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Introduction: Rethinking Science and Religion

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Science without religion is lame, religion without science is blind.
—Albert Einstein

Prolegomenon: “Science”? “Religion”?

Is science without religion lame, and religion without science blind? Einstein’s famous statement¹ finds many supporters: here, at last, the conflict between science and religion is laid to rest, and both are upheld for their different yet mutually supporting roles. Others, however, may be less enthusiastic with Einstein’s proposition that religion is necessary to give legs to science, or science to give eyes to religion. For them, the issue is indeed one of science versus religion, reason versus faith, realism versus idealism, matter versus spirit. Still others may wish Einstein had made the stronger statement that science and religion are parallel quests revealing similar truths. To this group of people, declaring science and religion to be separate but equal is to miss their metaphysical common ground. Reminiscent of “Goldilocks and the Three Bears,” then, some may find Einstein’s position to be just right, while others may find it to be too hot or too cold.

This volume reconsiders these and other major positions on the relationship between science and religion. But a fundamental question underlies any such position: what is meant by science and by religion? Einstein’s argument is illustrative. In the same text where the above statement is found, Einstein defines science as “the century-

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old endeavor to bring together by means of systematic thought the perceptible phenomena of this world into as thoroughgoing an association as possible.”² Yet, he argues, “The scientific method can teach us nothing else beyond how facts are related to, and conditioned by, each other. . . . [K]nowledge of what is does not open the door directly to what should be.”³ And this is how Einstein conveniently defines religion, stating “To make clear these fundamental ends and valuations, and to set them fast in the emotional life of the individual, seems to me precisely the most important function which religion has to perform in the social life of man.”⁴

The literature on defining science and religion is immense and not amenable to concise review—certainly not within the space of this introduction. As one would imagine, there are lumpers and splitters, those who discover a unity to science or to religion and those who stridently dispute such a unity. What is important here is to note that Einstein’s argument is utterly dependent on his definitions: if, indeed, science and religion are defined as unitary (science is about this; religion is about that) and complementary (in this case, science is about facts, religion about values, and the two need each other), then there is no other possible way to imagine their relationship.

Definitions of science and religion are inextricably bound to any position one encounters concerning the relationship between science and religion. There is no such thing as some neutral point of beginning from which we may compare alternative arguments, as these arguments necessarily concern not only the relationship between science and religion, but their essential identity as well. We thus hope the fresh perspectives we offer in this volume on the relationship between science and religion will reinvigorate discussion over fundamental questions concerning the nature of science and of religion—questions that go far beyond their relevance here.

Science and Religion: One or Two?

The range of possible positions regarding the relationship between science and religion has been formalized by Ian G. Barbour in a well-known typology.⁵ Barbour identifies four types: Conflict, Independence, Dialogue, and Integration. Conflict theorists would find Einstein’s position too “hot” (i.e., too supportive of science/religion compatibility). Einstein’s position itself may be read as Independence, with science and religion understood as separate enterprises, or stronger interpretations of this position may lead to Dialogue, examining the mutual dependence between science and religion. Lastly, Integration theorists would read Einstein as much too “cold” for their tastes, which desire an essential similarity between science and religion.

Though useful, Barbour’s typology has been criticized as static, overgeneralized, and ahistoric—a limitation of many typologies.⁶ One could per-

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haps improve upon Barbour by moving toward greater complexity, as does Willem Drees in a ninefold schema;⁷ but I would like to suggest an even simpler typology into which many positions on science and religion could be placed. It derives from Barbour's typology as well as the work of Harold Oliver,⁸ and focuses not on science and religion per se., but rather the assumed domains onto which they map.

There are two underlying models for many positions on science and religion: a one-domain, or monistic, model, and a two-domain, or dualistic, model. In the one-domain model, science and religion either vie for the same turf (following Barbour's Conflict type and Oliver's Conflict Theory) or work harmoniously in the same arena (Barbour's Integration type). In the two-domain model, science and religion occupy distant worlds (Barbour's Independence type, or Oliver's Compartment Theory) or close but different worlds (Barbour's Dialogue type); in both cases science and religion are at peace because they are somewhat separable. Let us call the one-domain models conflict and convergent monism, respectively, and the two-domain model conciliatory dualism.

The story often begins with conflict monism, a battle between science and religion built on the one-domain model. Here science and religion play the role of dueling outlaws in a Wild West town that's not big enough for the both of 'em. Conflict monism has its modern roots in late-nineteenth-century publications such as J. W. Draper's 1875 *History of the Conflict between Religion and Science* and A. D. White's 1895 *History of the Warfare of Science with Theology in Christendom*,⁹ yet retains continued popularity among those who fear religion is treading on the toes of science or vice versa. Perhaps the best contemporary example, at least in the case of the United States, involves competing accounts of the origin of life: the evolution versus creation controversy.¹⁰ Here, as the caricature goes, theistic and naturalistic accounts are inevitably at odds over how living things—especially humans—came to be.

