

Science and Religion

The dialogue between science and religion is an essential component in thinking through the ontological, moral, and rational unity of the world, a unity to which any theology affirming creation *ex nihilo* must be committed. This unity may not lie within the reach of human comprehension but it is rooted in the divine nature and disclosed through the bringing together of the various parts of human knowledge into a coherent picture. In this most general sense, the history of science and religion within Christian theology is as old as the idea of divine creation.

Thomas Aquinas (1225-1274) thematized the compatibility of scientific knowledge and religious knowledge through his distinction between knowledge from nature and knowledge from revelation, arguing that divine creation guarantees their consistency. For example, Aristotle's argument that the world cannot have had a beginning threatens a devastating conflict between natural knowledge and revealed theology's assertion that the world had a beginning. According to Aquinas, however, Aristotle's reasoning is faulty, and in fact the question cannot be decided on the basis of natural reason, so the harmony between reason and revelation is made manifest.

The advent of modern science placed enormous strain on this widespread medieval confidence in the compatibility of natural and revealed knowledge. Aquinas would recommend scrupulous parsing of disciplinary territory and careful analysis of arguments in each case of apparent conflict, so as to manifest the underlying harmony. In practice this proved difficult to accomplish, for two reasons. On the one hand, the essential content of revealed knowledge appears to be a matter of sophisticated interpretation that shifts with time and place because criteria for plausibility are dynamic and faith itself is rooted in the particular life-worlds of Christian people in all times and places. On the other hand, scientific knowledge has a complex

epistemological heritage within the intricacies of scientific practice and it changes rapidly, routinely opening up lines of compatibility with theological assertions that one seemed permanently closed, and *vice versa*.

A classic illustration of this double-sided hermeneutical problem is the conflict surrounding Galileo Galilei (1564-1642). The natural philosopher of Galileo's day combined what later would be distinguished as scientist, philosopher, and theologian. Aristotle's natural philosophy was dominant and generally felt to be satisfying because it made good sense of experience, produced metaphysically robust explanations of causal phenomena, and could be rendered consistent with the Catholic Church's teachings. Galileo triggered an extended battle with other natural philosophers by neglecting or abandoning the task of giving metaphysical explanations for causal phenomena. Rather, he concentrated on careful observation and measurement of these phenomena (such as a ball rolling down an inclined plane) and then gave a mathematical description of those measurements, leaving the causal explanations and metaphysical implications to others. His enemies thought Galileo cavalierly ignored a crucial task of natural philosophy. Yet Galileo produced a long series of observations and mathematical models of phenomena that appeared to contradict his colleagues' assumptions, including the equal acceleration of falling objects regardless of mass, the rough surface of the moon, and other moons in the solar system with circular motions that are not centered on the Earth. He accused them of refusing to observe and measure so as to test their hypotheses about the natural world because they were ensnared in the beautiful but fanciful world of speculative metaphysics. And he often did this through ridicule and sharp rhetoric. Meanwhile, Galileo never satisfied them as to why he simply ignored the traditional task of metaphysical explanation. Their question was fair: What use is a mathematical description of motion if we do not know how motion works?

The Catholic Church was on all sides of this issue. Everyone was Catholic, from Galileo and the other natural philosophers to those appointed by the Church to evaluate the controversies that Galileo caused. In fact, it is likely that Galileo's motivations in regard to the Church were those of a faithful Catholic trying to prevent the Church from falling prey to the false speculations of natural philosophers. To its credit, Church officials were highly tolerant of Galileo, in part because he was well connected, but also because exceptionally intelligent and perceptive people such as Cardinal Bellarmine could see that Galileo had a point. Despite Galileo's warnings and Bellarmine's astuteness, however, the Catholic Church did fall prey to the error of defending a proposition in the domain of natural reason on the basis of alleged revelation. Galileo triggered this reaction by publicly humiliating his friend, Pope Urban VII, in *Dialogue Concerning the Two Chief World Systems* (1632), ironically published with Church approval. On instructions from the Inquisition, Galileo was supposed to give even-handed treatment to the sun-centered and the earth-centered views of the planetary system, and so Galileo set the book up as a dialogue. But he assigned the earth-centered view to the character of Simplicius, in some cases using the Pope's own words, and he made Simplicius often stumble in his reasoning. To make matters worse, Galileo wrote the book not in Latin but in the language of the ordinary people, which gave a public dimension to this subtle humiliation of the Pope.

