

MINDING GOD/MINDING PAIN: CHRISTIAN
THEOLOGICAL REFLECTIONS ON RECENT
ADVANCES IN PAIN RESEARCH

by *Jacqueline R. Cameron*

Abstract. As Gregory Peterson's book *Minding God* illustrates, an ongoing encounter between theology and the cognitive sciences can provide rich insights to both disciplines. Similarly, reflection on recent advances in pain research can prove to be fertile ground in which further theological insights might take root. Pain researchers remind us that pain is both a sensory and an emotional experience. The emotional component of pain is critically important for the clinical management of people in pain, as it serves a communicative function—human connection occurs more readily through the expression of and response to emotion than through the sterile exchange of “objective” descriptions of sensory phenomena. But emotion, pain and communication also figure prominently in Christian theology. For example, doctrines of incarnation and eschatology raise questions about suffering, healing, and hope as well as about the nature of the divine-human relationship. In addition, there seems to be scientific evidence for (admittedly subtle) gender differences in the perception of and response to pain. Several feminist theologians have noted that a habitual theological emphasis on God's rationality tends to reinforce masculine images of God and demeans the validity of emotion in the divine-human relationship. Potential theological implications of the emotional and communicative aspects of pain and how this might affect women's religious experience—with a particular focus on Teresa of Avila—are explored.

Keywords: emotional or affective; gender; healing; pain; plasticity; redemption; suffering; transformation.

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Gregory Peterson claims in his book *Minding God* that “all forms of theology stand to be affected by a serious dialogue with the cognitive sciences” (2003, 10). He is correct. Any theology that is unwilling to engage science undermines both the value of the physical world and the humans who seek a deeper understanding of it. In recent years, much theological and scientific attention has been directed toward the study of human consciousness and mind/brain.

Pain research, a somewhat more focused area of neuroscientific inquiry, also raises intriguing theological questions and suggests insights that may contribute to the larger discussion. Christian theology—particularly with regard to doctrines of incarnation, salvation, and eschatology—addresses pain, suffering, healing, and hope and may be enriched through reflection on humans’ experience of pain and from recent advances in pain studies.

In this essay I review some of the basic neurophysiology of pain and explore possible theological insights raised by reflecting on these neurological phenomena and their effects on human living and encounter with God. I give particular attention to feminist criticisms that many traditional approaches to Christology and atonement place excessive emphasis on the rational and on God’s remoteness from humankind while ignoring the importance of emotion and relationality. Feminist concerns about whether a male savior can really “speak” to women’s deepest needs are also addressed. A second major focus is on transformation: I briefly explore the astounding capacity of nerves to change in response to experience (neuroplasticity) and how this might relate to themes of transformation, which are prominent in doctrines of salvation and eschatology.

Discussions of pain and suffering naturally lead to “why” questions. Why is there pain at all? Worse, why is there so much pain and suffering? These are terribly important questions, particularly for persons of faith who believe in a good, loving, and powerful divine Being, a Being who is still in relationship with creation. However, theodicy is not my major focus. I simply start with the fact that pain exists in creation and that it serves some good ends but also can result in terrible and deeply destructive suffering. My guiding question is more along the lines of “Given that pain and suffering exist, where and how might we find healing and hope?” rather than “Is all this pain really necessary?”

As a working theological paradigm I subscribe to the more evolutionary or unfolding vision of creation as set forth by Arthur Peacocke and John Polkinghorne rather than to a more traditional fall-from-a-once-perfect-creation model. The former model acknowledges that pain and death are a natural part of an unfolding and evolving universe, part of the freedom granted by a Creator who operates more by coaxing or drawing or inviting than by allowing pain and death to enter a previously perfect world as punishment for human sin (Peacocke 1993, 119, 168–77; Polkinghorne 2002, 15; 2000, 29–30). Such an evolutionary approach to theology still

admits that humans introduce even more destruction and suffering than would naturally occur—we call this sin—and acknowledges that all pain and suffering (or at least all human pain and suffering) needs to be redeemed.

