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Soul of Science: Christian Faith and Natural Philosophy

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Book Review

The Soul of Science: Christian Faith and Natural Philosophy, by Nancy R. Pearcey and Charles B. Thaxton Wheaton, Illinois: Crossway Books, 1994. pb. 298 pp. Reviewed by Russell Maatman, emeritus professor of chemistry

This carefully-structured book describes in Part One the new approach to the history of science, developed since 1950; Part Two explains three of the competing philosophies of the nature of the universe which arose between about 400 BC and 1800 AD and how those philosophies have affected the sciences; Part Three describes the role of mathematics in this story; and Part Four tells how all these things developed into the Second Scientific Revolution during the twentieth century

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This book is the best history of science I have seen. The book ties together most of the important philosophies of the last twenty-four centuries; it describes how three of these philosophies affected the development of the natural sciences; and, best of all, it is clearly written by Christians with a deep insight into the matters they discuss. It is detailed but fascinating. For one who has some interest in this area, it is practically a page-turner.

Part One: The New History of Science

In their first chapter, "An Invented Institution: Christianity and the Scientific Revolution," Pearcey and Thaxton, citing Christians and non-Christians, show that modern science has Christian roots. Although many pre-modern, non-Christian cultures, ranging from the Chinese to the Arabic, knew technology, they did not understand that the world consists of more than appearance and that phenomena obey laws. On the other hand, Christians eventually concluded that creation is precisely what God wanted it to be. Consequently, the use of mathematics, a precise discipline, is justified in natural scientific work. While animists and pantheists hold that God is in the world--the universe is all there is--Christians recognize the Creator-creature distinction. The Bible teaches that nature is good, yet not divine; and so experimental science is called for, not an invasion of the divine. Modern historians often dismiss scientists' theological or religious interests as distractions from their scientific work. In fact, this book shows that religious (sometimes non-Christian) conviction has very often motivated scientific pursuit.

The second chapter, "The History of Science and the Science of History: Contemporary Approaches and Their Intellectual Roots," describes the development of the new understanding of scientific history. Science historians, such as Frances Yates and Thomas Kuhn, came to realize that scientists have been primarily motivated by their nonscientific beliefs--whether it was sun-worship, mysticism, or something else. To understand scientific figures, they had to be contextualized. Thus, some sixteenth and seventeenth century scientists who accepted Copernicus's model--in which the sun, not the earth, lies at the center of the universe--might have been sun worshippers. But there is another view of scientific history--the positivist view.

The positivist view says that scientific history is a morality tale of scientific progress. The Middle Ages was a time of backwardness. The eighteenth-century Enlightenment was a time of revival of ancient wisdom and rationality. Modern science historians who adopt this view look upon the present as a time of triumph; everything before the modern period had no lasting meaning.

The contrary view, held by philosophical idealists, is that scientific history is a succession of new ideas, concepts, and worldviews. Here, as with the positivistic approach, mathematics is seen as an aid to understanding, for example, Newtonian mechanics. Positivists have no problem with this relation. But philosophical idealists see that if such a procedure is not checked, reductionism is the result. Human society becomes one kind of mechanism: materialism reigns. Idealists reject these conclusions by postulating two kinds of science: natural, concerned with universal regularities, causal connections, and objective observation; and human, which is about particular and individual motivations, goals, and beliefs. The historian of

human science attempts to get inside the mind of the subject. Therefore, the idealist sees two levels of reality--material and mental.

The authors see much good in the idealist approach, especially in its insistence on contextualizing historical figures. But, they say, Christians should see a danger. One can be too sensitive to context and fall into historical relativism, historicism, the belief there is no trans-historical truth.

Each of these two understandings of history has tended to counteract the excesses of the other. But that is not enough. The summary at the end of Chapter Two is perhaps the key to the book:

> Old fashioned realism, usually with a positivist flavor, has long been used in arguing that science is the only reliable source of truth. Religion is relegated to the realm of private feeling and experience. The new historicism undermines all claims to transcendent and universal truth--and hence likewise relegates Christianity to the realm of private opinion.
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> Christians need to have an answer for both positions. And though this not a book on apologetics, it serves as a reminder that we all need to be prepared to defend our faith--to be prepared, as Peter says, to give an answer to anyone who asks us. (56)

Part Two: The First Scientific Revolution

The title of the third chapter, "A New 'Thinking Cap': Three Little Sciences and How They Grew," refers to three worldviews that have been in the background of scientific development over the ages. Significantly, this book demonstrates that many scientists have been affected by one or more of these worldviews.

