

# Biology of Spirituality

Kevin S. Seybold



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*The idea that there is a biological basis for human spirituality is controversial to many people. There is, nevertheless, a growing body of empirical evidence coming from neuroscience, psychology, cognitive science, and related disciplines interpreted by some as suggestive of a biological basis for belief in God or the transcendent. The purpose of this article is to (1) review some of that evidence, (2) address the issue of how such a biological foundation to spirituality might have developed, and (3) construct a rationale as to why, from a Christian perspective, a biology of spirituality should be expected.*

## Biology of Spirituality

The notion that there might be a biological basis for human spiritual awareness or that spirituality might have evolved via natural selection is troubling to many people, both those with religious beliefs and those without. Alister Hardy proposed exactly that, however, when he suggested that what he called “the divine flame” is an important and necessary part of the human evolutionary process. The evolutionary process identified by Hardy was a combination of biological and cultural evolution whereby certain *Homo sapiens* ancestors “consciously chose” to attend to such spiritual awareness because it enabled them to better cope with existence.<sup>1</sup> As a zoologist, Hardy argued that “an empirical study of nature, man and human history can give us important evidence in support of a belief in a theistic universe.”<sup>2</sup>

While the question of God’s existence certainly cannot be answered by science, there is, nevertheless, a growing body of empirical evidence coming from neuroscience, psychology, cognitive science, and related disciplines, suggesting to some the existence of underlying physiological mechanisms that subserve spirituality. The purpose of this article is to (1) review some of that evidence, (2) address the issue of how such a biological foundation to spirituality might

have developed, and (3) construct a rationale as to why, from a Christian perspective, a biology of spirituality might be understandable and even expected.

Before discussing the empirical evidence for the biology of spirit, however, a definition of spirituality must be offered. I understand spirituality to be a property that emerges out of the brain; it is an embodied capacity which enables us to have personal relatedness. An emergent property is a mode of functioning that comes into being on the basis of the interactive operations of less complex subsystems.<sup>3</sup> In the case of spirituality, these operations are of the brain. Personal relatedness is the capacity to relate to and have a cognitive representation of the self, to have

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relatedness with others, and to have relatedness to God.<sup>4</sup> This view of spirituality is consistent with that of Thomas Aquinas who defined spirituality as the sum of all the unique, embodied human capacities and functions.<sup>5</sup> Aquinas also argued that God calls all creatures to return to him for the fulfillment of their being. What define us as creatures made by God are our relationships, and God calls us to relationship with him (the lure of the Divine). In maintaining that we naturally long for God, Aquinas is consistent with Augustine who famously said of God, “You have made us for Yourself, and our hearts are restless, until they rest in You.”<sup>6</sup> In order to establish this personal relatedness, it is necessary to first have certain cognitive abilities, and these cognitive abilities have a clear neurobiological basis. It is in this way that spirituality emerges out of the brain and can be said to be embodied.

Is there any scientific evidence for the views of Aquinas and Augustine? This article will argue that there is empirical evidence that can be drawn from various scientific disciplines. Such evidence, however, invites a second question. Why should we care if there is empirical support for the views taken by theologians 700–1,500 years ago? Or, why should theology today concern itself with trying to integrate what it has to say with what is taken from the scientific disciplines of psychology, neuroscience, biology, and cognitive science? We live, for good or ill, in a postmodern society that values science. We depend upon science for our continued health, for our way of life, and, at a more abstract level perhaps, for its path to uncovering truth. We also live in a society that has, in the view of many, become increasingly secular and unchurched. Because of the importance of science in our society, if Christians want to have any significant input in the ongoing debates in our society and want to be taken seriously in the marketplace of ideas in our culture, they must not only be conversant in and knowledgeable about science, they must also be able to show how their theological ideas relate to science. In addition, if Christians hope to convince the non-Christians or unchurched in our society to reflect on the claims of Christ, they must be able to articulate how the positions taken within Christianity can be seriously considered by a postmodern individual who has been raised in a culture that has such a high view of science, its methods, and its findings.

