The Templeton Science and Religion Reader
In our fast-paced and high-tech era, when visual information seems so dominant, the need for short and compelling books has increased. This conciseness and convenience is the goal of the Templeton Science and Religion Series. We have commissioned scientists in a range of fields to distill their experience and knowledge into a brief tour of their specialties. They are writing for a general audience, readers with interests in the sciences or the humanities, which includes religion and theology. The relationship between science and religion has been likened to four types of doorways. The first two enter a realm of “conflict” or “separation” between these two views of life and the world. The next two doorways, however, open to a world of “interaction” or “harmony” between science and religion. We have asked our authors to enter these latter doorways to judge the possibilities. They begin with their sciences and, in aiming to address religion, return with a wide variety of critical viewpoints. We hope these short books open intellectual doors of every kind to readers of all backgrounds.

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The Templeton Science and Religion Reader
Introduction

J. Wentzel van Huyssteen and Khalil Chamcham

The interest in the relationship between science and religion, both in academia and in the public, has grown in the past few decades. It has been driven by new findings in science and our perennial search for meaning through religion. This burst of interest is one of the most fascinating cultural phenomena of our time, but we would exaggerate to say that this never happened before. The volatile relationship between science and religion, and between specific sciences and distinct theologies, is centuries old. Our advantage today is to more fully understand how the boundaries between science and religion have shifted over the ages.

On that foundation, we have a fresh start. This collection of nine essays hopes to bring readers up to date on some of the great themes raised by the interdisciplinary encounter between different sciences and religions. Our contributors come from nine different fields of science. While they speak mostly about cutting-edge science, they also touch on the implications for religion. The essays are selected from the series of nine books that make up the Templeton Science and Religion Series, a project that unfolded between 2005 and 2011. Fortunately, the authors have given us the material necessary to take a panoramic view of the scientific findings that are relevant to religion, from the beginning of the universe to the everyday questions of the new computer technology and modern health care.

Science and religion are two of the most enduring, meaningful,
and dominant cultural achievements of our species. They are both products of a remarkable historical development intimately interwoven with the process of evolution, both biological and cultural. They are both part of the amazing cognitive story of our life on this Earth. The following selections illustrate how the interdisciplinary conversation between the different sciences and all aspects of the different religions is necessary for any comprehensive approach to human knowledge.

This is a very positive quest, but it also is challenging. Naturally, scientists are often reluctant to write on topics outside their own disciplines, and the topic of religion would seem to be very outside the box. Some scientists are highly literate in religion, theology, or the related history, but to master both fields is surely a rare feat even today. We were fortunate in assembling such a notable group in the Templeton Science and Religion Series. But the project also shows that there is plenty of room for more specialists in science and religion, plenty of cultural barriers to cross, and a wide range of topics still to be researched with academic precision.

Why, after all, should we bring together two such different domains of knowledge? Some religious believers see science as a threat to their beliefs. Many scientists view religion as an insult to their rationality. As this collection of essays may suggest, the dynamic encounter of these two realms nevertheless leads us to more fundamental questions of concern to all sides—questions such as: What is knowledge? What is faith? What might they have in common? This current interest in science and religion has many names. Some call it a “dialogue,” and others a “debate.” We prefer to suggest it is a discourse, which has a much more open-ended feeling. It implies a dynamic and complex playing field with more than just two parties involved.

This volume is dedicated primarily to the facts and stories of science. The study of science, however, does not demand that it be taken as a “great alternative” to religious belief, as if a completely rational alternative is displacing an irrational one. Both of these
kinds of knowledge are human. They are more complex and subtle
than any dichotomy can contain. The dichotomy could be traced
to the Renaissance and Enlightenment periods, a time when West-
ern thought began to negate any previous modes of human logic
and belief, whether the ancient religions or the disciplines such
as astrology, alchemy, or mysticism. More often than not, science
and religion today still are presented as two monolithic blocks of
unchanging nature, different in their methodologies and separated
by well-defined boundaries. True enough, religion is primarily
about belief, prayer, and meditation, and science is about predic-
tion and empirical proof.