The broader issue in many accounts of conflict monism is the validity of religion in its claims on reality. Consider the biologists Paul and Anne Ehrlich, in their book *Betrayal of Science and Reason*:

In the United States today, a surprising number of people believe in horoscopes, "out-of-body" experiences, the magical powers of crystals, and visitors from space. Our society is also witnessing a resurgence of creationism. . . . Such beliefs, and the activities they inspire, threaten rational scientific inquiry by rejecting the methods and procedures . . . that characterize modern science.¹¹

Yet conflict monism can equally challenge the validity of science and scientific rationalism. Consider the statement of Prince Charles:

The idea that there is a sacred trust between mankind and our Creator, under which we accept a duty of stewardship for the earth, has

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been an important feature of most religious and spiritual thought throughout the ages. . . . It is only recently that this guiding principle has become smothered by almost impenetrable layers of scientific rationalism. . . . If literally nothing is held sacred anymore—because it is considered synonymous with superstition or in some other way “irrational”—what is there to prevent us treating our entire world as some “great laboratory of life” with potentially disastrous long term consequences?¹²

How can it be that the Ehrlichs strongly support rationalism and Prince Charles strongly opposes it? Perhaps the issue is not with rationalism per se, but rather with the domain onto which rationalism is applied. Prince Charles’ speech addressed sustainable development and the fate of the earth; but his primary concern was with our attitudes toward nature, and where we should turn for moral guidance in these matters. Perhaps Prince Charles would agree that science and scientific rationalism are fine methods to get at the structure of the objective world; but when we get to our subjective selves, our values and attitudes, then science is ill-equipped to help, and can in fact hurt if it displaces spirituality as a moral resource. In its claims on the objective world, science is fine, but in the domain of the self, religion and spirituality are crucial. We hear in Prince Charles’ assertion the broader, well-known religious critique of secularism and its threat to the soul.

If this is how the battle is perceived, if religion treads on science’s domain when it makes pronouncements on the nature of reality, whereas science treads on religion’s domain when it becomes the preeminent guide for the self, then there is a ready solution to conflict monism: separate the two. It is thus in the context of conflict monism that Einstein’s statement makes sense. His characterization of science, religion, and their relationship is a familiar one, built on a quasi-metaphysical distinction between the continent of Facts on the one hand, which point directly to reality, and the continent of Values on the other, which point back to the self. This is precisely the path taken by the late Harvard paleontologist Stephen Jay Gould, who in his book *Rocks of Ages* argues that science and religion are noble, valid, but essentially different paths distinguished by their respective fact- and value-based domains of authority, which Gould terms “non-overlapping magisteria” or NOMA.¹³ (The title of his book comes from the old joke: science tells us about the ages of rocks; religion tells us about the Rock of Ages.)

Einstein and Gould represent conciliatory dualism, an attempt to reconcile science and religion, to grant them both validity, by casting each into its own separable domain. Let the scientists deal with facts about the world; let the religious leaders help us to clarify the values by which we live in the world. Perhaps they need each other (as Einstein admits more forthrightly than Gould), but they are certainly different.

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But there is another approach that repudiates both conflict monism and conciliatory dualism by seeking a solution where science and religion, reality and self, come into harmony. Indeed, perhaps the biggest business in science and religion today builds on the theme of convergent monism, where science and religion offer coherent claims on reality and the self. Consider new-age thinkers such as Ken Wilber, who promises in his book *The Marriage of Sense and Soul: Integrating Science and Religion*:

From the depths of a Kosmos too miraculous to believe, from the heights of a universe too wondrous to worship, from the insides of an astonishment that has no boundaries, an answer begins to suggest itself, and whispers to us lightly. If we listen very carefully, from within this infinite wonder, perhaps we can hear the gentle promise that, in the very heart of the Kosmos itself, both science and religion will be there together to welcome us home.¹⁴

Wilber's cosmology reconnects matter and spirit—and hence, the realities to which science and religion point—in a manner hearkening back to the Great Chain of Being.¹⁵ Other convergence accounts have a more mainstream ring and respectability, but at minimum suggest a belief in the unity of science and religion in their claims on reality, if not a new vision of self. Mathematical physicist Paul Davies introduces his *Mind of God*, for instance, by stating:

Through my scientific work I have come to believe more and more strongly that the physical universe is put together with an ingenuity so astonishing that I cannot accept it merely as a brute fact. There must, it seems to me, be a deeper level of explanation. Whether one wishes to call that deeper level “God” is a matter of taste and definition.¹⁶

Convergent monism has captured the attention of many people looking for a resolution to the cognitive dissonance of conflict monism without separating science from religion as in conciliatory dualism. A brief glance at science and religion titles in bookstores suggests the huge popularity of this convergence message. In my hometown of Santa Barbara, a recurrent lecture series called Mind/Supermind features many of these authors: one recent series ended with Fritjof Capra of *Tao of Physics* fame.¹⁷

This approach to science and religion thus elides the distinction between the universe and the self: here, science speaks to the soul, and religion speaks of deeper truths about reality. In this sense, convergent monism is a thoroughgoing monism, whereas conflict monism is a sort of inattentive monism, one that has placed the whole battle onto the domain of either the object or the subject, but never both.

How are we to make sense of monistic and dualistic treatments of science and religion? What should be apparent after brief reflection is that both offer

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a naïve taxonomy of the underlying domains upon which science and religion are founded. Consider dualism: can the domains of science and religion be so easily separated? Anyone who tries to assert that facts and values are readily separable, and that science has nothing to do with the latter and religion nothing to do with the former, is conjuring purified apparitions of both. So, then, is monism vindicated? Only by a similar simplification of science and religion—in this case with unificationist aspirations—and by the creation of a single domain stretching from you to the universe, one so vast as to be arguably meaningless. Perhaps, indeed, the universe and the self are one at some level, but only by squinting out all the important and interesting details.