The approach to the study of spirituality adopted in this article reflects the stratified nature of reality itself. According to this view, reality is complex and multileveled, requiring many different perspectives, each with its own methods and goals. No single approach to a particular part of reality (such as spirituality) is complete in and of itself. So, spirituality can be studied from a variety of perspectives, including the theological, sociological, psychological, and biological. Each of these levels of analysis will have its own methods to bring to the study of this particular part of reality. While one can, using methodological reductionism, begin to study spirituality at the biological level, this does not mean that only that level of analysis is appropriate or complete. Other methods more appropriate for the other levels must also be employed. It is in this way that one can speak of a nonreductive study of spirituality without explaining spirituality away as “nothing more than” a bunch of neurons firing or neurochemicals released into synapses.<sup>7</sup>

If spirituality has a biological foundation, one might expect to observe a “basic core” or universality that can be identified across cultures. David Hay, like Hardy a zoologist by training, believes he has found evidence for a biological basis for spiritual awareness, a kind of sense that, because it has survival value, developed through the process of natural selection. In his recent book *Something There*, Hay provides evidence, based upon years of interviews with individuals, many of them children, that spiritual experience or awareness is a built-in biologically structured component common to all humans. Examples of spiritual experiences reported by Hay include (1) awareness of the presence of God, (2) awareness of prayer being answered, (3) awareness of a sacred presence in nature, (4) awareness of the presence of the dead, (5) awareness of an evil presence, and (6) awareness of a transcendent providence or a patterning of events. Hay reports that in his home country of Britain, where a noticeable decline in church attendance and religious participation has occurred, there has nevertheless been an increase over the past twenty years in each of these spiritual experiences.<sup>8</sup> While not all of these examples correspond to spirituality defined as personal relatedness, certainly awareness of the presence of God, awareness of a sacred presence in nature, and an awareness of a transcendent providence or

a patterning of events can be seen to correspond to having a relationship with God as discussed above.

In addition, Hay and his colleague, Rebecca Nye, interviewing six- to ten-year-old children who had no connection to any religious institution nor any type of religious training, found that those children nevertheless used spiritual language in discussing issues such as awareness of mystery (e.g., wonder and awe), awareness of value (e.g., meaning and ultimate goodness), and awareness of the here and now (e.g., empathy and unity with something beyond oneself). In analyzing the responses, Hay and Nye identified a concept they termed “relational consciousness” that seemed to emerge from the children’s conversations, a tendency for the children to understand themselves and their world in relational terms. Hay and Nye speculate (consistent with Alister Hardy) that relational consciousness evolved because it encourages and enables cooperation.<sup>9</sup>

Azari, Missimer, and Seitz suggest that current neuroimaging data (neuroimaging consists of taking pictures of the brain while a person engages in some kind of task) point to a cross-cultural invariability in religious and spiritual experiences which involves brain regions utilized in and essential for relational cognition. If these authors are correct, this would support a possible biologically based universal component to human spirituality which could nevertheless be expressed differently from culture to culture.<sup>10</sup> One need not conceptualize this biological mechanism as being uniquely suited for relatedness to God or the transcendent. As will be discussed below, these mechanisms can be used to support a variety of social relationships, including those with the transcendent or God.

## Evidence for a Biology of Spirituality

In September 2003, the Commission on Children at Risk released a report which addressed reasons for the increased incidence of behavioral and mental health problems in US children. The commission, consisting of thirty-three physicians, research scientists, and mental health specialists, argued that the best scientific evidence from psychology, neuroscience, medicine, education, and other related disciplines suggests that human beings are “hardwired to connect,” born to form “close connections to other

people, and deep connections to moral and spiritual meaning.”<sup>11</sup> The opportunity to make these important connections to others and “for moral meaning and openness to the transcendent” has decreased in recent decades. Our society no longer makes it easy to develop these necessary relationships.

