Christianity and the Scientific Enterprise (I)

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As a student in the 1960's I remember the derision heaped upon Christianity whenever professors or students mentioned it in the classroom. Serious thinkers, it seemed, had replaced mythical Christian doctrine with a far superior, more scientific view of reality. Christianity and Science, were seen, necessarily, as in conflict.

Like most other Christian students of the time, I remained silent, intimidated by the superior knowledge of my mentors. Only several years later did I learn to discern the difference between science, and metaphysical naturalism masquerading as science.

While at Harvard in 1971, I had the good fortune of hearing a visiting lecture series conducted by Professor Rejer Hooykaas, a highly regarded historian of science.

Hooykaas presented, what was to me, a new and provocative argument. The Dutch professor maintained that Christianity had played a vital role in fostering the development of modern science.[1]

I remember my reaction well. As a Christian I wanted to believe him; as a scientist, I was yet skeptical. Hadn't many learned scholars already dismissed Christianity as an incredible intellectual position? Surely Hooykaas was mistaken. Perhaps, I misheard him? Though intrigued, I simply could not accept an argument that ran counter the dominant perspective of my education to that point. I had a Christian heart, but, as yet, a pagan mind.

Nevertheless, Hooykaas' argument fascinated me. I began a reading program to examine his claims. I found other historians and philosophers of science who had recognized that a distinctly Christian world view had inspired early scientific investigation. P. E. Hodgson in reviewing Stanley Jaki's *Science and Creation* said: "Although we seldom recognize it, scientific research requires certain basic beliefs about the order and rationality of matter, and its accessibility to the human mind . . . they came to us in their full force through the Judeo-Christian belief in an omnipotent God, creator and sustainer of all things. In such a world view it becomes sensible to try and understand the world, and this is the fundamental reason science developed as it did in the Middle Ages in Christian Europe, culminating in the brilliant achievements of the seventeenth century."[2] A. N. Whitehead added: "In the first place, there can be no living science unless there is a widespread instinctive conviction in the existence of an *Order Of Things*. And, in particular, of an *Order Of Nature* . . . The inexpugnable belief that every detailed occurrence can be correlated with its antecedents in a perfectly definite manner . . . must come from the medieval insistence on the rationality of God . . . My explanation is that the faith in the possibility of science, generated antecedently to the development of modern scientific theory, is an unconscious derivative from medieval theology."[3] According to Loren Eisley, the origin of modern science was due to: "The sheer act of faith that the universe possessed order and could be interpreted by rational minds . . . The philosophy of experimental science . . . began its discoveries and made use of its method in the faith, not the knowledge, that it was dealing with a rational universe controlled by a Creator who did not act upon whim nor interfere with the forces He had set in operation. The experimental method succeeded beyond man's wildest dreams but the faith that brought it into being owes something to the Christian conception of the nature of God. It is surely one of the curious paradoxes of history that science, which professionally has little to do with faith, owes its origins to an act

of faith that the universe can be rationally interpreted, and that science today is sustained by that assumption."[4]

Perhaps, Christianity had played a greater role in the development of modern science than I had imagined. I wanted to know more. If the Christian concept of creation in the late Middle Ages had motivated scientific inquiry, what could have discouraged it before then? In Europe, at least, the answer was clear.

The dominant view of reality in medieval Europe was essentially Greek, having been coopted by the Church and adapted for Christian service. It offered no motivation to investigate nature by observation and experiment. To the Greeks, reality consisted of forms and essences, not material things. In a world where ideals subordinate material reality observing "what is" becomes less important than reasoning "what ought to be."

The Greeks viewed nature as a living organism imbued with attributes of divinity. Nature was eternal and self-existent, not created. Nature was considered impregnated with final causes, with divine purposes and as such was self revealing. They had only to be apprehended by the mind, and, hence, the significance placed on intuiting axioms and principles from which all particular truths could be derived by deductive reasoning. It followed from this view that Greek knowledge of nature and reality rested on the authority of the "system builders": Euclid in geometry, and Plato and Aristotle in philosophy, etc. As a corollary to the Greek view of truth, sensory experience did not lead to new knowledge. It could only provide illustrations for what was already known through reason. Sensory experience was no more relevant to the Greek science of nature than it was to Euclidean geometry. Therefore Greek science of nature was never experimental. The Greeks' conception of nature and reality led them to distrust the senses.

The medieval world picture inherited from the Greeks was that of a vast hierarchy of beings extending from the deity in the Empyrean heaven at the outer edge of the universe, through a graded series of angels inhabiting the ten concentric crystalline spheres surrounding the central earth, to the levels of men, animals and plants on the earth itself which formed the system's cosmic center.

A sharp qualitative distinction separated the terrestrial and celestial domains of the universe. Not only were the two domains composed of different types of materials, they had different motions. The terrestrial environs consisted of earth, air, fire and water, each with rectilinear motion which had a beginning and an end. The heavenly bodies (above the moon) were composed of a more perfect fifth essence, with eternal circular motion.