Enter the Human Experience

With only two entities under consideration, it is perhaps understandable that science and religion are often discussed in terms of monistic or dualistic models: after all, the basic logic of comparison between two entities is sameness and difference, one or two. Yet, what if a third element is added? This is, analogically, the very problem Henri Poincaré entertains in the classic statement of chaos in celestial mechanics.¹⁸ The relative orbits of two celestial bodies—say, the Earth and the Sun—are stable and the solution predictable (indeed, it was completely worked out centuries ago by Newton). When a third body is introduced (e.g., the classic problem of Jupiter, Earth, and the Sun), however, the situation is shown by Poincaré to be enormously complex and mathematically insoluble. Poincaré, a genius in several mathematical and scientific fields, had entered a contest sponsored by the king of Sweden that began in 1887, in which one question necessitated demonstrating that the solar system's dynamic stability could be proven by means of Newtonian mechanics. Poincaré's failure to do so nonetheless so impressed the judges that he was declared the winner: what Poincaré effectively demonstrated was the impossibility of solving the three-body problem, or in other words the inevitability of chaotic behavior. The well-known characteristic of sensitivity to initial conditions in chaotic systems can be attributed to Poincaré; as he explains, "It may happen that small differences in the initial conditions produce very great ones in the final phenomena. A small error in the former will produce an enormous error in the latter. Prediction becomes impossible, and we have the fortuitous phenomenon."¹⁹

So, working from a strictly Newtonian perspective, one can obtain mathematical chaos—a complex, beautiful, but unpredictable phenomenon—simply by moving from two to three celestial bodies. Such may be the result of considering the human experience in treatments of science and religion. By the human experience, we mean the unfolding of human life in its historical, political, geographical, psychological, and other contexts. Just as the three-body

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problem grants each of its entities *de facto* validity in exerting a “pull” on the others, so in considering science, religion, and the human experience we intend to take all three realms seriously and respectfully, and not simply collapse one onto another to produce some ready Newtonian solution. One could, for instance, conceive of science as pointing to objective reality, but religion as simply a human construct, a projection (as Freud would have it) of childhood neurosis, something made-up. In this case, there are but two bodies: science (understood more or less as knowledge of reality) and the human experience, of which religion is a part. Or, we could even further simplify the system, and declare both science and religion to be human constructs, citing history as ample evidence that both have feet of clay. Then we have a system of one body: the human experience.

But we are not seeking a simple solution in bringing the human experience into the science-and-religion equation: we are seeking something more faithful to life. The three-body-problem analogy implies that the realities toward which science and religion point, and the forms of human experience in which they are grounded, may all interrelate in complex and unpredictable ways. Too often, science and religion become a shorthand for physical reality and for God (or the sacred), as if science were some transparent window onto reality and religion a similarly transparent window onto the realm of the sacred. The opposite position is to understand science and religion in terms of their human face. Both have some justification. Yet how can science and religion be a part of the human experience, yet transcend it? This is the central question considered in different ways by this volume’s essays.

The Essays

These essays derive from a research lecture series that took place at UC Santa Barbara between January 2001 and May 2003, with generous funding provided by the John Templeton Foundation. They have been grouped into four thematic sections: Theory, Cosmos, Life, and Mind. Theory concerns broad ways of understanding science and religion; Cosmos considers the ultimate nature of the universe; Life entertains the question of origins so prominent in science and religion discussion; and Mind concerns topics running from religious concepts to human consciousness. These four themes represent much of the current literature on science and religion; yet the perspective of the human experience casts each in a new light.

Theory

The Theory section begins with a brilliant essay by Bruno Latour, which aims to subvert typical assumptions about science and religion as a necessary pref-

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ace to rethinking their relationship. Latour likens religion to love as a performative (versus merely referential) manner of speech that brings immediacy, not the distant God as is generally assumed; and he similarly flips general assumptions about science upside down in arguing that science is concerned not with the immediate stuff of life but with largely invisible worlds (the supposed domain of religion). Latour then addresses representation in science and religion, suggesting that science is not a simplistic matter of corresponding words to world, but an unending process of cascading chains of transformation by which matter becomes form. Latour also critiques the traditional notion of religious images as pointing toward the invisible and not being sacred in themselves. Rather, he argues that religious images work to distort and confuse general notions of direct apprehension of the distant and invisible, thus placing a reemphasis on the immediate, a (literal) re-presentation. In both cases, then, Latour argues for a dynamic notion of truth, cautioning against “freeze-framing” truth as either a static world of scientific reference or a static incarnation of the sacred in historical time.

The next essay, by Thomas Carlson, similarly questions common assumptions about science and religion. Carlson notes the intimate and practically inseparable connection between science and technology, arguing how “techno-science” is involved in producing not only knowledge of the world but also a sense of what it means to be human. This sense of humanness involves a connection of techno-science, and modernity in general, with the mystical realm usually associated with religion. Techno-science generally is understood precisely in the opposite sense as eliminating ignorance, of knowing (and mastering) all. Building upon the work of Weber and Heidegger, Carlson argues that this “will to mastery” is framed in the positing of an objective reality that the knowing subject masters, based on the certainty of the knowing subject as framed historically in Protestant theology and the philosophy of Descartes. Yet, given the inaccessibility of much of the actual process of techno-science to most people, there is an important component of faith: Carlson cites the argument of Derrida that any authority is hence grounded on a “mystical foundation.” Indeed, similar to mystical systems of old, the aim of techno-science becomes to transcend time and space and attain a position of omniscience, much in the way that navigating the World Wide Web renders one everywhere and nowhere at once. Carlson emphasizes that this act of human self-creation is based on an essential un-knowing of oneself, in particular one’s destiny. The result, via our participation in increasingly powerful networks of knowledge and power, is a type of omniscience without comprehension of where we are heading—a sense of the human experience as conveying not finitude but infinitude, instability.