Robert Putnam in his book *Bowling Alone* describes how American society has become less community oriented and more individualistic since the decade of the 1960s. Putnam notes a decline in political, civic, and religious involvement and interest in the last fifty years. He also identifies a decrease in forming relationships in the workplace and in making informal social connections (e.g., bowling leagues and card clubs), and describes a corresponding decrease in altruism, trust, volunteering, and philanthropy in American society during the same time period.<sup>12</sup> The decline in relatedness among adults also impacts the number of opportunities for children to make connections. The Commission on Children at Risk argues that it is the lack of these opportunities that has contributed to the increase in problems seen in children in this country. Among other findings, the Commission reports that

- *The mechanisms by which we become and stay attached to others are biologically based and are identifiable within the brain.* Evidence from the neurosciences shows that the brain organizes itself in the context of relationships with others and that there is a biochemistry (e.g., oxytocin) to the connection process.<sup>13</sup> Relationships are not just nice to have, they are essential for the proper development and functioning of the brain.
- *The beginning of morality is primed biologically and is associated with the parental attachment process.* The innate attachment process that a newborn has to a primary caregiver is the foundation for the emergence of conscience and morality. Biological systems prepare us to associate certain emotionally toned messages, that some behaviors are good (and therefore permitted) and that other behaviors are bad (and not permitted), with reactions from the attachment figure.<sup>14</sup> Behaviors that “please” the attachment figure evoke positive emotions in the infant and are felt to be “good,” while behaviors that displease the attachment figure produce a negative emotional response in the infant and are felt to be bad. In this way, attachments help guide a child’s moral development.

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- *Early nurturing relationships, for example, with one's primary caregiver, influence early spiritual development, and that spiritual development also affects us biologically.* Studies in developmental psychology suggest that children form their conceptions of God, in part, from their conceptions of their parents (or other attachment figures). As a result, early experiences with parents, for example, the happiness or disappointment that comes with relationships with parents, can facilitate or inhibit the development of a person's religious faith later in life. In addition, religiosity and spirituality can have positive and beneficial effects on the individual throughout life in the form of reduced morbidity and mortality and greater psychological well-being. These physical and mental health benefits are similar to those associated with effective early parental nurture.<sup>15</sup>
- *Spirituality (and religiosity) influence physical and mental well-being.* As mentioned above, studies of religiosity and spirituality suggest a positive benefit of these concepts to mental and physical health. One of the mechanisms through which spirituality and religiosity are thought to promote these health benefits is via social connectedness or social capital.<sup>16</sup> Being in a relationship with others that is linked by social ties and common values can have a salubrious effect on physiological mechanisms involved in health and illness.
- *The human brain is organized to ask ultimate questions and seek ultimate answers.* Humans seem to have an innate drive to find meaning and order within reality. Recent studies in the neuroscience of religion point to various areas of the brain which are involved in the mediation of religious or spiritual experience. The work of David Hay suggests that young children, even those raised in unchurched or atheistic households, use spiritual language in discussing questions of death, life, and so forth (at least until they learn from their parents and/or society as a whole that such language is inappropriate).<sup>17</sup>

In the last decade, researchers in neuroscience, psychology, cognitive neuroscience, and related disciplines have investigated topics that, up until the last fifteen years or so, had been beyond the reach of empirical investigation.<sup>18</sup> Included in this research is evidence suggestive of a biological basis for human spirituality. In the next section, some of this evidence

will be reviewed, including a discussion of mirror neurons, theory of mind, the role of the prefrontal cortex, neurotheology, and social cognition.

### *Mirror Neurons, Theory of Mind, and Social Cognition*

Originally discovered in the early 1990s in monkey premotor cortex, mirror neurons are brain cells that discharge both when the monkey performs a particular response (e.g., opening and closing a hand) or sees another monkey perform the same behavior. The mirror neuron system, we now know, is also present in humans and goes beyond the motor cortex (in the frontal lobe) to include regions of the occipital, parietal, and temporal cortices as well. It is thought to be involved in various social behaviors in humans, including imitation, language, and theory of mind.<sup>19</sup> Language development and communication have clear implications for the establishment of social relationships, and language itself is acquired within a social context. It is not enough to merely hear words being spoken independently of context (e.g., hearing words coming from a television set); we acquire our knowledge of language by hearing and practicing language in relationship with others. It is by hearing what another person says to us in a social context and responding to that person within that social environment that language is acquired and mastered.

