Book Reviews

ERICH ROBERT PAUL. *Science, Religion, and Mormon Cosmology.* Urbana: University of Illinois Press, 1992. xi; 272 pp. 24 illustrations, glossary, bibliography, index. $29.95.

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In the morning of the Restoration, Joseph Smith recorded that when he and Sidney Rigdon had retranslated John 5:29,

> while we meditated upon these things, the Lord touched the eyes of our understandings and they were opened. . . . And we beheld the glory of the Son, on the right hand of the Father. . . . And now, after the many testimonies which have been given of him, this is the testimony, last of all, which we give of him: That he lives! For we saw him, even on the right hand of God, and we heard the voice bearing record that he is the Only Begotten of the Father—That by him, and through him, and of him, the worlds are and were created, and the inhabitants thereof are begotten sons and daughters unto God. (D&C 76:19–24)

Thus the Prophet Joseph adumbrated the themes which constitute the distinctive Mormon cosmology: a myriad of worlds, the overarching redemptive mission of Jesus Christ, and the simultaneous spiritual and intellectual communication of that vision from God to his children.

This cosmological vision was further illuminated in the book of Moses, as God declared that "worlds without number have I created . . . for mine own purpose; and by the Son I created them, which is mine Only Begotten" (Moses 1:33). To fulfill their roles in this cosmic drama of redemption, Latter-day Saints were enjoined to instruct one another "in theory, in principle, in doctrine, in the law of the gospel, in all things that pertain unto the kingdom of God, that are expedient for you to understand; Of things both in heaven and in the earth, and under the earth; things which have been, things which are, things which must shortly come to pass" (D&C 88:78–79).

By the Nauvoo period, the foundation had been laid for a remarkable, complex set of spiritual and intellectual relationships between Latter-day Saint theology and cosmology and between Mormon religious practice and secular scientific and technological progress.

Erich Robert Paul's *Science, Religion, and Mormon Cosmology* presents a carefully crafted analysis of this relationship and an assessment of its impact on Latter-day Saint thought and theology. An unabashedly scholarly history, it is replete with learned footnotes and includes an excellent bibliographical essay. It may be a sign of the times that it was written by a Latter-day Saint professor at an institution of higher learning on the *eastern* slope of the *Appalachians*. It may also be portentous that the book was published by the university press of a state whence the Mormons were driven out at gunpoint in the winter of 1846—a press now boasting one of the longest book lists on Mormon history. Plainly bound, but graced by illustrations ranging from medieval cosmological schemes to the Hertzsprung-Russell diagram of stellar evolution, the book is a substantial contribution to the growing library of books on Mormon intellectual history.

The issues raised by the complex relationships among science, LDS theology, and its revealed cosmology have philosophical, theological, sociological, and scientific ramifications. Paul has chosen to analyze these issues in a historical perspective, permitting the reader to see the cultural settings in which the relationships of science and religion have been shaped. This approach is critical to understanding the perceived conflicts between science and Latter-day Saint theology. It may also help us eventually to recognize that the dilemma is more artificial than real, stemming from an incomplete comprehension of the character of science and of theology as intellectual and spiritual enterprises.

The book is divided into two sections, "Issues in Science and Religion" and "Mormonism and Cosmology." In the first, Paul outlines the development of modern science—with a heavy emphasis on physics[1]—as an intellectual, social, and cultural enterprise and traces the genealogy of the conflict model of the relationship between science and religion. He is especially successful in showing the tentative, revisionist character of modern science and its inability to

root out of its systematic approach to nature all hedges, intuitions, and purely aesthetic model constructions. Here, for example, is the restive Newton, revising his speculations on the character of light in order to excise unwanted Hermetic tendencies inherited from alchemy—only to replace them by the universal law of gravitation, according to it the same place of pride once accorded magic.