Where Latour and Carlson took science and religion as their point of departure, Hilary Putnam’s essay focuses on the dimension of human experi-

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ence. Putnam seeks to dispense with the shallow notion of experience (including, but not limited to, religious experience) as something utterly reduced to sensations. He does so by carefully comparing the shallow Humean conception of experience, based on impressions or “pictures” formed on the senses, to the Kantian conception, which combines perception and conceptual ideas in a continuous self which fuses these experiences over time. Putnam then extends this Kantian notion of experience to discuss Kant’s aesthetic argument concerning “indeterminate concepts,” those that both involve and extend the creative imagination. Putnam applies Kant’s treatment of indeterminacy to morality as a means of suggesting its relevance to religious experience. He also extends this notion to science, arguing that the technological and aesthetic process of scientific knowledge production is far more complex than a sense-data view would suggest. Putnam then returns to religious experience, specifically the problem of skepticism, which may seem to result from a rejection of immediate sense-impression and an embrace of indeterminacy. He discusses several responses, ultimately siding with the existentialist approach, which stresses a responsibility to live (and hence make choices) despite what cannot be fully proven following “reasonable” means. Putnam concludes by noting the symmetry between atheists and fundamentalists, because for both groups religious belief (or nonbelief) is obvious; this obviousness, in his mind, betrays a simplistic notion of experience, again pointing to the centrality of rethinking human experience prior to deep consideration of science and religion.

In the final essay of this section, Jim Proctor considers science and religion as major institutions of epistemic and moral authority. Proctor argues that authority is at the heart of most discussions related to science and religion, given the ways these discussions generally compare their authoritative claims. Both the ideological means by which scientific and religious authority are constructed and defended, and the different patterns of trust in authority among ordinary individuals and communities, are relevant to understanding science and religion. In the former case, a common tendency is to elide the humanness of scientific and religious institutions and base their authority on some notion of objectivity or transparency, such that science points directly to reality, and religion to God (or the sacred). This claim, however, ignores the ways both are fully enmeshed in the human experience. In the case of peoples’ differing trust of authority, Proctor refers to his recent survey and interviews of adult Americans regarding their trust in four major domains of authority: science, religion, nature, and the state. The results suggest two primary models of authority that Americans decide whether or not to trust: theocracy, with God (religion) as the ultimate authority and the state as the mediating human authority; and ecology, with nature as the ultimate authority and science as the mediating human authority. Though problems exist in both of these models, Proctor notes that some measure of trust in authority is unavoidable—and, as representing a

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commitment to life, potentially beneficial as well. Proctor ultimately argues that both commitment and critique must be present if trust in authority is to lead to meaningful epistemological and moral guidance in our lives.

Cosmos

The section on Cosmos begins with an essay by Jeffrey Russell. Russell commences by distinguishing between universe and cosmos, the human understanding of the universe. Cosmos etymologically implies order and purpose, in contrast to chaos; to Russell, both science and religion are concerned with cosmos or meaning. Yet cosmos, Russell claims, is seriously fragmented in modern times; he proposes an exploration of history and metaphor to heal cosmos. The history of concepts allows one a cultural memory to consider worldviews or notions of cosmos distant in space and time. Augustine understood that God's creation of the universe was a creation of meaning (cosmos), as well as substance, and biblical truths were understood in a symbolic as well as overt sense. Dante's *Paradiso* culminated this rich tradition of cosmos; yet by the sixteenth century religious reformation led to an overemphasis on literal truth and a deemphasis on symbolism. Thus began the decline of meaningful cosmos, of conflation of cosmos with universe, suggested in the infamous Galileo affair. With the growth of a concept of science in the seventeenth and eighteenth centuries, the reduction of cosmos to universe was secured. The loss of cosmos can, however, be healed by considering the importance of metaphor. Metaphor opens up, versus closing down, the meaning of reality. Russell introduces the term "metaphorical ontology" to suggest how deep meanings of things—cosmos—can be suggested in language, and claims that the proper language of religion is thus metaphor. The healing of cosmos will be aided by metaphorical ontology as it is enacted through religion, science, and other vistas on the ultimate nature of reality, leading humankind along paths yet unknown.

The next Cosmos essay, by Daniel Matt, considers possible resonances between contemporary physical cosmology and the kabbalistic tradition of Jewish mysticism. Matt begins by suggesting that common views of science and religion as distinct or separable are themselves limited in not suggesting possibilities for fruitful interaction. Religion, for example, gives science wonder; and science gives religion a view of knowledge as provisional, thus leading to humility in light of realities such as the nature of God. Matt then recapitulates the scientific theory of the big bang, but echoes Jeffrey Russell in bemoaning the loss of "myth" necessary to give meaning to life. Yet perhaps in the big bang one can recapture mythic depth and meaning, as the big bang indicates that we are made out of the same stuff as all creation; we all come from the cosmic seed. The kabbalistic tradition of Jewish mysticism, for instance, sometimes refers to God as nothingness, as a oneness that animates all things.

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Kabbalah and physical cosmology, in fact, make parallel statements as to the singularity of the origin of the universe and its resultant unfolding. Other physical theories such as broken symmetry find kabbalistic parallels, in spite of their widely differing methodologies, and suggest that science and spirituality are complementary. Ultimately, this fractured world needs mending, argues Matt, and God needs us to mend it. But, as science may contend and kabbalah confirm, this God is no white-haired man in the sky; God is best understood as infinite and hidden, yet as close to us as is our connection with the big bang.