PAIN: SENSORY AND EMOTIONAL

What is pain? The International Association for the Study of Pain has defined pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Merskey and Bogduk 1994, 209). Pain is both sensory and emotional. Pain researchers Richard Chapman and Yoshio Nakamura insist that we have been getting it wrong by viewing pain as a “purely” sensory process. Pain neurons project to a variety of brain structures active in emotional responses. The sensory aspect of a painful stimulus cannot be separated from emotional responses that accompany it. Chapman and Nakamura further claim that “while sensory qualities are salient and quantifiable features of pain, they are only partial indicators of pain as a conscious experience. The affective aspects of pain, while much harder to engage scientifically, are more important to the sufferer than the sensory signals” (1999, 392).

According to Chapman and Nakamura, “emotion represents in consciousness the biological importance or meaning of an event to the perceiver” (1999, 399). This inseparability of sensation and emotion in pain is analogous to Antonio Damasio’s (and other neurologists’) insistence that reason or rational functioning also cannot be separated from emotion and normal emotional functioning (Damasio 1994, xiii–xv, 247–50).

The fundamental pattern that underlies the experience of pain—from the painful or noxious stimulus to perception—is transduction, transmission, modulation, and central representation (Chapman and Nakamura 1999, 391, 393–98). *Transduction* occurs when a stimulus reaches a certain magnitude—for example, when you hit your thumb with a hammer—and neurons are depolarized, or “fire.” The impulse is *transmitted* to the dorsal horn of the spinal cord, where the peripheral nerves synapse or connect with spinal neurons. These spinal neurons are organized into pathways that project (travel) to a wide variety of brain structures. Some project directly to limbic-system structures that mediate emotional responses (Price 2000, 1769–72). Most project to the thalamus, a very important central relay station, and then to the sensory cortex. There are also neurons that project from the sensory cortex to the limbic system. When you realize that your thumb hurts, you are experiencing evidence of *central representation*.

All along the pathway are mechanisms by which pain transmission can be altered, or *modulated*. Various endogenous substances, medications (such as morphine or antidepressants), and cognitive or emotional factors can act on pain-transmitting neurons to increase or decrease the intensity of the (eventual) perception of pain.

EMOTION AND COMMUNICATION—DIVINE AND HUMAN

We have seen that there is an intimate physiological link between the more overtly sensory aspect of pain and the emotional component of pain. Why does this matter? Chapman and Nakamura claim that “psychologically, the emotional aspect of pain is important because emotion serves a *communicative* function. While we cannot share directly in another’s sensory experience, we can observe the emotional expressions occasioned by another’s pain and we typically react empathically and affectively to those expressions . . . emotional expression makes possible the second person reality of pain, which at the sensory level is purely first person” (1999, 399; emphasis added).

No one can ever completely share another’s pain. We can never know directly what another’s pain truly feels like. This is why medical educators often use a more clinical definition of pain: “pain is whatever the patient says it is.” Descriptive sensory words such as *sharp, dull, aching, or tingling* help, but they allow us to maintain a certain clinical distance and do not allow a deeper insight into how the pain is really affecting the patient. On the other hand, a person’s emotional responses to pain call forth a deeper response in us as well; sometimes it draws us closer, sometimes it makes us want to withdraw. It seems likely that at its most primal the emotional dimension of pain serves as a link to what is popularly known as the fight-or-flight instinct, but it also seems likely that it may additionally serve as a link to other emotionally charged neuropsychosocial phenomena or processes such as those involved in mediating altruistic or empathic responses.¹

If pain, as sensory and emotional experience, can serve a communicative function between humans, there may be interesting parallels in Christian theology. James Dunn states, “Initially at least, Christ was not thought of as a divine being who had preexisted with God, but *as the climactic embodiment of God’s power and purpose*—his life, death and resurrection understood in terms of *God himself reaching out to men*. Christ was identified . . . with *God’s creative wisdom, God’s redemptive purpose, God’s revelatory word, God’s clearest self-expression, God’s last word*” (1980, 262; emphasis added). Commenting on this, Peacocke observes, “These descriptions of what Jesus the Christ was to those who encountered him and to the early church are all . . . about *God communicating to humanity*” (1993, 296; emphasis added).