The development of a theory of mind (ToM) also has implications for social relationships. A ToM is the recognition in a person that other individuals have separate minds and, therefore, have their own thoughts, beliefs, feelings, and so forth. This understanding is not present in newborns; it develops over the first four years of life. With a ToM, an individual can begin to understand what another person is thinking and feeling as well as what the other person might do in a given situation. (One might go further to suggest that the development of a ToM is necessary to begin to understand what God might want or expect from us.) This knowledge is important in establishing a relationship with the other person.<sup>20</sup> Seeing the world from another's perspective, thinking another's thoughts, knowing what another individual might do, are important pieces of information as we interact socially. Without such knowledge, having relationships with others is difficult or impossible, and mirror neurons are thought to mediate the development of a ToM. If spirituality involves

the ability to relate to oneself, others, and God, the above evidence suggests that our spirituality is in some way tied to the functioning of these mirror neurons.

While various regions of the brain demonstrate mirror neuron activity and are implicated in a ToM, the frontal lobes are particularly important in the mediation of these abilities. The frontal lobes are thought to mediate many of the characteristics that are believed to be uniquely human. One frontal lobe area which is particularly important in a ToM is the prefrontal cortex which is subdivided into different sections (e.g., orbitofrontal, medial, and ventromedial prefrontal). Brain imaging studies show that the prefrontal cortex is activated during ToM tasks and is involved in the control of impulsive behavior, judgment, and decision making, so-called “social cognition,” which is important in the development and maintenance of healthy, positive relationships.<sup>21</sup> Indeed, the specific subsections of the prefrontal cortex are linked to the regulation of interpersonal relationships, moral behavior, and social cooperation. For example, one researcher in this area suggests, “It could be that the integration of information about other people and oneself, and the social relationship between the two, are the hallmarks of medial prefrontal processing.”<sup>22</sup> Damage to particular brain regions can illustrate the importance of that neural area to the performance of specific behaviors. Damage to the orbitofrontal region is implicated in our ability to recognize deception in others and to perform effectively in various kinds of social exchanges, limiting our ability to develop and maintain positive, functional relationships with those individuals.

The evidence from neuroscience on mirror neurons, ToM, and social cognition suggests that specific regions of the brain, particularly the prefrontal regions, are involved in social-relational cognitive processes. When these brain areas are not functioning effectively, we will experience a deficit in our ability to fully relate to others; we might say that our spirituality is affected. Glenn Weaver reports on how Alzheimer’s disease not only affects the victim’s cognitive processes involved in memory, but how it can also dramatically impair how one relates to others. Weaver interviewed “partner observers” of Alzheimer’s patients. They noted a number of changes in spiritual expression in their loved ones. Observed changes included loss of the patient’s

spiritual life narrative, a sense of spiritual emptiness, diminished participation in spiritual practices (e.g., personal prayer and corporate worship), difficulty experiencing God’s comfort, and experienced guilt about the loss of close relationships in a community of faith.<sup>23</sup> We do not, of course, question the spirituality of these individuals just because they are suffering from a terrible disease and are not participating in private or corporate worship as they once did. It is important to note, however, that those patients who tended to rely on these kinds of activities in their spiritual practice often found it more difficult to feel close to God and to benefit from his presence, as a result of the disease.

### *Neurotheology and the God Gene*

In the last ten years, several research centers began investigating the role of the brain in religious and spiritual experiences.<sup>24</sup> Neurotheology—an inaccurate term in that neurotheology does not deal with theology per se—is the name some give to this field of research, and the findings of these researchers attract the attention of not only their fellow scientists, but of the general public as well. Several articles in popular magazines such as *Newsweek* and books in Barnes & Noble attest to the general interest this kind of research generates.

