

**THE NEW SCIENCE AND
ENGLISH LITERATURE
IN THE CLASSICAL
PERIOD. A DISSERTATION**

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The new science and English literature in the classical period. A dissertation by Carson S. Duncan

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CARSON S. DUNCAN

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The New Science and English Literature
in the Classical Period

A DISSERTATION

SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL OF ARTS AND
LITERATURE IN CANDIDACY FOR THE DEGREE OF
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(DEPARTMENT OF ENGLISH)

BY

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CHAPTER I

THE NEW SCIENCE

The new science, or the new experimental philosophy, arose in England as a fresh intellectual impulse, too subtle and too penetrating to be readily confined within the bonds of a definition. Its manifestations may be observed, its more obvious qualities may be studied, yet back of all these there is an elusive psychological problem that fairly challenges solution. As the waters of a stream are lost in the sea, where they are driven by unknown forces to break on unexpected shores, so new ideas entering the minds of men are lost to analysis only to reappear as new points of view, new methods of thinking, new attitudes toward life. Straightway men possessed of these new ideas set to work reforming human thought. Similarly, experimental philosophers in seventeenth century England, quickened by this new intellectual impulse, began to lay, broad and deep, the foundations for reconstructing the natural history of the world.

Scientific interest had existed in England long before the seventeenth century,¹ of course, and can be called a new interest in that period only in the sense that it received a new impetus. This new impulse came from the influence of four men, two foreigners and two Englishmen, Galileo and Descartes, Bacon and Harvey. When Galileo made his telescope and saw the proof of the Copernican theory, there was introduced the fundamental new principle,—namely, the application of mechanical apparatus to the solution of the problems of natural philosophy. “Since that Galileo,” wrote John Wallis, “and (after him) Torricelli, and others have applied Mechanick Principles to the salving of Philosophical Difficulties; Natural Philosophy is well known to have been rendered more intelligible, and to have made a much greater progress in less than a hundred years, than before for many ages”.² To Bacon is attributed the inductive method for scientific research, although as Pro-

¹ Cf. Adamson's *Roger Bacon; the Philosophy of Science in the Middle Ages*; Berthelot's *Introduction to a Collection of Ancient Treatises on Chemistry and Alchemy*; Bridges's *Introduction to Roger Bacon's Opus Majus*; Bon's *Roger Bacon*; Charles's *Roger Bacon et Sa Vie*; La Croix's *Science and Literature in the Middle Ages*; Phillips's *Science in England from Elizabeth to Charles II*; Wright's *Science Written During the Middle Ages*.

² Wallis, John, *Phil. Trans.* vol. I-II, p. 264, *Letter to the R. S.*

fessor Adamson truthfully says, "it is more than probable that in all fairness, when we speak of the Baconian reform of science, we should refer to the forgotten Monk of the thirteenth century rather than to the brilliant and famous Chancellor of the seventeenth".³ The new philosophers themselves were not familiar with the work of "Friar Bacon", while they persistently praised and honored the chancellor, and followed as well as they could his precepts as they found them in the *Novum Organum*. They became his disciples and "were not slow in carrying out the plan of a learned society as sketched in the *New Atlantis*".⁴ To him is due, then, the working hypothesis—the inductive method—,wherein a long and careful process of experimentation and observation must precede the drawing of conclusions.

The third element was furnished by Descartes. He was a mathematician as well as a philosopher, and hence could bring mathematical accuracy and precision to the aid of philosophical thinking. His great service, therefore, lay in his reducing to formulæ the facts gleaned from experiment and observation. "Monsieur Descartes did not perfectly tread in his (Bacon's) Steps, since he was for doing too great a part of his work in his Closet, concluding too soon, before he had made Experiments enough; but then to a vast Genius he joined exquisite Skill in Geometry, and working upon Intelligible Principles and an Intelligible Manner obtained his results."⁵ He also joined forces with Bacon against the power of ancient authority. "Bacon shares with Descartes the honour of inaugurating the modern period of philosophy. Bacon's protest against the principle of authority, a principle which had been accepted with more or less unhesitating loyalty by the Scholastic philosophers, is no less vigorous than that of Descartes. Both alike are eager to substitute for faith and tradition the independent effort of the individual mind in pursuit of truth."⁶

Harvey's chief influence was due to his achievements. Trained

³ Adamson, R., *Roger Bacon*, p. 7.

⁴ Becker, B. H., *Scientific London*, p. 2.

⁵ Wotton, William, *Reflections upon Ancient and Modern Learning*, p. 30.

⁶ "But one conclusion emerges out of these considerations, viz. not, indeed that arithmetic and geometry are the sole sciences to be studied, but only, that, in our search for the direct road towards truth we should busy ourselves with no object about which we cannot attain a certitude equal to that of the demonstrations of arithmetic and geometry".—Descartes, *Phil. Wks.*, vol. I, p. 5.

in the new scientific methods under Fabricius at Padua and filled with an enthusiasm for discovery, he returned to England to apply with clear-sightedness and commonsense the new principles to physiological research. The result was that he startled the learned world and stimulated intellectual curiosity with his discovery of the circulation of the blood.⁷

These are the elements underlying the new science of the seventeenth century in England in so far as they can be concretely defined. "The period had arrived when that experimental philosophy to which Bacon had held the torch, and which had already made considerable progress, especially in Italy, was finally established on the ruins of arbitrary figments and partial inductions".⁸ But, while the mind can easily grasp these tangible elements,—the use of scientific apparatus in solving philosophical problems, the inductive method of investigation, and the reduction of philosophical ideas to mathematical formulæ—there still remains a subtle and powerful force. The new science was more penetrating than the above definition indicates; it was an attitude of mind, it was a declaration of intellectual independence. "*Nullius in Verba* is not only the motto of the Royal Society, but a received Principle among all the Philosophers of the present Age."⁹ Not only are new discoveries to be made, new investigations to be carried on, but the old beliefs are to be re-examined. Aristotle and Descartes are to be of exactly the same authority so far as mere assertion is concerned.¹⁰ No authority is to be convincing because it is ancient; no conclusion is to be scouted because it is new.¹¹

This interest in scientific research crystallized into definitely organized societies. The Society of Antiquaries was formed at London in 1572 and continued into the seventeenth century until dissolved by James I. A Royal Academy was attempted as early as 1616-17, in which it was planned to devote some attention to science. Sir Francis Kynaston renewed the attempt in 1635.¹²

⁷ Announced 1616; published 1628.