On another view, however, the picture is more complex than
that. On closer inspection, science is not monolithic at all. It is
nearly impossible to generalize for all sciences. The most reliable
way to approach science is through its specific fields, whether biol-
ogy or quantum physics. Otherwise it is very easy to fall into vague
generalization when trying to discuss “science.” Each field of sci-
ence has its own subject matter, history, methodology, theoretical
construct, and experimental protocol. The attempt to define “sci-
ence” continues in some quarters, but in the encounter between
science and religion, it has proved important to take each field of
science on its own terms.

The religion side of the coin is no less problematic. For one
thing, in the distant past, the intellectual ferment within religion
itself often gave rise to scientific approaches. Some aspects of reli-
gion have certainly contributed to the foundations of reason that
now are expressed in science, law, politics, and ethics. At the same
time, there are many kinds of religion, each with its unique by-prod-
ucts. The elements of science have been approached differently by
the Jewish, Christian, Islamic, and Asian traditions. Religions also
have engaged in their own internal debates, which has generated
the field of theology. Different theologies have handled science in a
variety of ways. Given this multiplicity of elements, it has become
clear that the productive encounter between science and religion
must be based on specific parts of each—a distinct scientific field and a precise theological tradition, for example—looking at the common issues they might share.

It is hard to deny that scientific progress usually takes priority even in an open discourse with religion. Nonetheless, science is far from having resolved the deep human anxieties about our origin and destiny. Science still needs help in this. In human society, science cannot hope to advance without paying attention to religious sensitivities. The debates within academic science and religion can be highly refined and extremely agitated. They should never lose sight, however, of the fact that the general public loses out if it cannot be presented with the new findings of science with an adequate explanation of the implication for society and religion. There is a time for heated debate, and a time for amicable analysis.

One way to avoid the simple clash over science and religion is to gain perspective. This is where historical scholarship has been helpful, revealing the “tidal motion” between science and religion as they developed into very specific forms. History is an important laboratory for seeing the many ways that science and religion have already had important encounters, and makes clear what remains to be done, or what seems to be a perennial concern. The historical context can reveal the important question of “epistemology”—the study of how we “know”—since this often is at the heart of the claims made by a particular science or a specific religion.

“Epistemology” is not everyone’s favorite word, and it is one of the most complex aspects of philosophy, psychology, and even neuroscience. However, epistemology is no small matter. When science reaches a limit in its knowledge or applicability, the framework of epistemology must come to its rescue. The scientific field seriously grapples with how it knows things, either by theory, experiments, or mathematics. However, when science faces a new epistemological crisis—as it often does in history—it is not the role of religion to interfere. For example, when the now-conventional theory of the big bang origin of the universe was hotly debated in the mid-twen-
tieth century, it took decades more of experiments to help settle the core issues. The attempt of some theologians to point out that the big bang had consonance with ideas of creation may have been meaningful, but it did not help at all in solving the scientific issues. Many other cases since then have proved that the best common ground between theology and new scientific discoveries has been a mutual reflection on epistemology, or the different ways of knowing, whether proposed by the priest or the scientist.

Nevertheless, the temptation to force one on the other is always there. In recent times some have argued for a “convergence” of science and religion, or to define them as mortal enemies, destined to be in a “conflict” that brooks no discussion. It is true that some overlap will always take place, as seen in a great scientist such as Isaac Newton, who mixed theology with his science. There is no denying that science is a human enterprise, and its practitioners—whether believers or atheists—bring personal motivations to their work. However, modern science rejects any theological intrusion into its theories or experiments. There are different levels of human knowledge, often coming from common roots in human nature and history, but also having their autonomy.

This might be called a “complementary” approach to science and religion, which implies that each has territories with limits, much as human knowledge will have limits. The complementarity also recognizes that all forms of knowledge are based on metaphysics—metaphysics being the larger assumptions that any thinking human being makes about the very nature and essence of the universe. Even so, a complementarity approach calls for boundaries as well. It does not allow for a scientific religion or a scientific theology, or for religion to offer alternative explanations to scientific theories.

