

II. THE IMPACT OF THE SCIENTIFIC REVOLUTION: BACON AND DESCARTES

1. The Scientific Revolution

The Scientific Revolution is the name given to the fundamental change brought about in the seventeenth century in man's conception of the universe. The scientific awakening had started with Roger Bacon (1214–1292); it grew with Leonardo da Vinci (1442–1519), and reached the proportions of a revolution in the seventeenth century. It was made possible by the advance of mathematical knowledge.

The Scientific Revolution was inaugurated, as it were, by Copernicus (1473–1543), a Polish ecclesiastic of unquestionable orthodoxy. In his book, *The Revolution of the Heavenly Bodies* (1543), he propounded the notion that the sun is at the centre of the universe, and that the earth has a two-fold motion—a diurnal

heliocentric and an annual revolution about the sun. The Copernican heliocentric theory acquired prominence when the German Johannes Kepler (1571-1630) discovered the laws of planetary motion and formulated them in mathematical terms. Galileo (1564-1642), one of the greatest of the founders of modern science, discovered the importance of acceleration in dynamics, established the true law of falling bodies, and studied projectiles. The Italian scientist became an ardent advocate of the Copernican heliocentric system, perfected the telescope and quickly made many important discoveries. But he was condemned by the Inquisition in 1633, and he recanted and promised never again to maintain that the earth rotates or revolves. Rene Descartes was a sincere and practicing Catholic, but one who held many scientific heresies of the time. Descartes invented coordinate geometry which was his most valuable contribution to the Scientific Revolution. Again, his adumbration of the infinitesimal calculus was of fundamental importance to the development of science. Isaac Newton (1642-1727) achieved the complete triumph of science for which Copernicus, Kepler and Galileo had prepared the way. In 1687 Newton published his *Principia Mathematica* which, James Jean regarded as "the greatest scientific work ever produced by the human intellect."²⁶ Starting with his three laws of motion, Newton proceeded to enunciate his law of universal gravitation, the law by which the heavenly bodies are held in their paths. From this he was able to deduce everything in planetary theory.

2. Transition to Modern Philosophy:

Francis Bacon and Rene Descartes

Influenced by the attitude of the scientists, the leading philosophical spirits of the new age tended to reject the guiding hand of 'revealed' religion; philosophy now tended to associate itself with the viewpoint of mathematics and physics. Skepticism, characteristic of the Renaissance, now developed into a rejection of all supernatural explanations, as in Bruno. Bruno was burnt for his views in 1600. But the skeptical/secular spirit persisted and became pronounced in Bacon and Descartes, both men of science, who stand on the threshold of modern philosophy.

Francis Bacon (1561-1626) more than any other, summed up in philosophy the spirit and resolve of modern science. Bacon's

philosophy appeared before the Galilean and Newtonian triumphs in astronomy and physics. But it is imbued with the scientific spirit and wholly directed towards practical and utilitarian ends. Bacon is important in science and philosophy for devising a new method of inquiry and for formulating the ends of science. In his *Novum Organum (New Method)* he made a vigorous plea for the abandonment of Aristotelian deduction and the adoption of induction or the scientific or historical method of inquiry. Bacon was confident that his new method of induction would lead to "the knowledge of the causes and secret motions of things."²⁷ An important part of Bacon's philosophy is the enumeration of what he calls 'idols' or habits of mind that cause people to fall into error. To destroy these idols, he calls for the 'expurgation of the intellect'. It means that for any true scientific inquiry, we must wash our minds clean "of all preconceptions, prejudices, assumptions and theories... we must sweep out of our thoughts the 'idols' or time-honoured illusions and fallacies..."²⁸ Induction enables us to know the laws of nature, and by learning those laws, we can be nature's masters. An idea that runs through all of Bacon's writings is that knowledge is power, and utility is its end. In the *Mentumment of Learning* he expressed the noblest passion of his age—the betterment of life through the extension of knowledge.²⁹ Scientific knowledge enables us to build a paradise on earth. Bacon drew a picture of this paradise in his *The New Atlantis*. It is a fancied utopia of a perfect social order which could be produced by controlling science itself.

