

## SECONDARY SOURCES

### Why Was Science Backward in the Middle Ages?

Michael Postan

*The scientific advances of the seventeenth century are commonly considered revolutionary because of their contrast with the previous state of science. One way to gain insight into the origins of the seventeenth-century developments is to look at earlier periods to see whether something was missing then that explains this contrast. In the following selection Michael Postan takes this controversial approach, focusing specifically on the lack of scientific incentives in the Middle Ages.*

**CONSIDER:** *Why scientific incentives were lacking in the Middle Ages; the typically medieval traits that discouraged the men of the Middle Ages from scientific exploration; how the concerns and problems faced by Galileo relate to this argument.*

It is generally agreed that the Middle Ages preserved for the use of later times the science of the ancients. Therein lies both the scientific achievement and the scientific failure of the medieval civilization. . . . What the Middle Ages took over they did not very much enrich. Indeed so small was their own contribution that historians of science are apt to regard the Middle Ages as something of a pause. . . .

Thus some advance on planes both purely intellectual and technical there was; yet taken together and placed against the vast panorama of medieval life, or indeed against the achievements of Greek and Hellenistic science in the fourth century B.C., or with the scientific activity of the seventeenth century, all these achievements are bound to appear very poor. Why then this poverty?

To this question many answers can be and have been given. But what most of them boil down to is the absence in medieval life of what I should be inclined to call scientific incentives. Students of science sometimes differ about the true inspiration of scientific progress. Some seek and find it in man's intellectual curiosity, in his desire to understand the workings of nature. Others believe that scientific knowledge grew and still grows out of man's attempts to improve his tools and his methods of production; that, in short, scientific truth is a by-product

of technical progress. I do not want here to take sides in this particular controversy; what I want to suggest is that the Middle Ages were doubly unfortunate in that both the inspirations, the intellectual as well as the practical, failed more or less.

The easiest to account for is the intellectual. The Middle Ages were the age of faith, and to that extent they were unfavourable to scientific speculation. It is not that scientists as such were proscribed. For on the whole the persecution of men for their scientific ideas was very rare: rare because men with dangerous ideas, or indeed with any scientific ideas at all, were themselves very rare; and it is indeed surprising that there were any at all. This does not mean that there were no intellectual giants. All it means is that in an age which was one of faith, men of intellect and spirit found the calls of faith itself—its elucidation, its controversies, and its conquests—a task sufficient to absorb them. To put it simply, they had no time for occupations like science.

In fact they had neither the time nor the inclination. For even if there had been enough men to engage in activities as mundane as science, there would still be very little reason for them to do so. In times when medieval religious dogma stood whole and unshaken the intellectual objects and the methods of science were, to say the least, superfluous. The purpose of scientific enquiry is to build up piecemeal a unified theory of the universe, of its origin and of its working. But in the Middle Ages was that process really necessary? Did not medieval man already possess in God, in the story of Creation and in the doctrine of Omnipotent Will, a complete explanation of how the world came about and of how, by what means and to what purpose, it was being conducted? Why build up in laborious and painstaking mosaic a design, which was already there from the outset, clear and visible to all?

So much for intellectual incentive. The practical incentive was almost equally feeble. Greater understanding of nature could not come from technical improvements, chiefly because technical improvements were so few. Medieval occupations continued for centuries without appreciable change of method. After the great period of initial development, i.e., after the late eleventh century, the routine of medieval farming in the greater part of Europe became as fixed as the landscape itself. In the history of the smithies, the weaving shops, or the potteries, there were occasional periods of innovation, but taking the Middle Ages as a whole technical improvement was very rare and very slow. For this medieval economic policy was largely to blame. In the course of

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centuries economic activities got surrounded with a vast structure of bye-laws and regulations. . . . For bye-laws were as a rule based on the technical methods in existence when they were framed; and once framed they were to stand in the way of all subsequent change.

What is more, so deeply ingrained was the spirit of protection that in every local trade the technical methods were treated as a secret. . . . The men of the Middle Ages were unable to do more than they did because they were lacking in scientific incentive. What they achieved in advancing the practical arts of humanity or in preserving and transmitting ancient learning, they did in so far and as long as they were not typically medieval.

## Early Modern Europe: Motives for the Scientific Revolution

*Sir George Clark*

*By the seventeenth century, certain broad historical developments had set the stage for individuals to make the discoveries we associate with the Scientific Revolution. In addition, these individuals were motivated in ways that medieval people were not and used the new and growing body of techniques, materials, and knowledge to make their discoveries. In the following selection, British historian Sir George Clark, a recognized authority on the seventeenth century, examines some of the motives that led people to engage in scientific work.*

CONSIDER: *The distinctions Clark makes among different people engaged in scientific work; why, more than thirteenth- or fourteenth-century people, these seventeenth-century people had a "disinterested desire to know."*

There were an infinite number of motives which led men to engage in scientific work and to clear the scientific point of view from encumbrances; but we may group together some of the most important under general headings, always remembering that in actual life each of them was compounded with the others. There were economic motives. The Portuguese explorers wanted their new instrument for navigation; the German mine-owners asked questions about metallurgy and about machines for lifting and carrying heavy loads; Italian engineers improved their canals and locks and harbours by applying the principles of hydrostatics; English trading companies employed experts who used new methods of drawing charts. Not far removed from the economic motives were those of the physicians and surgeons, who

revolutionized anatomy and physiology, and did much more good than harm with their new medicines and new operations, though some of them now seem absurd. Like the doctors, the soldiers called science to their aid in designing and aiming artillery or in planning fortifications. But there were other motives far removed from the economic sphere. Jewellers learnt much about precious and semi-precious stones, but so did magicians. Musicians learnt the mathematics of harmony; painters and architects studied light and colour, substances and proportions, not only as craftsmen but as artists. For a number of reasons religion impelled men to scientific study. The most definite and old-established was the desire to reach absolute correctness in calculating the dates for the annual fixed and movable festivals of the Church: it was a pope who presided over the astronomical researchers by which the calendar was reformed in the sixteenth century. Deeper and stronger was the desire to study the wonders of science, and the order which it unravelled in the universe, as manifestations of the Creator's will. This was closer than any of the other motives to the central impulse which actuated them all, the disinterested desire to know.