Jesus’ generous but brief life ended in severe and very public pain. If Jesus really is God’s ultimate self-communication mediated (at least in part) through a suffering human, we discover yet another intriguing connection between neuroscience and theology. Hearing and responding to this embodied divine communication must also involve the entirety of our own “embodied mind/brain” (Peterson 2003, 43).

As he argued against the idea of a distant, dispassionate God who was “incapable of suffering,” William Temple observed, “What is portrayed

under the figure of physical suffering and literal blood-shedding is only a part of the pain which sin inflicts on God. . . . No further entry of the supreme God into the tangle and bewilderment of finitude can be conceived." This is followed by an interlude of somewhat problematic theodicy, but Temple then continues, "In the midst of the human history . . . came the manifestation of the perfect love. . . . That manifestation calls forth the spirit of love in men, by which they can be lifted out of their self-centeredness into an answering love" (1924, 269–71). If choice of language is any indication, it would seem that Temple (like Dunn) was not feminist, but he did pick up on the fact that the emotional aspect of pain can lead to empathic connection.

In *Minding God* Peterson notes that feminist theologians "have argued that the emphasis on the rationality of God and the *rejection of emotional states* has privileged the masculine models of God" (2003, 198; emphasis added). Theologian Ellen Leonard questions whether an emphasis on the pain and suffering of Jesus, especially if viewed as passive and purely submissive, simply serves to reinforce oppressive structures and encourage the weaker or less powerful members of society to simply remain in their subordinate positions: "Theories of atonement which seem to glorify suffering or which do not respect personal responsibility must not be perpetuated . . . an inclusive Christology will be based on interdependence and mutuality. It will not take over human responsibility by claiming that we are already saved in Christ . . . it will empower all persons to be responsible for one another and for our world" (Leonard 1997, 336).

The sixteenth-century Spanish mystic Teresa of Avila powerfully demonstrates how her identification with the human Jesus' pain drew her into a relationship of profound love and equality, a relationship that transformed her own self-image and empowered her to resist some of her male confessors and other church leaders who tried to suppress her visions and reforms. According to Constance FitzGerald, Teresa was transformed by the image of the human Jesus—the suffering Jesus who needed *her*. Teresa was not transformed by more typical rationalistic theories about the hows and whys of atonement. FitzGerald notes how Teresa's relationship with the human Jesus placed Teresa on a more equal level with Jesus, radically different from the very male-dominated hierarchical world of sixteenth-century Spain. FitzGerald writes,

We see also that God . . . is on the side, not of lifelong subordination and inferiority, but of development characterized by mutuality. . . . What must be stressed here again is the all pervasive presence of the *dialogue*, or the dynamic of reciprocity, between Jesus and Teresa. . . . She tells us that, although it was the risen Jesus who accompanied her, when she was suffering and when she was wounded by misunderstanding and persecution, he appeared on the cross or in the garden, wounded or crowned with thorns. In fact, he took her part and guided her through the misunderstandings, suspicions and poor counsel of her confessor who continued to believe she was deceived by the devil and should resist her visions. (FitzGerald 1988, 77; emphasis added)

FitzGerald also recounts John of the Cross's description of a vision Teresa had at age 57, in which Jesus gave her his right hand, showed her a nail, and told her that the nail would be a sign that she would be his bride from that day on. FitzGerald observes, "In the nail we understand that all the painful past was brought into this union. The nail sealed forever Teresa's identification with the dying, abandoned Jesus. *Because they had shared a common pain, all their possessions were now held in common.* . . . For God and for Teresa, the heart of equality is love" (1988, 90; emphasis added).

FitzGerald closes with Teresa's observation that women tend to have experiences of ecstatic union with God more frequently than men do: "There are many more women than men to whom the Lord grants these favors. This I heard from the saintly Friar Peter of Alcantara—and I, too, have observed it—who said that women make much more progress along this road than men do. He gave excellent reasons for this, all in favor of women, but there's no need to mention them here" (1988, 90; Teresa of Avila 1976, 280). One wishes that she *had* felt the need to mention those reasons!

