in this thesis amends the long-standing position taken by Nicolson and Rousseau. While it is true that Pope had a great deal of respect for Newton and his science, Pope was not as staunch a Newtonian as was formerly believed. The historical record indicates that Pope was influenced by other philosophies, specifically that of Bernard Fontenelle. Fontenelle's scientific literature influenced Pope's work almost as much as Newtonian science. Pope also participated in the scientific satire of the Scriblerus Club which dedicated itself to the satirization of popular culture. With Pope's approval, William Whiston, Pope's scientific mentor, and Sir Isaac Newton were both satirized by the Scriblerus Club. Several reservations regarding the new science also appeared in several works authored by Pope.

This evidence suggests that Pope was a transitional figure. Newtonian science had not yet come to dominate the scientific and literary cultures of eighteenth-century England. Although Newton was well respected, he was not yet a cultural icon. His science was beginning to be appreciated by the scientific community; however, many other philosophies continued to be influential. The transitional period in which Pope lived is best viewed through his eyes. A second look at Alexander Pope and the sciences reveals the actual nature of the period in which he lived.

BIBLIOGRAPHY

1. PRIMARY SOURCES

Addison, Joseph, Richard Steele, and Donald Frederic Bond. *The Spectator*. Oxford: Clarendon Press, 1965.

Bentley, Richard. *Eight Boyle Lectures on Atheism.* New York: Garland Publishing, 1976.

Calhoun, John, ed. *The Guardian*. Lexington, KY: The University of Kentucky Press, 1982.

Clarke, Samuel and Wilhelm Gottfried Leibniz. *The Leibniz-Clarke Correspondence,* ed. Henry Gavin Alexander. Manchester: Manchester University Press, 1956.

Cusanus, Nicolas. *Of Learned Ignorance*, trans. Fr. Germain Heron. London: Routledge & Kegan Paul, 1954.

Fontenelle, Bernard. *Coversations on the Plurality of Worlds*, ed. Nina Rattner Gelbart. Berkeley: University of California Press, 1990.

Kerby-Miller, Charles, ed. *Memoirs of the Extraordinary Life, Works, and Discoveries of Martinus Scriblerus.* New Haven, CT: Published for Wellesley College by Yale University Press, 1950.

Newton, Sir Isaac. *Principia*. Berkeley: Berkeley University Press, 1962.

_____. *Opticks*. New York: Dover Press, 1968.

Pope, Alexander. *The Dunciad*, ed. James Sutherland. London: Methuen and Company, 1943.

_____. *The Correspondences of Alexander Pope*, ed. George Sherburn. Oxford: Oxford University Press, 1956.

_____. "An Essay on Man." In *The Works of Alexander Pope: Volume II*, ed. Rt. Hon. John Wilson Croker. New York: Gordian Press, 1967.

_____. *The Iliad of Homer: Books I-IX*, ed. Maynard Mack. London: Methuen & Company, 1967.

Shadwell, Thomas. *The Virtuoso*, ed. Marjorie Hope Nicolson and David Stuart Rodes. Lincoln: University of Nebraska Press, 1966.

Spence, Joseph. *Observations, Anecdotes, and Characters of Books and Men: Volume I*, ed. James M. Osborn. Oxford: Clarendon Press, 1966.

Swift, Jonathan. *The Correspondence of Jonathan Swift, D.D.*, ed. F. Elrington Ball. London: G. Bell and Sons, 1911.

_____. *Gulliver's Travels*. New York: Bantam Books, 1986.

Thayer, H.S., ed. *Newton's Philosophy of Nature: Selections From His Writings*. New York: Hafner Press, 1974.

Voltaire. *Letters on England*. London: Penguin Books, 1980.

Whiston, William. *Astronomical Lectures Read in the Schools at Cambridge*, ed. I. Bernard Cohen. New York: Johnson Reprint Corporation, 1972.

_____. *Sir Isaac Newton's Mathematick Philosophy More Easily Demonstrated*, ed. I. Bernard Cohen. New York: Johnson Reprint Corporation, 1972.

2. SECONDARY SOURCES

Christie, John and Sally Shuttleworth. *Nature Transfigured: Science and Literature, 1700-1900*. Manchester: Manchester University Press, 1989.

Farrell, Maureen. *William Whiston*. New York: Arno Press, 1981.

Force, James E. *William Whiston, Honest Newtonian*. Cambridge: Cambridge University Press, 1985.

Fraser, George S. *Alexander Pope*. London: Routledge & Kegan Paul, 1978.

Jacob, Margaret C. *The Newtonians and the English Revolution: 1689-1720*. Ithaca, New York: Cornell University Press, 1976.

Koyre, Alexander. *From the Closed World to the Infinite Universe.* New York: Harper Torchbooks, 1958.

Mason, Stephen F. *A History of the Sciences.* New York: Macmillan Publishing Company, 1962.

Mack, Maynard. *Alexander Pope: A Life.* New York: W.W. Norton & Company, 1985.

Manuel, Frank E. *Isaac Newton, Historian.* Cambridge: Harvard University Press, 1963.

McMullin, Ernan. *Newton on Matter and Activity.* Notre Dame: University of Notre Dame Press, 1978.

Morgan, Kenneth O. *The Oxford Illustrated History of Britain.* New York: Oxford University Press, 1984.

Nicolson, Marjorie. *Newton Demands the Muse: Newton's Opticks and the Eighteenth Century Poets.* Princeton: Princeton University Press, 1946.

Nicolson, Marjorie, and G.S. Rousseau. *"This Long Disease, My Life:" Alexander Pope and the Sciences.* Princeton: Princeton University Press, 1968.

Nuthall, A.D. *Pope's Essay on Man.* London: Allen and Unwin, 1984.

Rosslyn, Felicity. *Alexander Pope: A Literary Life.* New York: Macmillan and Company, 1990.

Schofield, Robert E. *Mechanism and Materialism: British Natural Philosophy in An Age of Reason.* Princeton, NJ: Princeton University Press, 1970.

Sherburn, George. "Pope and 'The Great Shew of Nature.'" In *The Seventeenth Century: Studies in the History of English Thought and Literature from Bacon to Pope,* ed. Richard Foster Jones. Stanford: Stanford University Press, 1951.

Stewart, Larry. *The Rise of Public Science: Rhetoric, Technology, and Natural Philosophy in Newtonian Britain, 1660-1750.* Cambridge: Cambridge University Press, 1992.

Westfall, Richard. *The Life of Isaac Newton.* New York: Cambridge University Press, 1994.

Yoder, Paul R. "An Essay on Criticism." In *Critical Essays on Alexander Pope*, ed. Wallace Jackson and R. Paul Yoder. New York: G.K. Hall & Company, 1993.