It is not surprising that the Church acted under these circumstances, though it gave Galileo an exceptionally light sentence, permitting him to live under house arrest for the remaining few years of his life. Less well connected and less well regarded people were not so fortunate. Just a few years earlier, in 1600, Giordano Bruno was burned at the stake for heresy. Most of the charges were strictly theological in Bruno's case, but one charge concerned his portrayal of the physical cosmos as infinite in space and time, with many scattered stars—something like we

picture this today. Here again the Church failed to discriminate properly between the domain of natural knowledge and the domain of revealed knowledge. In both Bruno's and Galileo's cases, the Church's task of discrimination was made more difficult by its attempt to honor the Bible, which presumes an ancient cosmology that eventually proved to be quite mistaken. If the Church had possessed greater wisdom, the cosmology-related charge against Bruno would have been dropped, and Galileo would have been punished only for disrespect rather than for disobeying a previous order not to advocate the heliocentric model of our planetary system. In these cases and others, however, it is still possible to discern that the Church was endeavoring to uphold its conviction about the consistency of natural and revealed knowledge. It just failed to navigate the hermeneutical complexities with complete success. Protestants such as Martin Luther and Philipp Melanchthon displayed even less wisdom in rejecting heliocentrism. Whereas Bellarmine regarded the biblical depiction of Joshua commanding the sun to stand still at Gibeon (Joshua 10:12-13) with commendable caution in light of the heliocentric hypothesis, Luther and Melanchthon simply took this passage as proof that heliocentrism is mistaken.

Galileo's more limited approach to natural philosophy proved prescient. Scientists eventually confined themselves to observing and measuring phenomena, and testing hypothetical theories about those phenomena. Mathematics became increasingly important in many domains of science, as it had been for Galileo and other ground-breaking scientists. It functioned as a language that relates imaginative theoretical models to the quantifiable aspects of phenomena of interest. It also served as a means of relating one scientific theory to another, which helped to promote the impression that science offers an integrated interpretation of the observable and measurable aspects of the natural world. Meanwhile, scientists left metaphysical explanations for the phenomena they studied to philosophers. Of course, scientists often speculated about the

wider metaphysical significance of their theories (e.g. I. Newton) but increasingly they regarded this as a pastime that needed to be kept separate from their work as scientists. A classic example of this is the twentieth-century theory of quantum mechanics. It has a beautiful mathematical formalism that supports exceptionally accurate predictions of a host of sub-atomic phenomena. Yet the meaning of the formalism in the philosophical worlds of ontology and epistemology is quite obscure. In fact, there are several philosophically contradictory interpretations of the formalism that are empirically equivalent, including interpretations that support strict physical determinism and those that place an irreducible indeterminism at the root of natural processes.

Theology tends to interact with science by means of such philosophical (ontological, epistemological, ethical) interpretations of scientific theories. Where this appears not to be the case, it is typically because the hermeneutical role of the mediating discipline is not noticed. For example, scientists do not always notice when they wield a philosophical interpretation of scientific theories to support a theological conclusion (e.g. R. Dawkins uses a philosophical interpretation of evolutionary theory to argue that a personal divine being does not exist without fully acknowledging the role of philosophical interpretation) or a social policy conclusion (e.g. scientists debating the teaching of evolution in high schools are sometimes quite philosophically naïve in the way they describe the indisputable status of the theory of evolution). Similarly, theologians sometimes speak as if science has direct implications for theology (e.g. Pope Pius XII's unofficial 1951 address to the Pontifical Academy of Sciences alludes to the big bang in arguing that then-contemporary cosmology confirms the finite age of the universe).

Such dialogical missteps, added to the realization that science-theology dialogue often requires philosophical mediation and the much older belief that faith and reason are compatible, jointly suggest that science and theology have their own native domains. Perhaps they should

humbly confine themselves to those domains, honoring each other from a safe distance. This two- domains view can be rationalized in terms of the different language styles of theology and science, in terms of the different life-worlds of scientists and theologians, or simply as the basic condition for courteous coexistence. There have been enough instances of conflict traceable to domain transgression to inspire many theologians and scientists to advocate the two-domains approach (e.g. S.J. Gould). Yet the efforts of many theologians and scientists to draw the right borderline between the domains of science and theology show that the two-domains policy resolves nothing by itself. Peaceable co-existence and manifestation of the underlying unity of faith and reason depend on navigating hermeneutical complexities over and over again in each new situation. This may well require reassessing traditional theological assertions, reevaluating biblical authority, or rethinking the philosophical implications of scientific theories.