But what does Teresa have to offer women of today? Leonard, quoting Rita Nakashima Brock, observes, "she [Brock] looks for a Jesus who draws on community and together they 'co-create liberation and healing from broken-heartedness'" (Leonard 1997, 333). This pattern is evident in Teresa's life. As FitzGerald observes, in Teresa's "deep emotional identification with the humanity of God, she herself experienced a new solidarity with everything human in herself and others" (1988, 82). Teresa's identification with the wounded Jesus and Jesus' identification with the wounded Teresa did not merely engender submissive acceptance of the status quo. Teresa's affective bond with the wounded Jesus was strengthened and deepened through her own physical and spiritual pain. This was not merely an experience of private communion and mutual sympathy that had no significant effect on Teresa's daily or outward life. It was not simply a matter of companionship and comfort in shared suffering. Rather, this relationship caused her to grow in strength and courage—a strength and courage that empowered Teresa to lead significant reforms even in the midst of an often hostile church and cultural environment. Even as she challenged those in authority over her, Teresa knew all too well that the church and its human leaders were fully capable of inflicting further pain on her. Her courage to face the possibility of future pain was rooted in and flourished in her past experience of shared pain and of shared strength.

In some circumstances, therefore, pain can be viewed as a fundamental, powerful, and potentially redemptive human experience in that it can bring us to an encounter with a God who will stop at nothing to speak a word of invitation and love to us. Furthermore, this view of Jesus as God's living communication—as the fullest expression of God's love and invitation to healing and redemption rather than as a passive sacrificial victim slaugh-

tered to appease an offended deity or to meet the demands of a passionless cosmic lawgiver—might begin to address some feminist theologians' valid concerns that an overemphasis on the image of the suffering Jesus might simply serve to reinforce oppressive structures and ensure the continued subordination of women.

GENDER DIFFERENCES IN PAIN PERCEPTION AND EXPERIENCE

Recent studies comparing the differences in pain perception and response between women and men have shown that, in general, women are more likely to suffer from painful conditions such as multiple sclerosis, fibromyalgia syndrome, temporomandibular joint disorders, and irritable bowel syndrome (Aloisi 2003, 168; Karibe, Goddard and Gear 2003, 112; Naliboff et al. 2003, 1738; Chang and Heitkemper 2002, 1686; Heitkemper et al. 2003, 56).

In one study, women with angina (heart-related pain due to coronary artery disease) were more likely than men to describe themselves as “pain-enduring” and more likely to be undertreated (Vodopiutz et al. 2002, 719). In other studies, women with angina and women with painful peripheral arterial disease were more likely to be more debilitated by their pain than men, even though they rated the intensity of that pain similarly (Kimble et al. 2003, 45; McDermott et al. 2003, 222). And, in general, there is some evidence that seems to indicate that women have significantly lower pain thresholds than men—that is, they perceive a painful stimulus at a lower level of intensity than men do (Isselee et al. 2001, 27; Chesterton et al. 2003, 259; Sarlani, Farooq, and Greenspan 2003, 9). Women also respond to pain-relieving medications differently than men do (Craft 2003, 175; Pleym et al. 2003, 241; Criste 2002, 475; Keogh and Witt 2001, 886; Staud et al. 2003, 167; Jones, Zachariae, and Arendt-Nielsen 2003, 387). Many of these pain-related gender differences have been noted in animal studies as well in studies of humans (Barrett, Smith, and Picker 2002, 163; Mitrovic et al. 2003, 271; Bereiter, Shen, and Benetti 2002, 89; Terner et al. 2002, 183).

There are some very important caveats. These differences are subtle and not universal, and it is not the case that any time you compared a *particular* woman's pain threshold to that of a *particular* man the woman's would be lower. However, there does appear to be a tendency for women to have lower pain thresholds than men; in general, it seems that women are in some sense more attuned to pain than men are. Given this difference, though, and remembering that pain is both sensory and emotional and that the emotional component of pain is communicative, it might be fair to say that women tend to be (or at least are better equipped to be) more emotionally attuned to others' pain as well as their own.