Mario Beauregard, a neuroscientist at the University of Montreal, in his 2007 book, *The Spiritual Brain*, documents his studies of Carmelite nuns, finding that spiritual experiences are mediated via complex neural pathways and distributed brain regions.<sup>25</sup> The brains of these nuns were imaged (using functional magnetic resonance imaging) during a contemplative mystical experience. A widespread pattern of activity was observed throughout the prefrontal, temporal, parietal, and occipital cortices. Subcortical regions (e.g., insula, caudate, and brainstem) were also involved.<sup>26</sup>

Similar findings are reported by Andrew Newberg at the University of Pennsylvania in his study (using single photon emission computed tomography, or SPECT) of Buddhist monks during spiritual meditation and Franciscan nuns during contemplative prayer.<sup>27</sup> Again, widespread activation of the brain was observed, including the frontal cortex, and a reduction of activity was noted in some parts of the parietal lobe.<sup>28</sup>

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Changes in frontal and parietal lobe activity, as well as in amygdala, were also reported in a study measuring regional cerebral blood flow during glossolalia.<sup>29</sup> Decreased activity in the frontal lobe was seen as supportive of the hypothesis that glossolalia is related to a perceived loss of intentional control, and increases in amygdala activity were consistent with the emotional nature of glossolalia.

Findings such as these suggest that complex neural activity occurs in distributed brain areas during various kinds of spiritual and religious practices, reflecting the multifaceted nature of these experiences. The importance of these findings is not that they suggest a “God spot” in the brain, as some in the mainstream media have said in misrepresenting this work, or that God is just in one’s head. It is also important, as Azari and Slors caution, not to try to explain too much from these neuroimaging data.<sup>30</sup> Even so, the brain is involved in all of our behavior and experience. All that we think, do, feel, or believe involves the brain in some way. While acknowledging that what we perceive and what we know are influenced by context and culture, it is nevertheless accepted, by scientists at least, that the neural electrical patterns in our brains are accurate representations of reality. If the reality in which we find ourselves is accurately represented in the neural activity of the brain (which evolved in this reality), then we should not be surprised or in any way troubled by the fact that we experience God, who we believe is also part of the reality in which we find ourselves, by using our brains as well. If we as embodied creatures are made for a relationship with God, would not God have made it possible to experience him through our embodied natures?

Other researchers are interested in a genetic contribution to belief and faith. Studies of twins at the University of Minnesota suggest that upwards of fifty percent of one’s religious attitudes and values are influenced by genetic factors.<sup>31</sup> More recently, Dean Hamer, a geneticist at the National Cancer Institute (USA), gained attention with the publication of his provocatively titled book *The God Gene*, which suggests that human spirituality is an instinct that is “hardwired into our genes.”<sup>32</sup> Hamer’s “God gene” is actually a variant of a gene that produces a protein involved in communication between brain cells. Hamer found a correlation, not a causal connection, between the presence of this gene variant,

called VMAT2, and a paper-and-pencil scale designed to measure a character trait called self-transcendence. This measure includes subscales for self-forgetfulness, transpersonal identification, and mysticism, each thought to be an aspect of spirituality by the person who constructed the scale. VMAT2 was most strongly associated with the self-forgetfulness subscale, more weakly with the other two. While the title of Hamer’s book certainly grabs one’s attention in a bookstore, the nature of the research described within the book is less extraordinary than the title suggests. (Carl Zimmer, a well-known science writer in his own right, famously suggested in his October 2004 *Scientific American* review of Hamer’s book that a better, more accurate title would be, *A Gene That Accounts for Less Than One Percent of the Variance Found in Scores on Psychological Questionnaires Designed to Measure a Factor Called Self-Transcendence, Which Can Signify Everything from Belonging to the Green Party to Believing in ESP, According to One Unpublished, Unreplicated Study.*)

The empirical evidence cited above is suggestive of a biological foundation for spirituality as it is defined in this article, namely, the capacity to relate to and have a cognitive representation of the self, to have relatedness with others, and to have relatedness to God. None of the evidence is intended to demonstrate beyond doubt that spirituality is an innate and emerging process of the human brain. Even less is it intended to try to prove the existence of God. Science is necessarily naturalistic in its methods; it cannot address issues dealing with the nonmaterial or supernatural. Thus, no empirical data can answer ultimate questions raised by religion.