⁸ Hallam, Henry, *Introduction to the Lit. of Eur.* vol. IV, p. 518. Cf. also, Becker, B. H., *Scientific London*, p. 1.

⁹ Wotton, William, *Reflections*, p. 251.

¹⁰ Wotton, William, *Reflections*, p. 264.

¹¹ *Ibid.*

¹² Elton, Oliver, *The Augustan Ages*, p. 383.

But this study is centralized in the work and influence of the Royal Society of London. It did not absolutely lead the way, but it had a wholly independent development. There was in Florence an earlier society, Accademia del Cimento, with "provando e riprovando la natura" for its motto. "This body was more purely scientific in its plan than the Royal Society", but it was clearly an outgrowth of the same movement.¹³ In 1666 the French Academy of Science was founded, showing that scientific interest was awakened in Paris. Bishop Sprat thought, with some show of reason, that the French imitated the English.¹⁴ The question of source is eliminated from the discussion of the history of the Royal Society, because it had a definite English origin in Bacon's *New Atlantis*.¹⁵

As early as 1645 this common interest in England had drawn together a group of men, who had grown weary of the political and religious turmoil of the times.¹⁶ These men began a series of weekly meetings in the lecture room of the Professor of Astronomy at Gresham College. There was at first no definite organization or plan of procedure, although by 1651 there were rules printed intended for regulating the election of members, (fines for "defaults" 2s. 6d.), and even setting the time of meetings,—"every Thursday, before two of the clock".¹⁷ This company was called by Sir Robert Boyle, an early member, the "invisible College".¹⁸ Their discussions were limited by agreement to the "New Philosophy", i. e. to a study of things around them in nature, what they could see, touch, feel, or hear, "(not meddling with Divinity, Metaphysics, Moralls, Politicks, Grammar, Rhetoric, or Logic)".¹⁹

The company slowly increased. In 1658 there were twelve members, among whom were Wilkins, Seth Ward, Wallis, Sir Robert Moray, and Boyle. During this year several of the members were

¹³ Sprat, Thomas, *History of the Royal Society*, p. 56.

¹⁴ It became an era for societies. Cf. *Minerva's Museum*; see also, account of "Academy at the great Tew", The Rota, The Hartlib Group, The Athenian Society, Society for Physicians and Surgeons. Later branch societies sprang up in outlying towns; cf. Spalding, *Lincolnshire*.

¹⁵ Bacon, Francis, *The New Atlantis, Solomon's House*.

¹⁶ Ranke, Leopold von, *History of England*, vol. VI, p. 361.

¹⁷ Weld, C. R., *History of the Royal Society*, pp. 32-4.

¹⁸ *Ibid.* p. 35.

¹⁹ Wallis, John, *Letter to the Royal Society, 1696*.

called away to Oxford, whither they carried the new interest, and where they began a similar series of meetings. In this manner the scientific enthusiasm continued through the Commonwealth. In 1660 the two sections were united at Gresham College, and were formed into a definite organization. The number of members increased during the year to 115. The next year the attention of the new King was called to it by Elias Ashmole, and the King took an immediate interest in it. Dr. Johnson has suggested that his interest was not wholly scientific, but rather political. "It has been suggested", he writes, "that the Royal Society was instituted soon after the Restoration, to direct the attention from public discontent".²⁰ From whatever motive, Charles II did grant the Society a Royal Charter and the privilege of using the Royal Arms, and gave it a silver mace which it possesses and uses to this day.²¹ The organization was completed August 29,²² 1662, at which time the King declared himself to be the founder of the Society. In this way came into being the Royal Society of London for the Promotion of the Natural Sciences (*Societas Regalis Londini pro Scientia Naturali Promovenda*), which has continued from that time to this, growing in power and influence. The "Invisible College" had become the "Visible Church of Philosophy".²³

Out of that tumultuous mid-century, therefore, came this new interest, called the New, or Experimental Philosophy. Its followers were called philosophers, or more usually, virtuosi. What was their aim? In brief, it was to realize if possible the ambition of Bacon, to reconstruct the natural history of the world.²⁴ The broad foundation of this stupendous and profound history was to be laid by means of experiments. Everything was to be examined anew, and a careful record was to be kept, so that gradually but surely there should arise out of the chaos of scholastic discussion this new understanding; this solid mass of truth should grow into definition. These scientists were to accept nothing simply from report (*nul-lius in verba*); there must be demonstration wherever possible,

²⁰ Johnson, Samuel, *Works*, vol. X, p. 36.

²¹ Masson, David, *Life of Milton*, vol. VI, p. 395; Becker, B. H., *Scientific London*, Chap. I.

²² The Charter was dated April 22, 1662.

²³ Weld, C. R., *History of Royal Society*, p. 78.

²⁴ Boyle, Robert, *Phil. Trans.* vol. I-II, p. 186. Cf. also, Bacon's plan for Book VI, *Instauration of the Sciences*.