In some sense Jesus spoke the language of pain through his painful death. Clearly, this is not the only “language” he spoke; his life ministry centered

around healing and teaching. However, if the emotional aspects of pain are somehow communicative, then, even though Jesus was male, through his pain he spoke a language to which women seem in some way to be more naturally attuned. This is *not* a matter of submission (Jesus submitted, and therefore those who find themselves in submissive roles, usually women, should be content in those roles). It is more a matter of meeting women where they already are. Of course, as Leonard points out, this raises a potential problem: How does such an observation encourage us to fight pain, suffering, and oppression? In Teresa of Avila we see one example of how such identification between one woman and the suffering Christ led to her empowerment, which in turn allowed her to empower other women.

WHEN PAIN BECOMES SUFFERING

So much for so-called normal pain. As scholars Elaine Scarry, Eric Cassell, and many others have observed, and as those who suffer from chronic pain know from experience, pain can also become an extremely destructive and “dis-integrating” force (Cassell 1982, 640; Scarry 1985, 4). It can rob us of language, of hope, of meaning, and even of life itself.

As noted earlier, normally transmitted, or *nociceptive*, pain is detected in response to tissue damage by specialized receptors and transmitted through normal neuronal pathways. *Neuropathic* pain is *dysfunctional*. Through a variety of mechanisms, damaged nerves frequently develop abnormal firing patterns. Sometimes they fire (depolarize) spontaneously (i.e., in the absence of a stimulus). Sometimes they fire too often or in response to stimuli that would not cause a normally functioning neuron to fire. Damage to peripheral and spinal nerves can result in sensitization of and changes in neurons “higher up” in the central nervous system. This is called “central sensitization” (Payne and Gonzales 1998, 300–306) and can occur anywhere in the spinal cord or brain. It is probably responsible for phenomena such as phantom limb pain, in which a person continues to experience (often severe) limb pain after the limb has been amputated (Basbaum and Jessell 2000, 479). Similarly, cancer patients who have undergone pain-relieving neurosurgical procedures such as cordotomy (in which a segment of a spinal pain pathway is severed) commonly have recurrent or persistent pain. Even though the connection between the originally painful part of the body and the brain has been severed, the perception of pain persists because of changes that have occurred in neurons “higher up” in the brain.

Pain researchers have found that a single episode of severe pain from trauma, disease, or other injury can lead to irreversible changes throughout the nervous system that result in continuous and debilitating pain. Again, as noted earlier, neuronal changes sometimes occur at a significant

distance from the site of original injury. It is a kind of post-traumatic stress disorder (PTSD) of the pain pathways. Once this happens, there is no going back to the way things were. Changes can occur in the dorsal horn of the spinal cord as well as in the brain. As Allan Basbaum and Thomas Jessell put it, “there is a change in thalamic and cortical circuits in chronic pain conditions. Thus, patients who have experienced persistent pain due to injury have functionally different brains from those who have not experienced such pain” (2000, 481). Plasticity, the ability of the nervous system to change in response to experience, is an astonishing and essential quality of neural pathways. It allows us to learn and to change as a result of experience. However, plasticity becomes an unwitting yet destructive partner in the development of neuropathic pain (and, in the case of PTSD, of psychic “pain”).

At this time, most clinical efforts to relieve severe, persistent neuropathic pain aim to modify (modulate) or inhibit transmission of these abnormal impulses (recall the pattern of transduction, transmission, modulation, central representation). Most patients get significant relief from these interventions, but many do not. Many people with severe chronic pain feel so overwhelmed by their pain that they consider suicide (Breitbart 1987, 49–53; Breitbart, Passik, and Payne 1998, 440). Death may be seen as the only means of escape. If transformation and healing are not possible, persons in severe pain may consider annihilation preferable to continued agony.