Rene Descartes (1596-1650) was a scientist and a man of high philosophic capacity. Modern philosophy begins with Descartes. *The Discourse on Method*, which he published in 1637, was of epochal importance. The starting point of Descartes' philosophy — his method of inquiry — is methodical doubt. It is *de omnibus dubitandum* or universally doubting the existence or reality of everything. But Descartes comes to something whose existence he cannot doubt: A man's body may be illusory; sense perceptions might be wrong; but thought is different. How could a man think if he did not exist? *Cogito ergo sum*: "I think, therefore, I am." Beginning with methodological doubt, the self became the indisputable starting point of Descartes' philosophy. Now, why is the *cogito* so evident? Descartes concludes that it is only because it is very clear and distinct. He therefore adopts as a general rule the

principle that all things that we conceive very clearly and very distinctly are true.³⁰ Such are the ideas of god, of the self, of space, time and motion, the axioms of mathematics, and the freedom of the will. These are for Descartes, innate; that is, the soul derives them not from sensation and experience but from its own essence and rationality. Based on such a theory of knowledge, Descartes hoped to build a universal philosophical edifice, and the geometrical spirit of Cartesianism dominated the ensuing age.

3. The Impact of the Scientific Revolution on Historiography

How did the Scientific Revolution of the seventeenth century influence historiography? In what way did it affect its fortunes? The impact of the Scientific Revolution was both beneficial and inimical to historiography.

Beneficial Effects

Change in the Mental Outlook of the Western Man.

The rise of science brought about a great change in the mental outlook of the Western man. Bertrand Russell writes: "In 1700 the mental outlook of educated men was completely medieval; in 1600, except among a very few, it was still largely medieval."³¹ The change manifested itself in an increasing faith in reason. The idea of a world planned and created by a supreme being gave way to the idea of an orderly universe and of a physical world governed by natural laws which could be discovered by human reason. The confidence in reason and in the limitless potentialities of science encouraged massive secularization of life and thought and a new faith in man and his capabilities. Man was lifted up, as it were, with a new confidence; there was no limit to what he might do.

Idea of Progress

Most characteristic of the self-confidence instilled into man by the Scientific Revolution, was the repeated assertion of the idea of progress. The essence of the idea of progress is that human intelligence, building upon the achievement of the past, was steadily creating a better world. The idea would be fully developed by the

thinkers of the Enlightenment, but it had already started influencing men's thoughts. In 1688, Fontenelle, a brilliant popularizer of science, in his *Digression on the Ancients and the Moderns* affirmed the steady progress visible in modern times. Abbe St. Pierre's *Observations on the Continual Progress of Universal Reason* (1737) expressed much the same idea of human progress. The idea of progress was to develop into a powerful influence on the writing of history. The idea invested history with a meaning by showing that human society was not static but had always grown from lower to ever higher states of civilization. The study of the past now seemed to acquire a new relevance. Men became interested as never before in knowing the way in which mankind from a primitive beginning had attained its present civilized state.

Collection of Source Materials, Development of the Auxiliary Sciences, Periodization, Improvement of Methodology

The change of outlook brought about by the rise of science had a parallel impact on the study of the past. It was marked by an eager collection and publication of a wide range of source materials by a growing body of scholars. Ludovico Muratori wrote a year-by-year account of Italian history in seventeen volumes in addition to collecting twenty-five large folios of Italian source materials (1723-1751). Collection and publication of vast bodies of source materials - manuscript documents - made it absolutely necessary to devise techniques for authenticating such documents. Hence were developed the so-called 'auxiliary sciences' such as *epigraphy*, *paleography* (the science of deciphering ancient writings and the identification of different types of documents), and *numismatics*. A growing concern with matters like *periodization* was also visible. Lancelotti Bodin's work on history, Joseph Scaliger produced another work entitled *On the Restoration of Chronology* (1583). Periodization was made more precise by the German Christian Cellarius, who divided his *Tripartite History* (1685-96) of the world into 'ancient', 'medieval', and the 'new' ages.

Historiography gained from the Scientific Revolution particularly in the matter of *method*. Bacon's explicit rejection of the deductive in favor of the inductive method, his call for the purgation of the intellect of all prejudices and dogmas, and Descartes' advocacy of methodic doubt as the first step in any

ious inquiry would in due course revolutionize historical methodology. Particularly suited to historical inquiry was the method Descartes had devised—the method of analyzing every entity or complex conception into its constituents until the irreducible elements are clear and distinct ideas. Historical methodology in like manner would break up a document into its component units of ideas in inquiring what really had happened.

Undoubtedly, the critical spirit was growing. Daniel Papebrock, the Jesuit scholar who succeeded Bolland, was asserting the important truth that the oldest authority might not necessarily be the best—that the quality of the source had to be considered.³¹ Pierre Bayle's epochal *Historical and Critical Dictionary* (1697) is a masterpiece of skeptical thought, a product of the impact of the Scientific Revolution. Bayle's method was to collate authorized, expound contradictory opinions, and follow reason to its conclusion.³² The *Historical and Critical Dictionary* was so become "the fountainhead of the Enlightenment."³⁴

Inimical Effects

The benefits for historiography were the unintended results of the Scientific Revolution. On the other hand, the rise of science contained in it—in the works of two of its greatest proponents—ideas inimical and damaging to history. R.G. Collingwood writes that by relegating history to the realm of memory, Francis Bacon left it in an unenviable, even precarious, position; and, by questioning the very validity of historical knowledge, Descartes left history perilously adrift. It had now to fight for its life.

