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Journal of Faith and Science Exchange

2012-08-21

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SCIENCE AND THEOLOGY: A WORKING SYNTHESIS

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Theologians and scientists, working independently, have provided worldviews that lead to questions about the meaning of existence and human life. When these disciplines interact, opportunity exists for more profound insight. Two individuals, Johannes Kepler in the sixteenth century and Pierre Teilhard de Chardin in the twentieth, attempted theological reconstructions based on revolutionary theories of their eras. Informed by a fierce faith in God and a rigorous pursuit of truth derived from the scientific method, their attempts at synthesizing these fields led to results that were unexpected, even unwanted. Yet they provide lessons in the present age for interpretations of the new discoveries and the responsibility of humankind to play an active role in the modern creation story.

Science and Theology—the Synthesis

In a mysterious and complex world, theologians and scientists deeply devoted to the implications of the meaning of human existence offer explanations related to an understanding of creation. Yet humans, as a thinking species, have come to realize that there are no simple answers. Nature gives up her secrets slowly, and insights that prove the most fruitful need the cross-fertilization of both disciplines in order to arrive at a more complete world-view.

Two revolutionary developments in the field of modern science have profoundly affected an understanding of the cosmic question of human existence. In 1543, Nicholas Copernicus published *De Revolutionibus*, in which he introduced to the modern world the concept that the sun, not the earth, was at the center of the then-known universe. Three centuries later, Charles Darwin published *On the Origin of Species* in 1859, and *Descent of Man* in 1871, which proposed natural selection as the process that produced all living organisms, including human beings.

These developments released a vast amount of intellectual energy. Out of the turmoil of intense debate came a deeper under-

standing of the science involved, more profound theological insights into the secrets of creation, and a fuller appreciation for the complexity of existence. Two individuals, Johannes Kepler in the sixteenth century and Pierre Teilhard de Chardin in the twentieth, combined a fierce devotion to God with a profound appreciation of the wonders of nature to attempt to understand the natural world.

The Failed Seminarian and the New Science

Johannes Kepler was born in 1571, 28 years after the publication of Copernicus' *De Revolutionibus*. The sun's central location in the universe was not taken seriously until, as a young professor of mathematics, Kepler became one of the first to espouse this theory in the 1590s as a real description of nature.

As a Lutheran seminarian, Kepler developed a reputation for his brilliance as a mathematician and for his propensity to accept radical views on topics as diverse as the structure of the universe and the value of Calvinism.¹ He was surprised, only a few weeks prior to ordination, to be recommended by his seminary professors for a position teaching mathematics and natural philosophy. Though this recommendation was probably motivated by

the desire to keep his radical views hidden within the academic community, he reluctantly accepted and his career as a scientist began.

To Kepler, the fact that the sun was the center of the universe made perfect sense. While he found it to be a mathematically simpler means to understand the movement of the planets, he saw greater importance in the fact that the "sun must be the center of the world because he is the symbol of God the Father, the source of light and heat, the generator of the force which drives the planets in their orbits."² So for this "metaphysical reason,"³ to use Kepler's words, the new and radical Copernican idea became the operating principle of his theology.

The idea for his cosmology is said to have struck him in the middle

of a classroom lecture. Already known for his mumbling and confusing lecture style, his words must have thoroughly perplexed his students that day! What was intuitively obvious to Kepler was a cosmology based on three known concepts of natural theology. First, he was in complete agreement with the Aristotelian idea that planetary orbits must be perfect circles to reflect God's perfection. Second, for his "metaphysical reason", the sun was the center of the cosmos. Third, was his startling new observation of the uncanny agreement between the six known planets and the geometrical anomaly that there are only five possible perfect solids—three-dimensional objects whose surfaces are all identical geometric planes (the cube, for example). This concept was crucial to his cosmology, because a perfect solid has the unique property of allowing a sphere, the three-dimensional extension of a circular planetary orbit, to surround it such that each of the solid's corners touch the circumscribed sphere. A complete set of perfect solids and their circumscribed spheres, scaled so as to nest tightly inside one another, yielded a ratio of sizes that Kepler hoped to prove exactly matched the ratio of the sizes

of the planetary orbits. Perfect circles separated by the geometry of perfect solids: Never had the language of the cosmos—the common language of Creator and man—spoken so clearly of God's perfection.