Once the metaphysics are recognized, and the proper boundaries between kinds of knowledge are respected, people of faith and of science can speak more openly, if they care to. The religious believer is free to speak and reflect from within a personal
faith commitment, and in conversation with the scientist, to discover patterns and accomplishments that may turn out to be complementary and enhancing to a religious worldview. Religion may feel free to hold that its spiritual metaphysics encompasses even science, while science may hold that its apprehension of facts in the universe is crucial to all the world faiths, whatever their culture. This view allows religion and science to be equal partners in a democratic, interdisciplinary conversation where science is taken absolutely seriously, but where the voice of authentic religious commitment is also clearly heard.

In the following nine essays, chosen from the Templeton Science and Religion Series of books, the reader is invited to share in this complementary discussion between science and religion.

We start with astronomer and cosmologist Joseph Silk, who tells the story of the big bang, how it became our standard model, and the human drama involved in that discovery. As Silk says, we will never have experiments as powerful as the big bang to operate on Earth, so understanding its event and consequences continues to be one of the greatest experimental tools. As we study the universe and its great age has been revealed, we have realized that if the initial conditions of the universe had been slightly different, there would have been no structures and no life. Still, what remains unknown are the universe’s dominant components—dark matter and dark energy.

In the second selection, paleontologist Ian Tattersall takes us back to consider the formation of the ancient earth, and how it has provided us with a key to our knowledge of the past: fossils. The fossil trail is empirical and speculative, because scientists have had to organize the evidence over a few hundred years of research. The idea of a “tree of life” has continued to evolve, now obtaining a more complex structure than we had once thought (now like a bush or tangled vines). The scientific tools for dating fossils have been improving, and new fossils continued to be unearthed. The question of the first “life” still eludes us, however, even though sci-
entists and a good deal of speculation have given some of the best possibilities for how life arose in an inhospitable environment. Life requires complexity, but there is no definitive understanding yet of how complex organisms evolved into living organisms.

Environmental geneticist R. J. Berry next tells us about Earth as a “green machine.” The belief in the creation of the world for our benefit has been an obstacle to the study of the natural world and gave us reasons to abuse it. Scientific naturalists of the past, while keeping religious beliefs, began to study nature for its own integrity. This led to our ecological sciences. Along the way, Western culture had to reconcile a new view of the Earth with that of the Bible, which told a different story about the Earth’s age and formative stages. Berry tells how this great transition took place, and about some of the historic characters, such as Charles Darwin, involved in the new science of “biogeography”: how biological diversity has spread across the Earth, a key topic for ecology today. We have realized that diversity is driven by genetic variation.

Then in chapter 4 we turn to the science of human nature. After their long careers in psychology and neuroscience, Malcolm Jeeves and Warren Brown have much to tell us about how humans are like our closest animal relatives, and yet different by a “quantum leap.” How did this happen, and how do we make sense of this, so that, as the authors say, we do not see humans as “nothing but” smart animals? The main distinction lies in the use of language, the authors say. They introduce topics as diverse as language formation, “theory of mind,” and altruism. They see no problem for religious belief in studying us as a “human animal” as well. The authors argue for a more complex and holistic view of the brain and warn that increased complexity of the nervous system does not always mean increasing complexity of learning capacity or social behavior.

After that, geneticist Denis R. Alexander has a fascinating story to tell: how biological evolution could not make sense until we mastered the science of genetics. “Genetics is what rescued Darwinian natural selection from oblivion,” he says. This is the story of
the theory of natural selection looking for a source of “variation” in the characteristics of living things. The genetic pool was the answer, and from the monk Gregor Mendel to some of modern biology’s most brilliant researchers, we finally arrived at the “modern synthesis.” Alexander shows us how these two-steps of evolution work together in the field and in the laboratory. He also shows how the same concept—such as chance—can have completely opposite interpretations depending on political and cultural circumstances.

Cognitive scientist Justin Barrett then asks how we can make sense, from a scientific viewpoint, of the enduring nature of religion among human beings. It has its origin in the very way our brains and five senses work, he explains. This cognitive approach to religious belief and experience has social implications, shaping cultures and building theological systems and religious institutions. To explain this, Barrett takes us back to the basics of human “cognition” and perception. He shows, perhaps surprisingly, that religious belief is only “natural” for the way the human being is constructed. Humans have a tendency to look for intention or causal agents where “abstract causations” fail.