In this chapter, Paul also introduces modern cosmological views of the age and origin of the universe, the current "Big Bang" model of the universe, and the idea of the plurality of worlds. The plurality of worlds is a major theme which occupied many in the eighteenth and nineteenth centuries, and from the Church's earliest days captured the imagination of many Latter-day Saint thinkers and theologians. In an engaging *reprise* in the penultimate chapter, Paul gives an overview of the current Search for Extraterrestrial Intelligence (SETI), a quest of truly epic potential for making contact with other life-forms who might be the inhabitants of those "worlds without number" which Moses and the Prophet Joseph saw in vision (Moses 1:33; see also D&C 76:24; 93:10).

The third chapter, "The Nature of Modern Science," presents the scientific enterprise as "an extraordinarily dynamic process of engaging the world in dialogue with itself and the human mind" (61). For most Latter-day Saints, raised on a diet of imprecise statements about "true science" and "true religion" as allies in a prettified "search for truth" which leads along a magical yellow-brick road to "true reality," this chapter is likely to administer a healthy shock. Comparing the methods and metaphysical foundations of science and theology rather than their objectives, Paul finds fascinating similarities and points of contact as well as the familiar differences. Indeed, the "warfare model" for the relationship between science and theology may be as much a cultural hangover from the late nineteenth century as Darwin's "Nature red in tooth and claw."[2] Latter-day Saints through most of the nineteenth century seemed to feel no particular sense of conflict, and there is a substantial basis for a synergistic relationship.[3]

The thematic heart of the book is its second section, in which Paul focuses on Mormon cosmology as it relates both to the physical and the transcendent universe. Here Paul has ranged broadly to

portray the influence of contemporaneous religious and scientific thought on individual LDS thinkers and leaders. He begins, of course, with Joseph Smith, using the idea of plurality of worlds as connective tissue in limning the Prophet's far-reaching view of God, man, and the universe. Brigham Young's fascination with astronomical topics is briefly described (114–16)—and one sees enough to wish for a more detailed exposition in some future work. A subsequent chapter is devoted to Orson Pratt's unified atomistic and cosmological theories based on theological and scientific considerations. Firmly in the grip of the nineteenth-century mechanical view of the universe, Pratt is nevertheless as modern as P. A. M. Dirac in understanding the central role of theory—as opposed to Baconian induction—as the primary determinant of meaning in scientific thought.[4] The general themes of governing worlds, a plurality of worlds, and creation as a process of organizing preexistent materials were all in place at an early stage of Church history, helped along to a significant degree by both Pratt brothers as well as by Brigham Young. For the remainder of the nineteenth century, speculation on these topics found a favorable place in the sermons of Church leaders and in such publications as the *Millennial Star,* the *Improvement Era,* and even the *Young Woman's Journal.*

The drive for education and the practical bent for using science and technology to improve the material lot of Zion sent many young Latter-day Saints "back east" to graduate school at the end of the nineteenth century. In a chapter on "Science in the Church Hierarchy," Paul traces the ways in which the optimism about science and technology typical of the period shaped several men whose careers in science were cut short by calls to ecclesiastical service—Richard R. Lyman, Joseph F. Merrill, James E. Talmage and John A. Widtsoe of the Council of the Twelve Apostles. These men—whose professional acquaintance with science allowed them to interpret sympathetically its discoveries and inner workings to members of the Church—were largely responsible for the moderate attitude toward science which prevailed until the 1940s and 1950s. The most prolific exemplar of this Mormon scientism, however, was B. H. Roberts, who was without formal scientific training but was a man of keen and adventuresome insight. In Paul's study, Elders Roberts and Talmage emerge

primarily as the exponents of LDS cosmology; Elders Widtsoe and Merrill, on the other hand, are seen to focus on the rational character of science, viewed as a search for truth, and on the potential for productive *individual* synthesis of scientific thought and religious faith.