Despite this limitation, some researchers in this area are nevertheless reductionistic in their understanding of the data.<sup>33</sup> Persinger, for example, interprets spiritual and religious experiences as merely temporal lobe microseizures or transients. While these experiences might have had evolutionary significance, the continuation of spiritual and religious experiences “within contemporary human behavior is ominous,”<sup>34</sup> and he worries about the correlations between these experiences and aggression, helplessness and complacency. He also expresses concern about how “the decision-making patterns of people who occupy powerful political positions” might be influenced by these spiritual/religious experiences.<sup>35</sup>

Joseph also links spiritual experiences to temporal lobe and limbic structures, suggesting that these brain areas serve as a “transmitter to God” as well as accounting for “sexual and violent aspects of religious behavior.”<sup>36</sup> In a less reductionistic manner, however, Joseph does acknowledge that a true scientist cannot rule out the possibility that these brain structures evolved as they did because there are spiritual data to which humans can respond, and doing so increases the likelihood of survival.<sup>37</sup>

Notwithstanding the negative arguments presented by researchers such as Persinger and Joseph, the data cited above can provide support for the truth of theological beliefs that are initially taken on other than empirical bases. If one believes, on theological grounds, that God is at least partially understood as Father, Son, and Holy Spirit in relationship, and that this God created humans to be in a relationship with him (“Let us make man in our image, after our likeness ...” Gen. 1:26, RSV), then one might expect God to make the capacity to have this relationship embodied in our physical being. One might expect this capacity for spirituality to be innate, and therefore universal, and the evidence cited above can be interpreted as supporting, not proving, that expectation. Given this assumption, how might this innate and universal capacity for relatedness have developed? By what naturalistic mechanism, the only kind of mechanism revealed by science, might a biology of spirituality have emerged?

## The Development of a Biology of Spirituality

John Teske, in arguing for the embodiment of spirituality, suggests that human spirituality is a product of the same processes of evolution that make social life possible.<sup>38</sup> Others have also suggested that spirituality (or religion) is the product of natural selection. What are some of the possible ways that evolutionary theory might be applied to an understanding of spirituality’s apparent universality? David Sloan Wilson presents five evolutionary hypotheses that can be used to try to understand the presence of spirituality.<sup>39</sup> One perspective is to view spirituality as an adaptation, built into humans as a result of natural selection, with the outcome that spirituality serves for the benefit of religious groups. In other words, spirituality is selected at the level of the group via genetic as well as cultural processes. A second view

is that spirituality is an adaptation, but that selection is at the level of the individual; it is the individual, not the group as a whole, which benefits from spirituality, so some members of a group will reap the advantages of spirituality while other members of the group will not. A third option utilizes the concept of memes to try to explain spirituality by suggesting that the cultural characteristics of spirituality (and religion) act like parasites and infect the minds of the “spiritual,” much like viruses infect their unfortunate hosts.