In chapter 7, mathematician and computer scientist Javier Leach introduces us to mathematics as a “language,” one that complements our other languages (natural or scientific, for example). He explains how the very nature of mathematics has developed some of our theological concepts, such as infinity and God’s existence, involving cognitive processes that give us the sense of absolute consistency. To illustrate, Leach explores the famous “ontological argument” for the existence of God, an argument made by Jewish, Christian, and Muslim thinkers based on a similar system of logic. Although the “proof” is not universally persuasive, Leach says, it shows the common importance of logic for both science and theology.

Noreen Herzfeld, a computer scientist and scholar of religion, introduces us to cutting-edge science that is both ethereal and very small. Computers are forcing us to view human intelligence in new
ways, she says, and cyberspace may be altering our human perceptions of reality, even permanently, as well as our perception of religion: How can we conceive of divine action in a virtual space?

Meanwhile, nanotechnology is probing how to make molecular-size machines, a scary idea for many people. No less than that, there is talk of transforming our physical selves to defy death. By looking at these many questions in both artificial intelligence and nanotechnology, she introduces us to the promise and peril, and especially the religious and ethical decisions we must make about how far to go with these new technologies.

We end with medical science. After years of experience as a doctor, Harold G. Koenig argues that science needs the clearest possible definitions of “religion” and “spirituality” to understand how these affect health and medical practice. The days when the spiritual side of patients was ignored are over, Koenig says, especially because we must have every available resource in the coming “health-care crisis.” Koenig not only makes finer distinctions, such as dealing with patients in their own faith tradition, but provides practical tools for clinicians and patients. He shows that empirical research is on the side of taking religion and spirituality seriously in the world of medicine. This has become more urgent as troubled economic times require communities to play a major role in caring for patients.

All of the authors suggest that we live in a world of interconnectivity. This is a classic idea that goes back to the older mystical traditions, yet it seems to be borne out once again in the empirical sciences of today. Every single thing is connected to its immediate environment and to the rest of the world. We can identify singular things—a quantum, a star in a galaxy, a bee, or the seat of human intelligence, which some may call the soul. But none of these has meaning (or the ability to prosper) as isolated entities. Each acquires significance only in relation to other entities, either of its own kind or in the wider global environment.

A collection of essays such as this hopes to open the doors of
research related to science and religion a bit further. The nine authors suggest some of plausible ways to draw boundaries in science and religion, and yet cross over. Scholars have their appropriate ways to do this, but the general public is also encouraged to look for the complementary relationships in their lives. For the scholarly world, the horizon for the science-religion discourse seems to be the continuing problems of epistemological and philosophical categories.

In both science and religion, there must be an acceptance that we often face the unknown, yet such an acknowledgment does not undermine our confidence to move forward. Science and religion are helpful prods to each other in this quest. Religion invites science to move out of reductionism, while science invites religion to recognize more precisely the world of empirical evidence. Religion can ask science how it will serve humanity and “do no harm” to nature, while science can present to religion tools, mental as well as technological, to make these beneficent goals possible. An immense opportunity is open to develop a new holistic and interdisciplinary intellectual era. We may be at the dawn of a new paradigm that cannot be claimed by either science or religion by itself, but is only possible because of their willing, good-faith interdisciplinary encounters.
"The universe is a wondrous place," Silk says in his book *Horizons of Cosmology*. It is a wonder also that we now have a fairly simple explanation of the universe’s origin, elements, galaxies, and stars. We have found ways to measure these, making cosmology a practice of theory tested by observation. To observe the largest scale, science has produced ground and space telescopes; to see the smallest, it operates supercolliders. Our best laboratory still is the big bang itself, after which the characteristics of energy and matter developed into the world we see today. Given the limits of measurement in cosmology, its greatest thinkers have been inclined to speculation as well: ideas that range from multiverses to metaphysics. “Cosmology leads inevitably into considerations that have philosophical and even theological overtones,” Silk tells us. Cosmologists are all too human as well. Even they ask: Why do we exist in this particular universe? Is this a coincidence? Do we influence our universe as its observers? For as Silk notes, “After all, if we did not exist, who cares?” The great