Harold Oliver closes the Cosmos section with an essay that addresses cosmos at the level of metaphysics and hearkens back to the Theory section in his reconception of science and religion. Oliver's essay focuses on the notion of complementarity between science and religion: Oliver grounds complementarity in relativity theory and quantum theory. More generally, Oliver appeals to metaphysics as the basis for his relational paradigm, reassessing its Aristotelian legacy, which assumed the subject/object structure of the Greek language and produced the substantialist thesis that reality ultimately consists of things whereas relations between things are accidental. To Oliver, the cosmos is a grand unity of relations, with subject and object, mind and brain, and ultimately God and World, existing as derivatives of this fundamental relatedness. Oliver then proceeds to argue that religious language is not referential, but symbolic of relational reality; it is when this relational reality is reduced to its derivatives that religious language is changed from mythical to referential discourse. In the case of science, Oliver argues that science aims for the most economical way of speaking of the world, versus the rich metaphorical language of religion. Ultimately, though, religion and science are about the same domain of human experience. Oliver then considers the question of science, religion, and truth. He cautions against saying that certain scientific theories may be "true," arguing that it is preferable to consider that well-established scientific theories add to our experience of reality. In the case of religion, Oliver cautions even more strongly against the subject-object notion of truth, in which it is seen to refer to the independent existence of an object; religious "truth," rather, is a realization or experience of relational reality.

Life

The third section, *Life*, consists of three essays which present different interpretations of Darwin and evolutionary theory, one of the most central topics in the study of science and religion. The section is launched with an essay by historian John Hedley Brooke, who focuses on the idea of the unity of nature, which has been important in both scientific and religious discourse. Brooke notes that the unity of nature thesis, so central to Christian theology, was not simply an epistemological assertion, but one that was intended to demonstrate

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the beauty of God and creation. In the case of Darwin, the unity of nature thesis would seem to pose a threat to his religious belief, as a naturalistic explanation of the origin of life would leave no need for God. Yet Brooke notes that Darwin's personal beliefs about God were complex, arguing that it was ultimately a series of incidents, both personally experienced and impersonally witnessed, which led Darwin to thoroughly question the idea of God as a caring, guiding Creator. Darwin's own theory of evolution did not seem to uphold any tidy unity of nature—since nature competes against itself in a struggle for existence!—and among some Christian leaders it had similarly challenging implications as well. But what greater unification could be imagined than Darwin's theory? In particular, his inclination toward the view that all of life had been derived from a single proto-life form suggests his striving toward unification. Brooke concludes by noting the important political ends to which the unity of nature thesis has been applied after Darwin, suggesting that it could remain as a meeting-ground between science and religion.

Michael Ruse's essay examines, and ultimately dispenses with, philosophical arguments that claim Darwinism leads to the rejection of religious belief. Ruse considers the arguments of three scholars who maintain that there is, indeed, a contradiction between Darwinism and religion. The first is entomologist and sociobiologist Edward O. Wilson. Wilson, Ruse argues, is quite sympathetic to religion as an ethical system, yet maintains that its existence can be explained on evolutionary grounds. Yet Wilson considers religion to be a necessary illusion, hardly true in its own right. In the second case, Ruse considers biologist Richard Dawkins, who argues that, until Darwin, no one could reasonably dismiss the "God hypothesis" of design. Ruse considers the thesis, popular among early Christian Darwinians, that God designed life through the process of evolution. One problem with this thesis is the very random, seemingly undesigned nature of evolution; yet Dawkins himself is not worried by random variation. As his third example, Ruse considers his own argument that the biblical injunction to love one's neighbor as oneself does not seem to be based on biological fitness, as much as on a near-neighbor form of love. Yet Ruse counters himself by arguing that perhaps Jesus' injunction did not admonish one to love everyone equally; alternatively, Christianity could be reaching out to extend a system of morality that biology has attuned to only near-neighbor forms of concern. Ultimately, Ruse argues that the conflict between Darwinism and religion was initiated for social and political, not scientific, reasons, and though challenges still exist in reconciling the two viewpoints, there is no necessary contradiction.

Ronald Numbers' essay also examines Darwinian theory and religious belief, but takes a different tack from that of the philosopher Ruse, examining in some detail a range of positions people have adopted in coming to personal terms with evolution. Numbers focuses on four individuals, all from the United States with scientific backgrounds, who struggled with reconciling evolutionary

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theory and theistic faith. He begins with Joseph LeConte, well-known in the late nineteenth century for his efforts at harmonizing theism and evolution. LeConte's deep personal struggles over the loss of a two-year-old daughter and his rejection of the atheistic "dragon of materialism" formed a powerful emotional thrust toward an espousal of evolution that avoided materialism, supported the hope of immortality, and maintained a resolute if not altogether traditional theism. Numbers' second and third examples, J. Peter Lesley and George Frederick Wright, both were trained in geology and had deep religious backgrounds; both also accepted modified forms of Darwinism yet rejected full-bore evolutionary thought. Lesley's and Wright's beliefs are understandable via life events and quite different forms of engagement with Christianity, Lesley rejecting much of it though not in turn embracing evolution, and Wright growing more fundamentalist with time. His final example, early-twentieth-century creationist George McCready Price, found personal and professional satisfaction in well-publicized rejections of evolution. Numbers candidly recounts his own life story, in which an emotional crisis, precipitated in part by a reconsideration of evolutionary theory, eventually led to his rejection of a fundamentalist upbringing. Numbers closes by reiterating his belief that "feelings count—often more than facts" and suggests that this is why so many Americans continue to call themselves creationists rather than evolutionists.