Collingwood analyzes the position accorded to history by Bacon and Descartes.³⁵ Francis Bacon was himself a historian, and to him the value of history lay in conferring wisdom on men. Yet, Bacon's thinking betrayed a lack of the true historical spirit. He divided his map of knowledge into the three realms of poetry, history and philosophy, ruled over by the three faculties of imagination, memory and understanding. Memory presides over history, Collingwood informs us, however, that the position of history thus defined was not safe, but precarious. It had freed itself from the errors of medieval thought, but it had still to find its own function.

Actually, Bacon's definition of history as the realm of memory was wrong, because the past only requires historical

investigation so far as it is not and cannot be remembered. If it could be remembered there would be no need for historians.³⁶

The task of the historian is not to remember the past as it is in Bacon's thinking, but to reconstruct it by using archeological and other data much as the natural scientists were using data as the basis of scientific theories. Collingwood informs us that Bacon's own contemporary, William Camden, was doing that kind of historical reconstruction.

Descartes, like Bacon, distinguished poetry, history and philosophy, and added divinity to the list. Of these he applied his new method to philosophy alone, with its three main divisions of mathematics, physics and metaphysics, for it was only here that he hoped to attain certain and secure knowledge. Poetry was more a gift of nature; divinity depended on faith in revelation; "history, however interesting and instructive...could not claim truth, for the events which it described never happened exactly as it described them."³⁷ Not only did the Cartesian reformation of knowledge neglect historical thought but there was in it a strong anti-historical tendency. This was because Descartes did not believe history to be a branch of knowledge at all. A passage in his *Discourse on Method* questioned the very validity and utility of historical knowledge. The Cartesians were, for this reason, at best indifferent to history and sometimes even hostile to it.

Collingwood examines each of the four arguments advanced against history by Descartes:

The first is *historical escapism*. To Descartes the historian is a traveler who by living away from home becomes a stranger to his own age. The true answer to such an "escapist" view of history, says Collingwood, is to show that the historian can genuinely see into the past only so far as he stands firmly rooted in the present. But such an answer had to wait until further advances were made in the theory of knowledge. What makes true historical knowledge possible is the fact that the historian does not abandon the standpoint of his own age.

The second objection that Descartes raises is that *historical narratives are not trustworthy accounts of the past*. Here is Collingwood's rejoinder to Descartes's historical Pyrrhonism.³⁸ The

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...y that historical narratives relate events that cannot have happened is to say that we have some criterion, other than the narratives that reach us, by which to judge what could have happened. Descartes here is adumbrating a genuinely critical attitude in history which fully developed would be the answer to his own objection.

The third is Descartes's *anti-utilitarian idea of history*. He asserts that untrustworthy narratives cannot really assist us to understand what is possible and thus to act effectively in the present. Collingwood observes that Descartes was quite right in rejecting the utilitarian conception of history as Hegel would do later when he wrote in the introduction to his *Philosophy of History* that the practical lesson of history is that no one ever learns anything from it. But Descartes in his condemnation of history forgot that the old Graeco-Roman conception revived by the Renaissance historians, that the value of history was a practical value, was dead by the time he criticized it. As Collingwood tells us, the French philosopher did not see that the historical work of his own day in the hands of men like Buchanan and Grotius was actuated not by any pragmatic consideration but by a sheer desire for truth.

Descartes's *fourth* objection is that *historians distort the past by making it more splendid than it really was*. Collingwood subtly remarks that in saying that historical narratives exaggerated the grandeur and splendor of the past, Descartes was actually propounding a criterion by which they could be criticized and by which the truth they concealed or distorted could be rediscovered. But instead of laying down a method or code of rules for historical criticism, he seems to have been obsessed with demonstrating that no such improvement in historical method was possible.

Descartes's work, in brief, threw doubt on the validity as well as the value of history. Clio had to be vindicated.

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ORIENT LONGMAN PRIVATE LIMITED

Registered Office

3-6-752 Himayatnagar, Hyderabad 500 029 (A.P.), INDIA

e-mail : hyd2_orlongco@sancharnet.in

Other Offices

Bangalore, Bhopal, Bhubaneshwar, Chennai, Ernakulam, Guwahati,
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