The science-religion dialogue has generated numerous classifications of ways to understand itself in theory (e.g. I. Barbour) and in practice (e.g. T. Peters). Comprehensive theories of rationality that purport to explain the very possibility of meaningful dialogue (e.g. B. Lonergan, W. van Huyssteen) are relatively rare by comparison but important for understanding the significance of the dialogue from a theological point of view. If creation really does possess a rational and ontological unity despite the distinctive disciplinary perspectives that guide our understanding, then a satisfying theory of rationality must both accommodate disciplinary particularities and illuminate the underlying harmony. The diversity and intricacy of the science-religion dialogue in the contemporary period shows that this is a difficult task.

A sampling of some the prominent themes in the science-religion dialogue illustrates this diversity. First, the relation between scientific views of the physical cosmos and theological ideas of creation and providence has been important because of dramatic scientific discoveries

during the modern period (e.g. **biological** evolution, big-bang cosmology). The leading theological question is where to locate divine creativity and providential action. Should God's creation be linked with the big bang, with a hypothetical multiverse within which there is a vast number of big bangs, with the primordial laws of nature that govern the emergence of the universe, or elsewhere? Similarly, can God's providential care be linked with the predation and extinction that is the condition for the emergence of life or should it be confined to the laws of nature that define the system within which complex beings such as ourselves can emerge? One line in this debate presses toward deism whereby the autonomous world operates independently and God sets it in motion and sustains it (e.g. P. Davies), with corresponding difficulties for interpreting divine providence and religious experience. Another line articulates full divine involvement commensurate with traditional claims about divine omnipresence and continuous creation (e.g. J. Polkinghorne), with corresponding difficulties for interpreting the moral character of God.

Second, Christian theology has been active in the ecological movement since the second half of the twentieth century. Most basically, this has involved identifying resources to support environmental protection from within the same tradition that offered little resistance to the ill-effects of industrialization and colonial exploitation. This kind of theological rationalization for environmental activism has been warmly welcomed even by scientists with no sympathy for Christian beliefs because of its usefulness (e.g. E.O. Wilson). More profoundly, some theologians have sought to reassess traditional ideas of God in search of a spiritual basis for a vision of nature and human civilization that is ecologically responsible and sustainable (e.g. J. Cobb, S. McFague).

Third, Christian theologians have played key interpretative roles in debates over bioethics (e.g. R. Cole-Turner, T. Shannon). Technologies that traditional natural-law approaches might have deemed impossible are now commonplace and more arrive every year that affect human reproduction, medical treatment, genetic prediction of disease, end-of-life care, and the germ lines of human beings and other species. Theologians have been relatively ineffective in reaching consensus about these technological developments but they have played important roles in explaining the theological basis for each sub-tradition's point of view, and sometimes in helping Christian communities arrive at an official position.

Fourth, cognitive psychology and the neurosciences have had a significant impact on Christian theological interpretations of human nature. At one level this discussion concerns the ontology of persons and whether the human soul is an emergent property of complex physical systems (e.g. N. Murphy). At another level the issue is about the moral nature of human beings. The theological significance of the fact that both selfishness and altruism evolved in the human species is one complex question (e.g. S. Post). Another is science's revelation of unsuspected causal intricacy in the development and operations of the human brain. Previously strictly moral judgments must now accommodate information about genetic and environmental factors that place human behavioral difficulties at least as much in the domain of medicine and psychotherapy. This has striking implications for legal systems (e.g. L. Tancredi) and also for theological interpretations of themes such as divine law and judgment and human healing and sanctification (e.g. K.S. Seybold).

I. Barbour, *Religion and Science* (1997); J.H. Brooke, *Science and Religion* (1991); P. Clayton, *God and Contemporary Science* (1997); A. Peacocke, *Theology for a Scientific Age* (1993); T. Peters, *Science, Theology, and Ethics* (2001); H. Rolston, *Environmental Ethics* (1989).

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