Mind

The fourth section, *Mind*, begins with an essay by Pascal Boyer, who follows up on the spirit of the preceding section by providing an evolutionary explanation of religion, in particular religious mental concepts. The human "mind-brain," Boyer argues, consists of multiple systems that guide understanding and action in different realms; though none of these systems are specific to religion, several may be connected to religious concepts, and some concepts may be more successful at cultural transmission via these systems than others. The first important feature of religious concepts to Boyer is that they are supernatural concepts, defined by their violation of some, but not all, normal domain-level expectations. Boyer then further clarifies that religious concepts tend to build on our templates of persons, yet emphasize their intentional agency, which can be evolutionarily explained either in terms of the mind-brain's need to understand the complex social interactions characteristic of humans, or as an asset in predator-prey interactions. Religious concepts are also about social interaction; yet, in contrast to ordinary people, supernatural agents have "perfect access" to all strategic (socially relevant) information relevant to a given social situation. Boyer cites research that suggests people who believe in the Christian God combine features of omniscience with a human-like mind; for instance, one must pray in order for God to hear you. Finally, Boyer argues that religious concepts prey upon common intuitions about mis-

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fortune: gods that do not matter much to peoples' daily lives, no matter how powerful they are otherwise, are not that religiously important. These concepts focus not on how, but why, the supernatural agents cause misfortune, the reason tracing back to some mishap of social interaction with these agents.

The section continues with an essay by Evan Thompson, who considers empathy as a central feature of the human experience, one which grounds both science and religion. Thompson draws upon cognitive science, contemplative psychology, and phenomenological philosophy in considering empathy the dynamic coupling of self and other, as a basic intersubjective dimension that precludes the distinction of inner and outer realities. Phenomenological inquiry suggests four aspects to empathy: involuntary coupling of self and other, imaginary transposition of oneself to the place of the other, interpretation of oneself as Other to the other and vice versa, and moral perception of other as person. These capacities exist wholly or in part in specific instances; all of these elements are found in human developmental psychology and come together in the lived bodily experience and via language. Thompson then turns to Buddhist contemplative psychology as a means of discussing implications for non-duality of self and other. Thompson analyzes the eighth-century Way of the Bodhisattva, which argues that notions of "self" and "other" have no independent existence, but are conceptually-based; Buddhism, as a middle way, negotiates between the conventional truth that we have bounded selves and the ultimate truth that self has no bounds. Thompson finally turns to consider implications for cognitive science, arguing that it tends to rely on third-person theories and models, whereas for Thompson, the very fact of experience suggests the importance of adding first-person models to develop scientific accounts of consciousness. These first-person methods not only provide authentic experience, but trained, disciplined first-person methods afford the kind of reflective distancing necessary to process the complex set of interactions that intersubjective experience affords.

In the third essay of this section, Anne Harrington explores the overlap between faith and science in the context of medicine. Does the mind, or do higher powers accessed by the mind, have power to heal the body? Harrington considers four related claims, all offering some scientific validation. The first is that participation in religious services is good for one's health, which can apparently be explained only in part by religious communities serving as high-quality social networks. The second is that meditation reduces physical stress and aids healing, whether or not the meditator has any knowledge of or connection with a religious tradition. The third, larger claim is that religious belief of any sort can heal the body; this claim has strong roots in American religious history, but seems to derive more from the belief that the mind has innate healing capacities, rather than that healing comes from any sort of divine power. The fourth claim, in contrast, is that prayer conveys healing benefits, whether or not it is the patient or an intercessor who prays. This fourth claim

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is bolstered by certain controversial studies and differs from the other three in its implicit support for divine power, and thus divinity, whereas the other claims are exceedingly pragmatic in their overtones: religion is important because it works. All four claims, however, are somewhat distinct, and hardly form a coherent package. Overall, Harrington is concerned with the broad assertion that religion heals the body, due to its insistence that science has provided conclusive proof, as well as its utilitarian emphasis on medicinal therapy versus any other benefits conveyed by religion. To Harrington, what may result is not the spiritualization of medicine, but the medicalization of religion.

The final essay is by Alan Wallace and revisits the Theory section while connecting it with Mind. Wallace aims to present an alternative to metaphysical realism on the one hand, and to relativism and constructivism on the other, by exploring the possibility of intersubjective truth in science and religion. Wallace gives a summary of objectivism, the view that there is a world separate from human perceptions and concepts. As scientific naturalism proceeded to build knowledge of the objective world, religion recoiled against this naturalism as insufficient to account for God or the soul, thus maintaining a sort of mind/matter dualism. Wallace argues that the science of mental phenomena has been largely speculative and not systematically empirical, due in large part to the strong emphasis of science on external phenomena. Thus contemporary cognitive science focuses on the mechanics of mental phenomena, instead of the dynamics of the mind. Wallace discusses the pioneering work of William James, suggesting that science could consider the ways that brain and mind influence each other rather than taking mind to be simply an outcome of brain processes. He asserts that science works with the world of experience, not a world independent of human experience. Yet truth-claims can be organized according to their intersubjective invariance across multiple frames of experience-based reference. Wallace then discusses how one may validate scientific and religious claims made by those who are highly trained and have opportunities for extraordinary experiences of consciousness—those that outsiders cannot share nor perhaps understand. Yet both apply intersubjective empirical and pragmatic criteria to determine the utility of their truths. Wallace closes with a quote by William James that asserts the need for an empiricism of religious experience.

The Upshot: Between One and Two

Fourteen essays, each with a particular take on science, religion, and the human experience. Is there any overarching message one can bring home from these essays? To offer a tidy package to the reader would cheapen these great thinkers and their diverse thoughts: read the essays for yourself and see what you get from them.