NEUROPLASTICITY AND TRANSFORMATION:
RESURRECTION, ESCHATOLOGY AND HOPE

Because of the double-edged nature of neural plasticity, healing cannot be simply a matter of returning to a pre-injury or pre-illness state. There is no going back to the way things were. In what ways, then, might we seek to go forward? From a clinical standpoint, would it not be preferable to find ways to guide and to coax damaged pain pathways into healthier, more adaptive modes of functioning? Since there is no way to simply erase the effects of past negative experience, wouldn't it be wonderful if an overwhelmingly good experience could transform damaged pain pathways into new and healthier modes of functioning?²

With what theological claims might these questions resonate? On a very basic level, Jesus' resurrection and reappearance as a still-recognizable but transformed individual can be seen as a strong indication that God wills healing transformation rather than annihilation and death. However, Jesus did die, and each of us will die as well. Even for Jesus, resurrection was not simply a matter of being restored to a previous healthy state or of simply evolving into a better mode of existence. Similarly, for us—individuals and all of creation—healing can never be simply a matter of going backward to a better time, a time before all the bad choices, all the

suffering, all the losses occurred. Redemption must be a being drawn forward through healing to a new kind of wholeness (Peterson 2003, 155).

Furthermore, chronic or neuropathic pain is one of the relatively rare instances in which the body is not able to heal itself. Minor episodes of pain end, and minor wounds heal on their own. However, in the case of chronic pain, outside intervention is required. In some very fundamental ways, we cannot heal ourselves. Similarly, from a Christian perspective, our entire hope for complete healing and for new life rests in the love, faithfulness, and power of God, not in ourselves or in other humans (Anderson 1998, 193; Green 1998, 170).³ Furthermore, it seems clear, at least from our current vantage point, that we will not simply continue to evolve or to be transformed into ever-increasing health and redemption in the world as we now know it. Physicists insist that our universe will not be able to support carbon-based life forms indefinitely. Some current theorists expect that the universe will continue to expand, rendering it incapable of sustaining current life forms, while others postulate a reversal of expansion, resulting in what some have rather flippantly referred to as “the big crunch” (Polkinghorne 2002, 6–9; Stoeger 2000, 20–27). As many theologians have observed, any Christian hope of redemption and new life or resurrection must face the stark fact of death and the bodily disintegration that accompanies it. Any hope for continuity must also account for this radical discontinuity.

And yet, if there is to be redemption and not simply annihilation and reconstitution of a completely new universe populated by completely new creatures, there must be a significant continuity as well. As we have seen, because of neural plasticity and the very real changes that occur as we live and interact with each other, with God and with the world, we are changed as we live. Sometimes we are made more broken and sometimes more whole. We are not simply creatures who *have* memories and experiences, we *are* our memories; we *are* our experiences. If we somehow tried to separate a “self” from “experiences” we would fail, because we change as we live, and those changes—good and bad—become part of who we are.

For example, after the devastating loss of someone I love, I feel less “like myself.” Grief leaves me feeling hollow, empty, and flat. I have been changed. I am different now, and there is no going back. Persons with chronic pain also bear a constant reminder that they have been changed. The pain is now a constant and unwelcome companion. This pain alters self-perception, changes the dynamics in interpersonal relationships, and interferes with daily living. Severe or chronic physical pain, like emotional pain, is like a little death; even though one still experiences significant continuity, significant discontinuity has been introduced.

In his eschatological vision, Polkinghorne insists that any pain, any injustice here will not simply be forgotten or erased in the world to come. Any hope of resurrection or of life in a restored world to come must ac-

count for all of the pain and brokenness that has become part of us during our lifetime here. Hope does not ignore the past; in fact, hope is not possible without a kind of stubborn and honest remembering that acknowledges all of the wounds of the past yet still allows us to look forward to a time when our wounds will be not forgotten but healed. Somehow, brokenness and pain must be redeemed:

If eschatology is to make sense, all the generations of history must attain their ultimate and individual meaning. Christianity takes the reality of evil seriously, with all the perplexities that entails. It “refuses the premature consolation that preempts grief, the facile optimism which cannot recognize evil for what it is.” As part of its unflinching engagement with history, Christianity will recognize that episodes like the Holocaust deny to it any shallow conception of what hope for the future might mean, as if it could be divorced from acknowledgement of the horror of the past. . . . Hope, then, must involve the redemption of the past as well as a promised fulfillment in the future. Indeed, the one requires the other. If it is to be true and total, hope must look in both directions. . . . Without forgiveness there can be no redemption of the past. (Polkinghorne 2002, 96; quote from Bauckman and Hart 1999, 42)