In addition to these adaptation approaches, there are those arguments that see spirituality (or religion) as nonadaptive. The first of these nonadaptive approaches suggests that characteristics of spirituality were possibly adaptive in the past when groups were small and the individuals in the groups tended to be genetically related to each other, but that these traits are not adaptive in large groups of unrelated individuals. Another nonadaptive approach argues that spirituality is a functionless by-product of cognitive processes that are themselves adaptive in nonspiritual contexts. In other words, relatedness to God, a characteristic of spirituality as defined in this article, is a nonadaptive by-product of adaptive cognitive processes involved in relatedness to other humans. The cognitive processes involved in developing relationships to others evolved because this type of relatedness was important in human ancestral history. Relatedness to God is a by-product of these adaptive cognitive processes, but has no adaptive survival function in and of itself.<sup>40</sup>

For spirituality or any other characteristic to be adaptive, it is necessary to show that it increases the survivability of the individual (or group). Support for the view that spirituality is an adaptation is seen, some argue, in the positive relationship between spirituality and health.<sup>41</sup> Individuals scoring high on measures of spirituality also tend to score positively on various measures of physical as well as mental health, including lower levels of disease risk and lower mortality rates. In analyzing the adaptive nature of religion, Joseph Bulbulia maintains that such evidence can be interpreted as suggesting that natural selection “endorsed religious cognition because religion assists in restoring and maintaining individual well-being.”<sup>42</sup> Given the overlap in research findings on the effect of spirituality and religion on health, and the close connection between spirituality

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and cognition maintained in this article, a similar statement might be proposed to argue for the adaptive nature of spirituality as well. To show that a characteristic or capacity is an adaptation, it is also important to link that capacity to particular brain regions or structures that have been selected for in evolution. Some of the literature discussed above speaks to this requirement. It can be argued, however, that while the cognitive (and brain) structures necessary for developing self-relatedness and relationships with others was selected by evolution because of their survival value, the third part of relatedness, to God, is still a by-product, not a specific adaptation.

McNamara suggests that the influential role the prefrontal cortex has on social cognition (see discussion above) supports viewing spirituality as an adaptation.<sup>43</sup> The way that spirituality performs this adaptive function is by “tapping the neurochemistry of the prefrontal lobes to support moral, filiative, and prosocial behaviors,”<sup>44</sup> all of which encourage cooperation and relatedness. The ability to inhibit selfish behavior, cheating, and short-term gratification are necessary to establish trusting, long-term, cooperative relationships with others. These relationships, in turn, are required for human survival. Cognitive mechanisms that mediate these prosocial behaviors would be selected, leading to adaptation and reproductive success.

The nonadaptive by-product view is the perspective presented by psychologist Lee Kirkpatrick and anthropologist Pascal Boyer. For Kirkpatrick, spirituality is considered a by-product of a system that is meant to do something else, in this case, provide the necessary cognitive processes to enable social cognition and the development of relationships with other humans. There are different kinds of evolutionary by-products. One type is known as a spandrel, which “refers to incidental, nonfunctional (or sometimes dysfunctional) effects of adaptations that result more or less inevitably but ‘unintentionally’ from the design of an adaptation ...”<sup>45</sup> Another kind of by-product is an exaptation which “refers to the use of an adaptation for a purpose other than its original function.”<sup>46</sup> In either case, natural selection produced the cognitive processes necessary for social relatedness, and at least some of these processes were used for the purpose of developing a relationship with the transcendent or God. For many of the

writers in this area of scholarship, the fact that God, or the transcendent, does not exist in reality would no doubt suggest that the by-product is not only incidental, but also dysfunctional. Kirkpatrick also argues that, while there might be psychological benefits to spirituality, that is not the same as demonstrating reproductive success to spirituality, and it is reproductive success that is ultimately, from a gene-selection perspective, what counts. Pascal Boyer, perhaps the best-known theorist on the evolution of religion and spirituality, affirms the important role of cognition in spirituality, but ultimately ascribes spirituality as a by-product, not a capacity that was directly selected for by natural selection.<sup>47</sup>

One might say at this point that from a Darwinian perspective, it is unreasonable to suggest that there is any purpose to the selection of particular cognitive processes beyond genetic reproductive success, and that the mechanisms of mutation and selection do not, therefore, allow for any evolutionary or physical account of the development of spirituality. Simon Conway Morris, evolutionary paleobiologist at the University of Cambridge, argues convincingly that there is a kind of direction to evolution in that it has an ability to repeatedly “navigate” to the correct solution to various life problems.<sup>48</sup> For example, he maintains that the eye has evolved independently multiple times, because the camera-like eye is the “solution” to the problem of seeing. Regardless of variations in environments, all solutions are not possible. There are a limited number of workable solutions, and through the process Conway Morris calls “convergence,” the correct solution is repeatedly found. Convergence to Conway Morris suggests that evolutionary trends are real, not just apparent.