Kepler's cosmology was firmly rooted in his ardent pursuit of theology and based on the best and most modern principles of the science of the day. The mind of the Creator could be read as that of a Perfect Geometer.

For theology, God's creation was seen to be more complicated and subtle than indicated by the artificial perfection of earlier models. The benefit of the synergy of these two fields to science was even more dramatic. It yielded no less than the first giant building block in the foundation of modern physics.

God's power and light emanated from the center of the cosmos through the Holy Spirit. God's planetary subjects traveled in perfect circles as required by their perfection. The separation of the planets and periods of their orbits, could be determined by the geometry of the five perfect solids regulating the intervals between the six planets. All that remained to unleash this great revelation on to the world was the mathematical proof of its validity, a relatively simple exercise because it described a perfect geometrical view of God's secrets.

Kepler devoted the rest of his life to trying to prove this implausible system. But his rigorous approach to the mathematics of the problem led to one of the seminal discoveries in the development of modern science. Through years of tedious calculations using continuously more precise observations of the orbit of Mars, Kepler became convinced that the foundations of his theology—circular perfection of the planetary objects, unvarying orbital speeds, and ultimately his cosmic geometry of perfect solids—could no longer be valid. The language of the cosmos spoke, but the words were as unexpected as they were unwelcome.

His calculations of the actual geometry of planetary mechanics became known as Kepler's three laws. They provided the foundation for Newtonian physics and, in the present day, are still used as the basis for calculations of velocities and orbits of spacecraft in their journeys through the solar system.

Kepler's cosmology was the first fusion of theology and modern science. The energy created by the interaction of the two disciplines in the fertile mind of one individual formed the basis for great advances in both fields. For theology, God's creation was seen to be more complicated and subtle than indicated by the artificial perfection of earlier models. Yet theology survived intact. It was not a challenge to the mind of the Creator that this complexity existed, but a challenge instead to the inflexible human conceptualizations of God. The benefit of the synergy of these two fields to science was even more dramatic. It yielded no less than the first giant building block in the foundation of modern physics.

The Priest and the Paleontologist: Evolution and the Risen Christ

The introduction of Darwin's work, *On the Descent of Man*, in 1879, was a serious challenge, in some minds, to the foundations of Western theology. In fact, Darwin delayed publication of any manuscript relating to evolution and natural selection for twenty-three years after his return from the voyage of discovery aboard the *H.M.S. Beagle*, because he felt that all objections must be met before it could see the light of public scrutiny. In this fact alone, theology made a significant contribution to the cohesiveness of the new proposal.

By the early twentieth century, Darwinian evolution had established a firm foothold in the scientific community. Transformation through increasing complexity was given greater status as a fundamental property of the universe in the 1920s by the discovery that galaxies were moving apart. This discovery supported the idea that the universe itself was not static but was, in fact, evolving.

It was into this environment that a young Jesuit priest graduated with a doctorate in paleontology from the Sorbonne in Paris. Pierre Teilhard de Chardin was a devout practitioner of Catholicism and a mystic. In addition, his life as a scientist was engaged in the study of fossils and the evolution of life forms into new species. Like Kepler, he had one foot rooted in a need to understand the workings of God and the other in the rigorous search for empirical truth defined by the scientific method.