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But there may be some broad lesson we can gain by bringing the human experience into our discussions of science and religion. On one level, these discussions are simply about how scientific and religious people could get along, which is an important problem to resolve. But on a deeper level, science and religion have served as semiotic representatives, as binary code words pointing to longstanding philosophical tensions between the Great Domains of matter and spirit, truth and meaning, fact and value, transcendence and immanence, autonomy and constructedness, nature and culture. As suggested earlier, positions typically taken on science and religion concern not only science and religion, but also these Great Domains. Of course the easiest solutions are to either separate these Domains (and science and religion) or to unify them: dualism and monism are thus unsurprisingly popular options. But, just as Poincaré suggests how a third body forever disrupts any tidy solution to two-body planetary motion, here the human experience forever disrupts these two tidy solutions to the relationship between science and religion.

So have we simply made things more complex? Yes, but that is not all: indeed, many of the essays in this volume suggest an alternative approach to science and religion as informed by the human experience. A classic formulation of this approach is the earlytwentieth-century work of Alfred North Whitehead. Whitehead, a brilliant mathematician-turned-metaphysician, was himself quite interested in science and religion: as he states, “When we consider what religion is for mankind, and what science is, it is no exaggeration to say that the future course of history depends upon the decision of this generation as to the relations between them.”²⁰

Whitehead’s seminal contribution, one that resonates with many of the essays in this volume, amounts to a fundamental reexamination of the Great Domains that science and religion are assumed to signify, whether as separate (following conciliatory dualism) or unified (following convergent monism). What Whitehead suggests is that underlying these Great Domains is a supposed substratum of two substances, Object and Subject, a belief in “the concept of matter as the substance whose attributes we perceive. . . . Namely we conceive ourselves as perceiving attributes of things, and bits of matter are the things whose attributes we perceive.”²¹

This is known as Whitehead’s account of the bifurcation of nature:

What I am essentially protesting against is the bifurcation of nature into . . . two divisions, namely into the nature apprehended in awareness and the nature which is the cause of awareness. The nature which is the fact apprehended in awareness holds within it the greenness of the trees, the song of the birds, the warmth of the sun, the hardness of the chairs, and the feel of the velvet. The nature which is the cause of awareness is the conjectured system of mole-

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cules and electrons which so affects the mind as to produce the awareness of apparent nature.²²

How is this bifurcation of nature, this fundamental bifurcation underlying all related bifurcations into Great Domains, bifurcations to which science and religion rush and declare them either separate but equal or one and the same, how is this bifurcation to be conceptually healed? This is precisely where many of the essays in our volume make a similar claim to that of Whitehead. As Isabelle Stengers and Bruno Latour note, Whitehead's dismissal of the bifurcation of nature into Object and Subject, primary (real) versus secondary (perceived) qualities of things, is supported by (surprise!) none other than our trilogy's third player, the human experience.²³ A world of human experience is a world that precedes objects and subjects; in other words, object and subject are derivative of experience. Experience points forward to objects as much as it points backward to subjects; experience thus annuls the hard dichotomy between subjects and objects, since it is from experience that the very meaning of "subject" and "object" is obtained.

There is much more to human experience, however, than what may appear to be a mere semantic point that it precedes objects and subjects. Significantly, experience is best evidenced in life, far different from the cold substantialist bias in much philosophy. Life is about experiences, not primarily about substances, and certainly not primarily about some Great Domains of reality and perception that categorically exclude the possibility of life. Latour summarizes Whitehead's argument, and Stengers' commentary, thus:

The modernist philosophy of science implies a bifurcation of nature between primary and secondary qualities; however, if nature had really bifurcated, no living organism would be possible given that being an organism implies to ceaselessly blur the difference between primary and secondary qualities. Since we are organisms surrounded by many other organisms, nature has not bifurcated.²⁴

Or, as Latour remarks, "an organism can't learn anything from the bifurcation of nature except that it should not exist. In that sense, philosophies that accept the bifurcation of nature are so many death-warrants."²⁵

Important implications follow for Latour and Stengers concerning science and religion. For starters, science is no longer trapped in subjectivist skepticism—though certainly naïve empiricism is gone too, following the demise of the object-world. Another, perhaps more startling implication, is that Whitehead's argument for the necessity of God is not something to be conveniently excised, but plays a well-deserved role in his new cosmology. Though Latour reminds us that "[Whitehead's] God is there to solve very precisely a technical problem of philosophy not of belief,"²⁶ and though the involved explications

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Latour and Stengers provide of Whitehead's extremely involved account of God are, perhaps unsurprisingly, dense, the broad point is unmistakable: science, religion, and the human experience are each refashioned, then each upheld and respected in a manner that denies anything fundamental to the Procrustean beds of Object and Subject, on which their living limbs are so often lopped off.

One way of putting Whitehead's philosophy in different terms is that, given its emphasis on process and experience, it finds relations to be more fundamental than things. This is a theme you will find in many contributions to this volume. "Relationality," "complementarity," "intersubjectivity," "experience": these are different terms than monism—we are not solving the problem of Two by retreating to the simple world of One. By bringing the human experience into science and religion, we have not so much gone from two to three or two to one, but rather have found a point somewhere between one and two, somewhere between the denial of difference (and hence the possibility of relation) that so bedevils monism and the metaphysical gap that defines dualism.

If there is no inherent subject, no object, but only as derivative of the relational human experience, then one can answer the central question of this volume, "Are science and religion a part of, or apart from, the human experience?" by eliminating a priori the subjectivist and objectivist options. The nature of human experience suggests that no longer can science or religion be dismissed as subjective constructions, nor can they be exalted as conduits for direct access to the objective reality of the universe and/or God. Yet we could equally say that the relationship between science, religion, and the human experience is a curious one in which *both* the subjectivist and the objectivist positions are upheld. Science and religion are both fully human enterprises, yet illuminate—however dimly at times—a reality that transcends human understanding.

