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4. Roger Bacon and Medieval Science

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4. Roger Bacon and Medieval Science

Abstract

Throughout the Middle Ages there was little interest in theoretical science as such. Not since the Greeks had nature been considered a sufficient object in and of itself for most of the study that we would call scientific. The Middle Ages' concern with nature was not its primary concern. The medievalist was interested in nature either as a mirror of the supernatural or as something which could be used in reaching the supernatural. The reappearance of Aristotle's thought and the development of those practical and technical interests which grew up around the problems of trade and industry demanded a new and different attitude toward the natural world, one quite different from that of previous times. [*excerpt*]

Keywords

Contemporary Civilization, Medieval Era, Science, Scientific Thought, Roger Bacon

Disciplines

European History | European Languages and Societies | History | History of Science, Technology, and Medicine | Medieval History

Comments

This is a part of [Section IV: The Medieval Ferment](#). The [Contemporary Civilization](#) page lists all additional sections of *Ideas and Institutions of Western Man*, as well as the [Table of Contents](#) for both volumes.

More About Contemporary Civilization:

From 1947 through 1969, all first-year Gettysburg College students took a two-semester course called Contemporary Civilization. The course was developed at President Henry W.A. Hanson's request with the goal of "introducing the student to the backgrounds of contemporary social problems through the major concepts, ideals, hopes and motivations of western culture since the Middle Ages."

Gettysburg College professors from the history, philosophy, and religion departments developed a textbook for the course. The first edition, published in 1955, was called *An Introduction to Contemporary Civilization and Its Problems*. A second edition, retitled *Ideas and Institutions of Western Man*, was published in 1958 and 1960. It is this second edition that we include here. The copy we digitized is from the Gary T. Hawbaker '66 Collection and the marginalia are his.

Authors

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4. Roger Bacon and Medieval Science

Throughout the Middle Ages there was little interest in theoretical science as such. Not since the Greeks had nature been considered a sufficient object in and of itself for most of the study that we would call scientific. The Middle Ages' concern with nature was not its primary concern. The medievalist was interested in nature either as a mirror of the supernatural or as something which could be used in reaching the supernatural. The reappearance of Aristotle's thought and the development of

* Saint Bonaventura, Itinerarium Mentis in Deum (The Journey of the Mind to God), trans. Father James [Edward O'Mahony] as The Franciscan Vision (London: Burns, Oates, and Washbourne, 1937), pp. 9-10, 13-14, 15-16, 18-20, 71-74. Used with permission.

*Studies were either irrelevant or down right dangerous.
If you deal in medicine, do it in religious manner.
Cosmos - thought the earth was formed like the Ark of the Covenant.
Rediscovery of the material findings of the Greeks.
(most important place)*

those practical and technical interests which grew up around the problems of trade and industry demanded a new and different attitude toward the natural world, one quite different from that of previous times.

It was primarily at the University of Oxford that this new attitude toward nature was developed in the thirteenth century. Oxford was the center of Augustinian thought and, through that, of Platonism and Neoplatonism as well. Robert Grosseteste (c. 1168-1253) was the first rector of the Franciscan school at Oxford, founded about 1224. Later he was made bishop of Lincoln, a post which included responsibility for the university. He was therefore in a position to exercise great influence in the organization and direction of Franciscan education. The direction which he gave was unique in its emphasis on the study of nature for its own sake. Since nature was created by a good God, he argued, knowledge of it was not something to be transcended. Such knowledge of nature could, furthermore, lead man to God without the help of any intermediaries. The unity of all knowledge could be asserted also, in contrast to any attempt to divide it into two parts (Averroes) or into two levels (Aquinas). As a result, the role of the individual knower became more significant. Grosseteste learned Greek in order to read in the original not only the newly discovered Aristotle, but many of the Neoplatonic works as well. Thus he was able to spend his time following out the suggestions of Aristotle rather than trying to accommodate them to a Christian framework, as was being done at the University of Paris.

Philosophy & theology are the same thing.
Grosseteste thus began the process of weaving into a new method those factors of reason and experience which were to take the place of the medieval combination of faith and reason. The questions of how and why no longer had to be arranged in a hierarchical order in which the why determined the how. How light traveled was just as important to the scientist and philosopher as why it behaved as it did. It was no longer sufficient to say that light acted the way it did because it was fulfilling its nature or purpose. Furthermore, the person who was concerned with practical and technical matters now could have a set of theoretical tools to use, and his type of work no longer needed to be depreciated as it had been by the Greeks, who had concerned themselves primarily with why questions.

Franciscans loved the world.
Roger Bacon (c. 1214-1294) studied under Grosseteste at Oxford. From there he went to Paris and studied theology. About this time the papacy was making a series of rulings (1210-1245) on Aristotle in order to provide for his accommodation to Christian beliefs. The various attempts at Paris to carry out these rulings convinced Bacon that nothing creative was being done there. He returned to Oxford and became a Franciscan, probably because of his teacher and because he found the atmosphere of that order congenial to his study and experiments. Bacon's philosophical work did not differ radically from the work being done by some of his contemporaries. His unique contribution was to add to his philosophical speculations

Borrowed Galen for their medicine.