An Evolution-based Theology

Teilhard identified two trends as contrary and detrimental to traditional Christianity. First, doctrine was stagnating and leading the faithful away from the Mother Church.⁴ He was convinced that his contributions to theology would serve as the source of new enthusiasm and vitality necessary to lead enlightened membership back to the faith community. The second trend was that the scientifically-driven changes in an understanding of the natural world could be viewed as a significant indication of God's work of creation. This new understanding was not to be ignored, because it showed definitively how God works and, more important, it showed God's plans for the created world. Teilhard explained the guiding force that brings these views into a working thesis of the universe and humankind's place in it as none other than the nemesis of orthodoxy: evolution. To Teilhard, evolution is the new lens through which humankind understands its place and the place of Christ in the cosmos. Evolution is "a prime property of experiential reality."⁵

Teilhard was careful to add that evolution does not exist as an independent force in the universe. This transformation is infused with the spirit of Christ as the true power of the process:

[I]f a Christ is to be completely acceptable as an object of worship, he must be presented as the saviour of the idea and reality of evolution.⁶

The adaptations proposed by Teilhard were sufficiently radical to result in his being replaced as a professor of science at the *Institut Catholique*. This incident, ironically reminis-

cent of Kepler's experience, led to the start of his geological work in the Far East.⁷ As further punishment, the Vatican prohibited the publication of his theological writings until after his death.

For Teilhard, evolution is the key to understanding the God of creation. Gradual transformation requires a continuous sequence of events built on the foundation laid by previous events. "To create a soul, God must first create a world."⁸ Teilhard identifies the life of the universe as involving three phases. The first phase, well documented, is the development of the geosphere: all matter in the universe from subatomic particle to super-galaxy. The next level, the development of the biosphere, includes the evolution of life. *Homo sapiens* and its ability to observe, reason, and interact is the first step in the development of the highest level, the noosphere. Though consciousness exists as a separate spiritual layer in the universe,⁹ humankind fills the unique role as the focal point of this consciousness. God's plan will be fully realized when a spiritual and intellectual unity exists among all sentient beings into a unified spiritual whole. When this result is achieved after billions of years of further evolution, the cosmos will have reached the Omega Point, a place of "supreme confluence and unity,"¹⁰ and the end point of the process.

This spirit of Christ, which has existed since the beginning of time, is the life force of Teilhard's theology. It is not driving the evolutionary force from behind, in deterministic fashion, but leading ahead and allowing transformation to converge towards the Omega Point. Teilhard describes Christ in this path-finding role as the "God of the Ahead,"¹¹ distinct from the "God of the Above."¹²

If we assume Christ to be established ...at this remarkable cosmic point of all convergence, he then immediately becomes co-extensive with the vastness of space...as though at a universal crossroad....¹³

Christ's existence as role model for personal behavior becomes less important than that of unifier and synthesizer of the total spirit.

"Christ the Redeemer has become Christ the Evolver."¹⁴

The need to reconcile Christ the Evolver with the traditional Christ the Redeemer has implications for the practice of Christianity. Teilhard describes as no less than a "religious crisis... that there exists an...antagonism between the God of supernatural revelation on one side, and the great mysterious figure of the universe on the other."¹⁵ Humankind is no accident of the cosmos. It could have come in other forms, but the direction of evolution has given it the active responsibility, as the first sentient organism, to cross the bridge from biosphere to noosphere. Humanity has a position of privilege in that it can look to the past and envision the future. But every symbol of Christianity, in Teilhard's world, is a call to active participation in promoting the new world order.

The New Synthesis

Kepler formulated his theories on the workings of creation in a worldview dominated by a fixed traditional theology. Three hundred years later, the pendulum swung to the opposite extreme. Teilhard attempted to revitalize traditional theology by injecting it into a worldview dominated by a radical new understanding of creation produced by science. He and Kepler strove for the same result: a comprehensive cosmic view that incorporated the painstaking observations of the workings of nature and a persistent devotion to a personal and intercessionary God.

Both men fell short of their objective. Kepler's theology did not withstand the scrutiny of his own dogged search for material truth. Though Teilhard benefited from a more comprehensive understanding of the processes of nature, he failed to account for the future material evolution of the universe. Future development of the Whole would continue to take place in the environment of nature. Teilhard made no effort to account for this material future.