Each of the three worldviews depends on a metaphor. In Aristotelianism, the world is a vast organism. Just as the internal patterns in seeds lead to adults, everything has a "goal" or "final cause," determined by a "Form." A falling rock seeks its final place, the earth; all motion has a purpose. The medieval scholastics were Aristotelians. For them, God is rational and so his final causes are his divine purpose.

The second worldview, neo-Platonism, which arose around 1500, was "a mystical vision of the world as a series of emanations from the Divine Mind" (60). Here the metaphor is art: God, the Creator, is an artisan. The universe consists of a passive element, matter, and an active element, a rational World Soul. As in Aristotelianism, the world is an organism. However, the creative power is not a Form, but rather a spiritual force. Within neo-Platonism, there were two streams of thought --one mathematical, emphasizing astronomy (both Copernicus and Kepler had mystical ideas about the importance of the Sun), the other in medicine, early chemistry, and magnetism. (Both medicine and chemistry emphasized mysterious "active principles"; magnetic attraction between bodies was said to be the consequence of a mysterious force, even when they are not in contact.) The authors conclude for neo-Platonism, "It had great appeal for those who revolted against the arid rationalism of Aristotelianism" (69).

In the third worldview, mechanistic philosophy, the universe is a giant machine. Mathematics is necessary, but not mystical. The authors say, "If Aristotelianism portrayed God as the Great Logician, and neo-Platonism as the Great Magus, then mechanistic philosophy portrayed Him as the Great Mechanical Engineer" (70). Galileo, Descartes, and Hooke were all mechanists who used the idea to show the greatness of God; later, however, as positivism developed, the mechanistic idea was used to counter belief in God. The authors do not insist that every scientist adhered to only one of these worldviews. During the last few centuries--Isaac Newton is an example--many scientists actually succeeded in mixing worldviews.

Part Two ends by exploring the consequences of Newtonian science, showing what this science signifies about how God relates to his world (Chapter Four), and discussing biology, from the sixteenth century through the Darwinian evolution in the nineteenth century--a revolution they term "belated" (Chapter Five).

Part Three: The Rise and Fall of Mathematics

One might expect that the next part of the story would be a description of the Second Scientific Revolution, which began at the end of the nineteenth century. Not so. In the sixth and seventh chapters, Pearcey and Thaxton consider the role of mathematics. Why? They show first that mathematics had become an idol by the end of the eighteenth century. But the development of non-Euclidean geometry caused the idol to fall. In addition, mathematical intuition was shown to

be unreliable. Yet, for some reason, mathematics is eminently successful in advances in several sciences. A Christian understanding of the relations between the sciences will claim that the various aspects of creation are not reducible to other aspects (here they cite Dooyeweerd), and that mathematical analysis has its place in this context.

Only when that idea has been established are the authors ready for the next series of developments.

Part Four: The Second Scientific Revolution

In the last three chapters of the book, Pearcey and Thaxton show the relevance to their subject of the components of the Second Scientific Revolution: Einstein's relativity theory, the development of quantum mechanics, and the discovery of the DNA chemical code of life. It is not possible here to review in detail their discussion of these subjects. But two points must be made. First, they take up many important ideas within each of these parts of the Second Scientific Revolution. Second, in spite of the inherent difficulty in presenting these matters, their explanation of scientific ideas and their relation to philosophy is lucid.

I shall only list some of the relativity questions they discuss (Chapter Eight), all of which they relate to philosophy: Is the speed of light the same in all directions? Is there a unique reference point in the universe (a question that Newton had to consider)? Can time slow down? Can anything move faster than the speed of light in a vacuum? What is the relation between mass and energy? Is there such a thing as curved space?

With respect to quantum mechanics (Chapter Nine), these are some of the subjects they analyze and their conclusions. They take up the wave nature of particles, the uncertainty principle, the question of whether causality is real, the competing understandings of quantum mechanics (including the example of "Schrodinger's cat"), the question of whether reality is created by the observer, the many-worlds hypothesis, and the mysterious transfer of information from quantum particles very far apart.

Scientists differ over the meaning of quantum mechanical principles. This difference arises because of different philosophical starting points. The so-called "Copenhagen interpretation" is based on the inherent uncertainty in measuring simultaneously the values of certain pairs of variables, such as the position and the momentum of a particle. Critics say that it is unwise to base a fundamental understanding of science on one's inability to make accurate measurements. The authors claim that positivism is the starting point for those who accept the Copenhagen interpretation.