*Aristotle (spheres embedded in a crystalline substance - sun, planets)
In science, the way to find truth was to use the authorities. Didn't ask how.
Aristotle was accepted because he was so much better than what they had before.*

Grosseteste's interest in languages and mathematics, as well as his own emphasis on experimentation. He translated and wrote commentaries on Aristotelian and Neoplatonic texts. He compiled Greek and Hebrew grammars to help those who wanted to study the newly discovered materials, as well as the Bible, in the original languages. His work in mathematics emphasized the clarity and importance of the quantitative aspect of things, instead of the qualitative aspect which had hitherto been paramount. His experimentation emphasized the active participation of the scientist, rather than the more passive role suggested by experience in terms of mere inspection.

Bacon's experiments, however, got him into trouble because even scholars in his time were not ready to think of the knowledge of nature as good in and of itself. Such doings smacked of allegiance with the "other powers" or black magic. Bonaventura, then the general of the Franciscan Order, recalled Bacon to Paris and put him under surveillance, forbidding him to publish anything. This restriction continued for some time. But Pope Clement IV (1265-1268), who as papal legate in England had known Bacon's work, countermanded the order and commanded Bacon to summarize his philosophy and send it to Rome. Bacon dashed off three works within eighteen months. The first and most important of these was the Opus Majus (Greater Work, 1268), which was more of a prospectus of what he intended to do than a finished summary of the conclusions he had already reached. This work, like most of his writings, was characterized by a lack of organization, a jerky and unfinished style, and a generally critical attitude toward others. Evidently someone must have intervened in Bacon's behalf because he was allowed to return to Oxford. In 1277 his works, along with those of other writers, were condemned by his order because of "certain suspected novelties," and Bacon was forced to spend most of his remaining years in prison.

Church confined him to his monastery. Thought that he dealt in magic.

In such a situation, and with the loss of his only possible protector (Clement IV had died the same year that Bacon had written his three books), he had become the target of those whom he had so severely criticised. The charges that he was most fond of making focused on the lack of knowledge by his opponents of basic tools such as languages and mathematics. This meant that, in his eyes, the defenders of Christianity were often ignorant or stupid, or both. And the persons at whom he had aimed such charges were to be found through the entire Church. Nevertheless, Bacon had a genuine concern for knowledge and truth, and he did what he could to advance them, in his own way. It was this work he and Grosseteste began, and the new directions they opened up, which went a long way toward making Oxford a center of creative thought during their time.

The Opus Majus is divided into seven parts, one each on the causes of error, philosophy, languages, mathematics, optical science, experimental science, and moral philosophy. The very topics, the order in which they occur, and the amount of space given to each are important because they suggest clearly the

*Attached views of certain churchmen.
Wants to study natural science because it will support the religious life.*

emphasis which Bacon was trying to give to the thought of his time. The parts on mathematics and moral philosophy take up almost two-thirds of the whole book. His approach to all of these topics can be gathered from the opening paragraph of the Opus Majus:

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Like most persons who start with a new approach, Bacon believed that there was much to be cleared away before it would be possible to build the new edifice of knowledge as he envisioned it. Therefore it became important to get rid of those factors which stood in the way of man's grasping the new truth. So Bacon turned immediately to the causes of error. In the paragraph which summarizes these causes it is instructive to note how he deals with the problem of authority, which he sees as one of the obstacles to knowledge:

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* Roger Bacon, Opus Majus, trans. Robert Belle Burke (Philadelphia: University of Pennsylvania Press, 1928), I, 3. Used with permission.

*faulty authority
 not attacking authority, but faulty authority*

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Bacon next pointed out that all true knowledge is one. Since as a medievalist he accepted Christ's teaching as true, this meant that all knowledge was contained within His revelation. And as "the truth of Jesus Christ is in the wisdom of the Scriptures," it is to them that men should turn for the "one perfect wisdom." The means of gaining this knowledge were at first threefold: authority, reason, and experience; but later Bacon added a fourth way, that of moral philosophy. This additional science he believed was better than the other three because it was active rather than speculative. It "instructs man in his relation to God, and to his neighbor, and to himself." The Thomistic hierarchical order of reason leading up to faith with the help of the Church was thus radically altered. Experience was given the place of priority as the source of man's certitude, and activity in the sense of moral action was placed above speculation and contemplation.

Roger Bacon is chiefly known for his introduction of experience and the experimental method into the stream of scientific thought. Experience, as he pointed out, is of two kinds: internal and external. The latter refers to our sensory knowledge of things heavenly (such as the planets) and earthly, and is aided by whatever instruments we can construct, while the former refers to our spiritual knowing. This spiritual knowing is not to be limited to religious matters. It is to be applied to scientific matters as well. And it was for experience in these two senses that Bacon was hopeful. He believed that experience thus interpreted and used would solve many of the problems of his time:]

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* Ibid., I, 4-5.

Experience
 Faith Ext
 God can tell you about the spiritual world as well as the natural world.

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Bacon accepted the medieval world-picture, but within this picture he asked a number of questions different from those which others had been asking. His questions centered about the problems of the relation of reason and experience. His concept of reason was dominated by the measurable or quantitative factors, rather than the purposeful or qualitative factors. And between reason and experience he chose experience as the more important, giving it his own unique interpretation which emphasized the active participation of the experiencer. The priority of this kind of experience emphasized even further Bacon's insistence on a person's moral activity as the application of the scientific principles which he had reached. In ways such as these Bacon became the greatest of the medieval scientists. While his more immediate influence is to be found in the philosophical and religious thought of such other Franciscans as Duns Scotus and William of Occam, his long-term influence is to be found in the much later flowering of Renaissance science.

* Ibid., II, 583-588, 615-616, 627-628.