Neither man's efforts were in vain. Each pursued the study of nature as divine revelation and gave further meaning to human rationality. A study of science had been the foun-

dation of this understanding. But the theology expressed, while not inconsistent with the science, offered a plan of action for human involvement.

Teilhard's synthesis of science and religion, and Kepler's before him, demonstrate that a deeper understanding of creation can lead to fresh insight into the meaning of human existence and its relationship with God. The refinements provided by both, and the discoveries that spawned them, have led to a far more profound and sophisticated view of the Creator than existed five hundred years ago. What lessons can be carried forward to reconstruct this synthesis and accommodate future discoveries?

A more fruitful understanding of the nature of God can be determined by a study of creation, though the answers may be unexpected, even unwelcome if they do not fit an overly rigid theological construction. There is greater insight waiting to be sorted out. Humankind is only beginning to struggle with concepts described by *Astronomy Magazine* columnist Bob Berman as "Bubbleland," concepts that are "beyond the present reach of

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science."¹⁶ He describes self-contradictory concepts such as "the world before the Big Bang," zero-mass particles, and quantum weirdness, as more suggestive of human ignorance than of reality. These concepts are not clearly defined and offer much opportunity for further inquiry. The constructs that result may yet alter the view so far conceived. It will be incumbent on the thinking species to assess these ideas, as Kepler did, and find truth

in the possible further reconstructions that result.

The Omega Point theory of physicist Frank Tipler is an example. He attempts to use theological concepts similar to those of Teilhard to predict the future of the universe and stipulate a sequence of events leading to Omega in the final singularity of a universe collapsed back on itself.¹⁷ In Teilhardian fashion, all matter and intelligence will have merged into a "c-boundary," which "signals the end of spacetime, but lies just outside it."¹⁸ Tipler's theory is consistent with one probable outcome of cosmology and with the current state of knowledge in information theory and cybernetics. While it advances a theology that is pluralistic, it offers less than satisfying guidance for the meaning and value of human life. But it is added to the sphere of discussion as grounds for productive debate.

Possibilities for relevant theologies abound in light of the information provided by a scientific study of the natural world. Process theologians use the evolving universe to develop metaphors of God as wisdom and persuasion. Liberation and feminist theologians include treatment of the environment with the human condition to propose an activist theology based on community and cooperative interaction.

As scientists speculate on the nature of reality, great opportunities—and responsibility—exist for theologians to contribute to a unified understanding of the cosmos. A theology that will play a relevant role as guide through the nature of reality will be consistent with these new explorations and will offer a sound explanation of the awesome privilege of being human. In addition, it will offer a means of evaluating the new technologies that will inevitably result. A fruitful exploration by scientists and theologians in the spirit of

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Kepler and Teilhard, each profession acknowledging the contribution of the other, will use hard-gained knowledge in both fields to provide new meaning for human existence in the cosmos.

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2. Ibid., p. 261.
3. Ibid.
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5. Teilhard de Chardin, "Christology and Evolution, p. 175.
6. Ibid., p. 78.
7. Teilhard de Chardin, "Note On Some Possible Historical Representations," p. 55.
8. Teilhard de Chardin, "On The Notion of Creative Transformation," p. 32.
9. Teilhard de Chardin, "Fall, Redemption, and Geocentrism," p. 43.
10. Teilhard de Chardin, "Christ The Evolver," p. 143.
11. Teilhard de Chardin, "The Christian Phenomenon," p. 206.
12. Ibid.
13. Teilhard de Chardin, "Christology and Evolution," pp. 87-88.
14. Teilhard de Chardin, "Christianity and Evolution, p. 181.
15. Teilhard de Chardin, "Pantheism and Christianity," p. 65.
16. Berman, p. 106.
17. Tipler, p. 322.
18. Ibid.

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