Polkinghorne also insists that because all evil, all pain and suffering, must eventually be redeemed and healed, it is far better to cooperate with God in God’s ongoing work of creating and redeeming—of God’s continuing call to wholeness—now, in our varied present circumstances, rather than to oppose God by introducing more suffering or by failing to struggle to minimize suffering and evil. In this vision, God will ultimately prevail, but what happens along the way does matter. This might at least partly address Leonard’s concern (1997) that an overemphasis on Christ’s suffering might not provide sufficient impetus to fight against suffering. If all suffering and sin is remembered and must eventually be healed or forgiven or purged, what we do here and now really does matter on an individual and a cosmic scale.

Peacocke and many other theologians also argue for an eschatology that can embrace a more evolutionary vision of the cosmos. These and other approaches that emphasize God’s ongoing creative and redeeming relationship with the world recognize that, although there is and will be significant discontinuity between the world as we presently know it and the life of the world to come, there must also be continuity. They reject theological models that expect complete annihilation or an erasing of what has gone before and insist, as Polkinghorne does, that a rich doctrine of creation and redemption cannot view this world and its inhabitants as disposable. The sweep of redemption must be broad and must bring the good to completion and fullness, but it must also draw the broken and damaged toward healing and wholeness rather than simply discard them.

Real pain is acknowledged by God, not forgotten; it must be healed, not merely erased. Our memories and our history, our pain, and our joy have been given substance in our very nerves—but not only in our nerves. In a

very real way, we remember with our whole body, from our genes to neurotransmitters, to the hormones coursing through our bloodstream, to our innermost thoughts and feelings, to our overt behaviors. Remembering is a whole-body experience. Hope must, therefore, be firmly grounded in the reality of what we have become and what we are becoming. Hope acknowledges the past and draws us toward the future. Polkinghorne's vision, like that of Nancey Murphy and many other nonreductive physicalist theologians, does not postulate a soul that simply escapes the body at death. Both Polkinghorne's and Murphy's visions of the life to come insist that somehow the entirety of who we have become over the course of a lifetime must be redeemed and healed (Murphy 1998, 23–24).

Similarly, as Peterson rightly observes, because we are a complex mixture of spiritual and physical/biological, any account of salvation must take all of these aspects of the human person into account. As he puts it, “theological claims about soteriology are incomplete unless they take the whole person—body, brain and all—into account. A religious transformation is also a psychological transformation. It is even a biological one” (2003, 94). This is true for transformation that occurs in this life and must surely, somehow, be true in the life to come.

Both theology and neuroscience show us again and again that we are all works in progress. All of creation is a work in progress. Hope insists that this process will not end in mindless destruction and death but rather that ultimate healing lies in transformation.

NOTES

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1. Communication leading to cooperation probably has evolutionary roots. In a discussion of evolution and creation in *God in Creation*, Jürgen Moltmann points out that Darwin's conception of “struggle for existence” and his evolutionary law of “the survival of the fittest” have been applied too broadly and have been used to endorse excessive competition in human society—particularly in an effort to justify capitalist and imperialist endeavors. Moltmann points out that zoologists had “demonstrated the evolutionary law of mutual help among animals and human beings: in the struggle for existence it is precisely those beings that live symbiotically which prove to be the strongest. The isolation of the human being in the competitive struggle of modern society is therefore his weakness. Darwin also already observed and described phenomena of social organization among animals and particular animal species. It was only ‘social Darwinism’ that suppressed this, misusing Darwin's theory ideologically in order to justify early capitalism and the racist policies of imperialism: if this is the way things are among animals, the argument ran, then the suppression of the weak by the strong among human beings is ‘quite natural’” (Moltmann [1985] 1993, 195).

2. Unfortunately, there is as yet no clinically useful way to accomplish this.

3. Ray Anderson puts it this way: “A holistic account of salvation points toward the restoration of ecological, social, psychological and spiritual health experienced partially in this lifetime and completely in the life to come. Salvation from sin involves not only pardon for personal guilt but the restoration of the possibility of eternal life through resurrection of the same person through a sovereign act of God's power and Spirit” (Anderson 1998, 183).

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