The relational character of the worlds of human experience revealed by science and religion, then, is perhaps unavoidably expressed in conventional subject/object language as paradox, an admission of two seemingly contradictory truths. Science and religion as neither subjective nor objective, or in another way of speaking, as both subjective and objective. How can they be both subjective and objective? How can they be both and be neither at the same time? A multilayered paradox indeed. Yet the deepest human truths by which we live are the same: these truths can be fully historical products of a given culture in a given location and yet somehow provide brilliant glimpses of our ultimate realities. Paradox is much harder to grasp than a simple dualist statement that science is this, religion is that, or the monist assertion that science and religion are ultimately one and the same. But paradox, that elusive space somewhere between one and two, is certainly a part of our human experience

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of life. And how could we expect anything less in the relationship between science and religion?

NOTES

1. This statement from Albert Einstein, *Ideas and Opinions*, trans. Sonja Bargmann (New York: Crown Publishers, Inc., 1954), 46. Einstein invoked several formulations of the relationship between science and religion, of which this is but one. In another passage, for instance, Einstein adopts the historical argument that “While it is true that scientific results are entirely independent from religious or moral considerations, those individuals to whom we owe the great creative achievements of science were all of them imbued with the truly religious conviction that this universe of ours is something perfect and susceptible to the rational striving for knowledge”; see Einstein, *Ideas and Opinions*, 52.

2. Ibid., 44.

3. Ibid., 41–42.

4. Ibid., 42.

5. Barbour’s taxonomy is most recently presented in scholarly format in Ian G. Barbour, *Religion and Science: Historical and Contemporary Issues* (San Francisco: HarperSanFrancisco, 1997), and used as an organizing framework for Ian G. Barbour, *When Science Meets Religion* (San Francisco: HarperSanFrancisco, 2000).

6. See Geoffrey Cantor and Chris Kenny, “Barbour’s Fourfold Way: Problems with His Taxonomy of Science-Religion Relationships,” *Zygon* 36.4 (2001): 765–781. Barbour’s reply is found in Ian G. Barbour, “Response: Ian Barbour on Typologies,” *Zygon* 37.2 (2002): 345–359. For other critiques of Barbour, see, e.g., William A. Stahl, Robert A. Campbell, Yvonne Petry, and Gary Diver, *Webs of Reality: Social Perspectives on Science and Religion* (New Brunswick, N.J.: Rutgers University Press, 2002); Willem B. Drees, *Religion, Science, and Naturalism* (Cambridge: Cambridge University Press, 1996).

7. See Drees, *Religion, Science, and Naturalism*.

8. See, e.g., Harold H. Oliver, “The Complementarity of Theology and Cosmology,” *Zygon* 13.1 (1978): 19–33, where he discusses “conflict” (one-domain) and “compartment” (two-domain) positions as a preliminary to his argument on complementarity. See also Oliver’s essay in this volume.

9. See John Hedley Brooke, *Science and Religion: Some Historical Perspectives*, Cambridge History of Science (Cambridge: Cambridge University Press, 1991), 33ff, for a discussion of these and other historical publications supporting the conflict thesis.

10. See, for instance, Robert T. Pennock, *Intelligent Design Creationism and Its Critics: Philosophical, Theological, and Scientific Perspectives* (Cambridge, Mass.: MIT Press, 2001); Michael Ruse, *The Evolution Wars: A Guide to the Debates* (Santa Barbara, Calif.: ABC-CLIO, 2000).

11. Paul R. Ehrlich and Anne H. Ehrlich, *Betrayal of Science and Reason: How Anti-Environmental Rhetoric Threatens Our Future* (Washington, D.C.: Island Press, 1996), 25.

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12. Prince Charles, Millenium Reith Lecture, April-May 2000. Available online at http://news.bbc.co.uk/hi/english/static/events/reith_2000/lecture6.stm.

13. Stephen Jay Gould, *Rocks of Ages: Science and Religion in the Fullness of Life*, The Library of Contemporary Thought (New York: Ballantine Publishing Group, 1999).

14. Ken Wilber, *The Marriage of Sense and Soul: Integrating Science and Religion* (New York: Random House, 1998), xii.

15. Arthur O. Lovejoy, *The Great Chain of Being: A Study of the History of an Idea* (Cambridge: Harvard University Press, 1936).

16. P.C.W. Davies, *The Mind of God: The Scientific Basis for a Rational World* (New York: Simon & Schuster, 1992), 16.

17. Fritjof Capra, *The Tao of Physics: An Exploration of the Parallels between Modern Physics and Eastern Mysticism* (Berkeley: Shambhala, 1975).

18. I am grateful to Walter Kohn for suggesting this analogy.

19. Henri Poincaré, *Science and Method*, trans. Francis Maitland (New York: Dover Publications, Inc., 1952), 68.

20. Alfred North Whitehead, *Science and the Modern World* (New York: Macmillan, 1925), 260.

21. Alfred North Whitehead, *The Concept of Nature: Tarrner Lectures Delivered in Trinity College, November, 1919* (Cambridge: The University Press, 1920), 26.

22. *Ibid.*, 30–31.

23. Isabelle Stengers, *Penser avec Whitehead: Une libre et sauvage création de concepts* (Paris: Gallimard, 2002); Bruno Latour, “What Is Given in Experience? A Review of Isabelle Stengers’ *Penser avec Whitehead: Une libre et sauvage création de concepts*,” to appear in *Boundary 2* (2004).

24. Latour, “What Is Given in Experience?”

25. *Ibid.*

26. *Ibid.*

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