According to ancient mechanics, motion was maintained only as long as there was a constantly applied mover. As Butterfield said, "A universe constructed on the mechanics of Aristotle had the door half-way open for spirits already . . . Intelligence had to roll the planetary spheres around."[5]

Medieval Christians were attracted to this Greek picture of the world. An authority-based

hierarchical system with God in his Empyrean above the moon was easy to visualize. The angels mentioned in the Bible could push the planets around-not a hard job since celestial bodies were made of the very light fifth essence. And what could promote the importance of man any better than this Greek view of man at the center of the universe? What psychological power such a view commanded. The conception suggested that man was important in a truly cosmic sense.

The linchpin for this medieval cosmology was Aristotle's view of motion through constantly applied force. But as Butterfield remarked, "It was supremely difficult to escape from the Aristotelian doctrine (of motion) by merely observing things more closely . . . it required a different kind of thinking-cap, a transposition in the mind of the scientist himself."[6]

Late Medieval Christianity supplied just such a transposition of thought through a greater familiarity with Scripture, and an emphasis on the doctrine of creation. Through the advent of the printing press the ideas of

Scripture were much more widely disseminated. People could discover for themselves that both Old and New Testaments regarded the material world as substantial, real and good. A premium was placed on the value and essential trustworthiness of sensory experience, especially in some of the more prominent authority based passages. For example, after Moses reiterated the Ten Commandments, he reminds the people that he is not the authority. The Commandments on stone only solidified the message all the people heard. Says Moses, "Ye heard the voice."[7] The Hebrews had an empirical test for identifying a false prophet.[8] Saint John introduces his First Epistle with an empirical emphasis: "We have heard," "we have seen," "our hands have handled."[9] Jesus said to the doubting ones after His Resurrection, "handle me and see."[10]

For many centuries the Church had openly acknowledged God and His creation. Yet the Medieval view of nature remained essentially Greek. But with greater appreciation for the value of sensory experience within a created universe, more and more people began to think through the implications of belief in creation for their view of nature. According to M. B. Foster; "The modern investigators of nature were the first to take seriously *in their science* the Christian doctrine that nature is created . . ."[11] (Emphasis his).

A created world is contingent upon the will of the Creator, and need not necessarily conform to our *a priori* reasoning. These early scientists emphasized observation using the five senses and experiment, in order to gain new knowledge.

Francis Bacon (1561-1626) maintained that finding new facts required new methods. He set out to reformulate scientific method to give the empirical, inductive process a more central place. Part of the genius of modern empirical science was precisely its use of recurring natural events to provide observable checks on hypotheses. No more would scientists content themselves with speculative reason unchecked by sensory experience.

Bacon also repudiated the Greek search for final causes in nature, which he maintained were inscrutable to man. Therefore, "inquiry into final causes is barren, and like a virgin consecrated to God produces nothing."[12] According to Bacon, the Greeks were simply wrong in their approach to nature because they failed to regard it as created. Creation may have been a mere doctrine in earlier centuries, but to many in the late Middle Ages it supplied the impetus to rethink the ancients' view of the natural world.

Realizing the implications of a created nature opened the door to emphasizing the importance of sensory experience. Empirical science follows directly from belief in a created and therefore contingent nature. Not until the end of the 17th century would Newton reach a new understanding of physical reality. In the meantime, a certain sense of delight and fascination came in exposing cracks in the Aristotelian edifice.

The voyages of discovery in the 15th century not only opened up the New World with new trade routes, they gave empirical proof that ancient knowledge was both incomplete and in many instances wrong. The explorers contradicted the ancients by experience. They, for example, did not fall off the edge of the earth when sailing uncharted waters.

Once a "transposition" in thinking occurred allowing for meaningful experiential checks on ideas, the new empiricists found the universe replete with evidence repudiating the ancient cosmology.

In 1572, a new star appeared in the skies over Europe. The star remained visible for a year and a half, even in the daytime. The star hovered clearly above the moon. Yet, according to established Aristotelian views the heavens were supposed to be changeless. Some of the learned professors refused to acknowledge the new star, calling it an optical illusion. But for everyone else it was clear evidence the Aristotelian system was in deep trouble. What's more, the evidence was empirical.

Another blow to the Aristotelian picture came with the comet of 1577. The comet not only signaled more change in the heavens, but since it must have passed through the supposedly impenetrable crystalline

spheres its appearance contradicted Aristotle's view of the heavens. Many, such as Tycho Brahe, were encouraged to actually deny existence to the crystalline orbs.

Copernicus had taken the bold first step, refashioning the world picture. He put the sun at the center in his system, thus making the earth just one of the planets. Copernicus did keep to circular motion for the planets, however. Later, Kepler would discover on empirical grounds the orbits were elliptical.

By the end of the 17th century Newton had synthesized the work of Copernicus, Tycho Brahe, Kepler, and Galileo by achieving a unity of heaven and earth, with the same substances in the heavens and earth, all equally subject to mathematical analysis. Newton banished the Aristotelian terrestrial/celestial dichotomy that had dominated intellectual thought for nearly two thousand years.

The modern scientific enterprise was now ready to explore by the senses combined with mathematics the structure and ongoing operation of the universe. Christian thought had done much to inspire this new form of inquiry. As for my own study I concur with C. F. Von Weizsacker's conclusion that modern science is a "legacy, I might even have said, a child of Christianity."[13]

REFERENCES & NOTES

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