Cosmology, as the study of the structure and dynamics of the universe as a physical system, posed little threat to Latter-day Saint theology. However, toward the end of the nineteenth century, the focus of scientific discussion shifted to evolution and cosmogony, the study of the *origins* of humankind and of the universe. These are by nature much thornier for the Church as an institution and for its members, because here the models and the language used by science are necessarily different from those usually invoked by theologians. As Paul points out, even during this era of Mormon scientism, a conservative, indeed a reactionary, trend was developing, led at first by Joseph Fielding Smith and later by Bruce R. McConkie. Paul has coined the term "neoliteralism" to describe their literal interpretation of the creation narratives in the books of Genesis, Moses, and Abraham in preference to evolutionary theory and standard "old-earth" geological models of creation. If we are to judge by the statements quoted by Paul, it appears that among the Twelve, this neoliteralist position now predominates, even though the official positions taken by the First Presidency seem not to explicitly reject scientific points of view.

Much as widespread speculation on the plurality of worlds in the nineteenth century was a part of the intellectual universe of Orson Pratt, current attitudes toward science among Church authorities mirror a fundamental ambivalence about science now found in the general population. Fully half of all Americans no longer believe that the theory of evolution correctly describes the origin of humankind—though it is arguable that the version of evolution in which they do not believe bears scant resemblance to current scientific theories or models. Given the recondite vocabulary of current scientific debates about origins, exemplified by such interdisciplinary arcana as biophysical geochemistry, it is unlikely that anyone in the leading councils of the Church will provide interpretive discussion like that found in Elder Widtsoe's *A Rational Theology*.[5] The tremendous strains of a truly worldwide Church on its leadership

leave precious little leisure for such things. Instead, the increasing number of Mormon scientists who now do leading-edge science in these areas must learn to explain their work from an LDS point of view to a curious Church public.

The tragedy of the neoliteralists—inside the Church and out—is their evident determination to freeze both theology and science at the current, or even at a previous, stage of understanding. Thus they have failed to comprehend that the relentless self-critical drive of astrophysics, and the revolutionary partnership of physics and biology, have completely changed the terms of the debate over theories of creation, evolution, and the origins of man and the universe. The feared and imagined Darwinist enemy is no longer inside the gates; he probably does not even exist. Current discussions of biological science are full of words like "self-organization," "smart genes," and "anti-chaos," all hinting at purpose, self-organization, and other plainly ontological and teleological concepts which scientists as a rule dislike but which the scientific evidence no longer permits them to avoid.[6] Paul's study of the neoliteralist reaction to science deserves a sequel in which the evolution debate is set in its current cultural and scientific context, just as he has juxtaposed the discussion of plurality of worlds and cosmogony with the current search for extraterrestrial intelligence.

If and when such a sequel is written, it ought also to incorporate an analysis of two more recent developments in cosmogony and evolution. One is the impact of nonlinear dynamics[7] on our understanding of human freedom. Our approach to this seminal problem in both theology and the behavioral sciences must change because the nonlinear version of Newtonian mechanics is forcing scientists to give up the traditional link between deterministic (i.e., lawful) behavior and predictability.[8] The other is the so-called "dark-matter" or "missing mass" problem—the discovery that the visible matter on which all present cosmologies are based may amount to as little as five percent of the total mass of the universe.[9] Should this turn out to be the case, our present cosmological theories and the underlying physics would have to be viewed merely as special cases of far more general and still undiscovered laws.

One crucial aspect of the scientific enterprise figures only marginally in Paul's analysis: the mechanisms of consensus which

shape the character of theory and experimentation in the scientific community. Science is not just an activity carried out by curious individuals determined to ferret out the "stubborn, irreducible facts of nature."[10] It is, more importantly, an ongoing conversation in search of truth, carried out under mutually agreed rules of art and sustained by a community subscribing to a common faith in that larger purpose.[11] The dreary repetition of such statements as "there is no conflict between 'true science' and 'true religion'" tends to obscure this central truth for many Latter-day Saints who are certain that the end of science is to reveal the grand secret of How It All Happened, or to write down the Wave Equation of the Universe. But science—defined as the activity in which scientists engage—depends in critical, indispensable ways on scientific consensus for the validation of knowledge. What Paul describes as "mainstream science" is, in fact, the *only* science. Those who refuse to submit to the discipline of critical review within the scientific community may have training or advanced degrees in science, but they are only spudding in their own gardens, not practicing any science worthy of the name.