Another example of convergence within nature is the emergence of sentience. Conway Morris suggests that sentience is inevitable, that the evolution of life seems to necessarily lead to intelligent life. Conway Morris is well known for his rebuttal of Stephen Jay Gould’s statement that if you play the tape of evolution over, there will be an entirely different outcome. Not so, says Conway Morris. If you play the tape of evolution over, you will get pretty much the same outcome we have now (namely, intelligent life more or less in the current human form). The reason for this is evolutionary convergence which leads to sentience. Intelligent life, human life, is an evolutionary inevitability. The ideas of convergence and the inevi-

tability of intelligent life provide scientific support for the theological position that God created humans for the purpose of having a relationship with him. If Simon Conway Morris is correct about convergence and the inevitability of intelligent human life, then the natural mechanisms of mutation and selection could be the means whereby God created the embodied spiritual nature of humans, that part of our human capacity that enables us to establish personal relatedness.

## Why a Biology of Spirituality Might Be Expected

We have seen that there is empirical evidence for a biological basis of spirituality when spirituality is understood as personal relatedness, i.e., relatedness to one's self, to others, and to God. What grounds are there, from a Christian theological perspective, for expecting an innate, biologically based spirituality in humans? Why should we not be surprised at the findings presented by the Commission on Children at Risk, that we are hardwired to connect, not only with other members of our species, but also to the transcendent?

Aquinas believed that because humans share in the *imago Dei*, we have a passion for communion with God; we are driven toward a relationship with him and are attracted to God who is the object of this passion.<sup>49</sup> Trinitarian theology provides a rationale for why humans should experience this lure of the Divine. Miner argues that a Trinitarian perspective is necessary because it focuses on all members of the Godhead (rather than viewing God as simply Creator/Father) and how the relationships within the Godhead can be seen as a model for human relationships, both with God and with other humans.<sup>50</sup> God as relational has implications for our being made in the likeness of God, the *imago Dei*,<sup>51</sup> and this central Christian doctrine suggests that our destiny is to enter into fellowship with God, a destiny manifested on Earth as a drive to relate to something beyond ourselves.<sup>52</sup> It is in relationship with others that we reflect the image of God and reach our full potential as humans.<sup>53</sup> According to Miner, and consistent with Aquinas, "God is attuned to and desires relationship with humans. Human longing for God is a result of an innate, God-given capacity to pursue relationships."<sup>54</sup> Our spirituality is the capacity to engage in these relationships, and it should not be

surprising that this God-given capacity has a biological basis or that it emerges out of brain functioning. We are embodied beings whose physical natures are affected by, and are involved in creating, all of our experiences, including our relationships. To the extent that our spirituality involves relatedness, our physical nature, our biology, will be involved and will mediate these relationships, even our most important relationship to God. □

## Notes

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- <sup>6</sup> G. Simon Harak, *Virtuous Passions: The Formation of Christian Character* (Eugene, OR: Wipf and Stock, 1993), 60.
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- <sup>8</sup> David Hay, *Something There: The Biology of the Human Spirit* (West Conshohocken, PA: The Templeton Foundation Press, 2007); David Hay and Pawel M. Socha, "Spirituality as a Natural Phenomenon: Bringing Biological and Psychological Perspectives Together," *Zygon* 40 (2005): 589–612.
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- <sup>16</sup>Kevin S. Seybold, "Physiological Mechanisms Involved in Religiosity/Spirituality and Health," *Journal of Behavioral Medicine* 30 (2007): 303-9.
- <sup>17</sup>Hay, *Something There: The Biology of the Human Spirit*.
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