> The Copenhagen interpretation is often associated with . . . positivism. The positivist maintains the electron does not really "exist" in the full, common sense notion of the word. But no matter, since science is not about constructing an ontology (a theory of reality) anyway; it is merely about consistently correlating observations. (209)

At this point, Pearcey and Thaxton introduce instrumentalism and realism. They maintain that physicists are often not as comfortable leaving unknown matters at the "measurement level" (the Copenhagen interpretation) as they claim. They cite Roy Clouser, who said that physicists were bothered because at first the neutrino was merely a particle which was hypothesized so that one could make sense of experiments. But physicists worked on the problem until they proved that the neutrino does exist; it is not merely a hypothetical particle.

Philosophical idealists maintain that accepting quantum mechanics leads to a repudiation of materialism. This idea has occasionally been associated with the philosophy of New Age physicists. Thus, one New Age enthusiast maintains that we influence our reality and to a certain extent *create* that reality. Mind rules over matter.

The climax of *Soul* is Chapter Ten, "A Chemical Code: Resolving Historical Controversies." Adherents of the three philosophies–Aristotelianism, neo-Platonism, and mechanism–have for centuries attempted to understand the twin problems of the origin and the complexity of life. Scientific discoveries of the last fifty years have made possible new responses from these schools of thought. However, as we shall see, the authors' understanding of these developments introduces a new idea, one consistent with the Christian understanding of creation.

Two key discoveries concerning living matter were made during the 1940s and 1950s. First, proteins, which determine the function of living

cells, consist of a sequence of amino acids which is *unpredictable*, that is, no known law can predict the sequence. Scientists had hoped for more:

> Biologists were convinced that if they were able "not only to describe these sequences but to pronounce the law by which they assemble, one could declare the secret penetrated," [quoting Nobel-prize winning biologist Jacques Monod] the riddle of life solved.
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> But in 1952 scientists' hopes were dashed. In that year the first description of a complete protein sequence was published. To their shock, biologists discovered that the amino acid sequence followed no apparent law at all. There was virtually no regularity, no pattern. In other words, if a protein were composed of 200 amino acids, and scientists knew the exact order of 199 of them, there was no rule to predict what the last one would be. (223)

Second, the DNA molecule was shown to contain the "code of life": DNA determines the amino acid sequence in proteins. The sequence of amino acids is in turn determined by the sequence of "bases" in DNA, whose symbols are A, T, G, and C. Once again, the sequence is unpredictable. But it is the DNA molecule that is inherited by each generation. So the unpredictable code of life goes back in time to the beginning of life.

Pearcey and Thaxton derive two main conclusions from the DNA revolution. First, each of the three philosophies provides a central insight: the cell's function is based on matter (mechanism); since no physical law determines the base sequence, life is not reducible to physics and chemistry (neo-Platonism); and finally, "...organic structure and development are attributable to an inner intelligible pattern or plan . . ." (245) (Aristotelianism).

Second, life was designed, not derived by chance from nonlife. It is not that design is a fall-back position, one adopted because nothing else seems to work, but rather a position which is the consequence of the growth of knowledge:

> Critics often dismiss appeals to design as merely a temporary measure to bridge current ignorance, to fill gaps in scientific knowledge. In earlier centuries, that may well have been the case at times . . ..
>
> The contemporary design argument does not rest, however, on gaps in our knowledge but rather on the growth in our knowledge due to the revolution in molecular biology. (245)

Why? Because one kind of order in nature resembles the order found in a written message:

> In our experience, a written message is always the product of an intelligent agent; hence we can construct a positive argument that informational structures such as DNA are likewise the result of an intelligent agent. (245)

The long sequence of A's, T's, G's, and C's in what seems at first to be random order in DNA is actually a message, like a written message. Therefore, the very existence of DNA is a message to us that life did not arise by random physical events, but that all life that has ever existed was designed. Life cannot be traced to some other part of creation. (Pearcey presents this argument on a more popular level in a recent article: "DNA: The Message in the Message," *First Things*, 64, June/July, 1996; pp. 13-14.)

At the end of the book Pearcey and Thaxton return to their main theme:

> A scientific overview of scientific practice such as we have offered in this book reveals clearly that science and scholarship are never carried out in a philosophical and religious vacuum. The Christian religion, hand in hand with various philosophical outlooks, has motivated, sanctioned, and shaped large portions of the Western scientific heritage. Modern Christians ought to drink deeply at the well of historical precedent. If we do, we will never feel intimidated by positivists and others who deny that religion has any role in genuine scholarship. In the broad scope of history, that claim is itself a temporary aberration--a mere blip on the screen, already beginning to fade. (248)