Paul notes, for example, that the Church Education System refers in its institute classroom materials to "reputable scientists" who are said to endorse "young-earth" theories. But science is "public knowledge,"[12] based on consensus, and no such position is accepted at the present time anywhere in the scientific community. "Young-earth" theories are, of course, sustained by conservative evangelical Christians under the guise of creationism—but it is not clear that Latter-day Saint theology should be moved to a position having so much in common with the larger world view of "Creation Science" just to save the appearances.

As Paul suggests, the debate over science and religion also suffers from the pervasive confusion of technology with science. Technology and science are now more intimately intertwined with each other than ever in the past and are generally viewed by the public as inseparable. However, their motivations, sources of knowledge, and cultural impact are vastly different. Technology, with its practical bent for doing what can and must be done, stands apart from science, just as religion often stands apart from theology.

The lensmakers of Delft, operating without the benefit (or hindrance!) of theories of optical physics, gave to Galileo and Newton the instruments with which they dismantled the cosmology of the medieval church. Indeed, technology is to science in many ways what religion is to theology. Technology tempers science, forces it out of comfortable paradigms, creates societal justification for the pursuit of science and simultaneously provides science with new tools. Technology not only has a certain kinship with religion, but indeed can be serviceable to it. President Spencer W. Kimball was fond of observing that God revealed the paraphernalia of modern technology to man to bring temporal and spiritual blessings to his children.[13] This intermingling of motivations and benefits may well be a principal source of the ambivalent attitude toward science now common inside and outside the Church.

Thus, though this book is unlikely to be the last word on the complex interactions between science, theology, and Latter-day Saint religion, there can be no question that Erich Robert Paul has brought new clarity and depth to the issues. Most Mormon presentations of the science and religion debate—such as Henry Eyring's *Reflections of a Scientist*[14] or the more recent essays by Robert Fletcher, Victor Cline, and Carlfred Broderick in *A Thoughtful Faith*[15]—turn on the ways individuals resolve the dilemmas of personal belief while living in an overwhelmingly secular and scientific culture. While these are unquestionably crucial issues for individuals, such writings give little guidance for evaluating our stance vis á vis science as a cultural and intellectual enterprise. By setting the science-religion debate in its historical context, Paul has presented us with a well-marked guidebook for understanding how we got to where we are.

Where we take the discussion from this point, however, is problematical. What William James called that "passion for unity and smoothness [which] is in some minds so insatiate"[16] operated in the Middle Ages to claim for religion the role of supreme arbiter of the fundamental questions of life. In the nineteenth century, the claim of conventional theologies for an imperial stewardship over human thought and culture was ceded to science. But that grant of cultural power has brought no peace and precious little insight into the

human condition. Writing at the high-water mark of America's post–World War II enthusiasm for science, Jacques Barzun observed that

> it is not just because science is unfixed, tentative, often backtracking, and always unorganized that it is unfit for monarchical rule. Far more disqualifying is its irrelevance in a myriad situations that are of immediate moment to living beings. The facts that science collects, the models it invents, the relations it measures, are in those situations meaningless or disorienting. To live in society, which is to say in the relations of love, work, conversation, parenthood, or conviviality calls for judgments incommensurable with those of scientific fact and truth.[17]

Nevertheless, science is an important part of our culture, and its inseparable companion, technology, provides material benefits we cannot and, at least in some cases, should not do without.

It appears that the root of our conflict is that, in theology as in science, we can know and prophesy only in part until "that which is perfect is come" (1 Cor. 13:10). However, where either science or theology is uncertain, Latter-day Saints have no reason to resort to conflict, let alone to warfare. As Paul points out, Mormon theology makes man and woman necessary, rather than contingent, partners with God in the creation and redemption of the universe. Hence the search for meaning in either science or theology, when pursued in faith with our divinely-ordained intellectual and spiritual endowment, must necessarily be pleasing to God. Given a religion predicated on the belief that God "will yet reveal many great and important things" (A of F 9) and given a science in which the ground shifts constantly to incorporate new discoveries and models, it scarcely makes sense to construct a Maginot Line between the two.

NOTES

[1] One minor problem occurs in Paul's explanations of quantum theory and relativity: relativity is indeed a field theory, but field theory is not opposed to quantum theory. Quantum field theories have shaped cosmology through the theory of elementary particles and the "Big Bang," as well as providing the basis for modern condensed matter physics.

[2] The two books which shaped the attitudes of individuals toward discussions of science and religion were both products of the Darwin era: John William Draper's

History of the Conflict between Religion and Science, 8th ed. (New York: Appleton, 1877); and Andrew Dickson White's *History of the Warfare of Science with Theology in Christendom* (New York: Appleton, 1930).

[3] I have presented arguments for this symbiotic point of view in "Religion and Science: A Symbiosis," *Dialogue* 8, nos. 3/4 (1973): 23–40.

[4] For a popular description of Dirac's insights, see Tyler Wasson, ed., *Nobel Prize Winners* (New York: Wilson, 1987), 263.

[5] John A. Widstoe, *A Rational Theology* (Salt Lake City: Deseret News Press, 1915).

[6] See, for example, Stuart A. Kaufmann, "Anti-Chaos and Adaptation," *Scientific American* 265 (August 1991): 78–84; and Tim Beardsley, "Smart Genes," *Scientific American* 265 (August 1991): 86–95.

[7] Nonlinear dynamics is the technical term for what has come to be known in the popular press as "chaos theory." Useful references are James Gleick's *Chaos: Making of a New Science* (New York: Viking, 1987) for the general reader, and J. M. T. Thompson and H. B. Stewart, *Nonlinear Dynamics and Chaos: Geometrical Methods for Engineers and Scientists* (New York: Wiley, 1986) for the specialist.

[8] All of this should, in turn, force a complete reinterpretation of many of the mechanistically inspired theories of the social sciences which have made their models so obnoxious in the minds of many contemporary Mormons.

[9] "Visible" as used here refers to what astronomers call "electromagnetically visible" matter—that is, matter which can be seen by radiation in any part of the electromagnetic spectrum ranging from radio- and microwaves through infrared to visible, ultraviolet, and ultimately x-ray energies.

[10] This phrase was coined by Norwood Russell Hanson, *Patterns of Discovery* (Cambridge: Cambridge University Press, 1958), chapter 1.

[11] Michael Polanyi, *The Tacit Dimension* (Gloucester: Peter Smith, 1983), chapter 3.

[12] The term was coined by the English physicist, John Ziman, in his book *Public Knowledge: An Essay Concerning the Social Dimension of Science* (London: Cambridge University Press, 1968).

[13] For example, Spencer W. Kimball, "To the Uttermost Parts of the Earth," *Ensign* 9 (July 1979): 2–9.

[14] Essays by Robert Fletcher, Victor Cline, and Carlfred Broderick, in *A Thoughtful Faith,* ed. Philip L. Barlow (Centerville, Utah: Canon, 1986).

[15] Henry Eyring, *Reflections of a Scientist* (Salt Lake City: Deseret Book, 1983).

[16] William James, *Principles of Psychology,* vol 1. (Cambridge: Harvard University Press, 1981), 165.

[17] Jacques Barzun, *Science: The Glorious Entertainment* (New York: Harper and Row, 1964), 287-88.