

## THE DISCOVERY OF MEANING THROUGH SCIENTIFIC AND RELIGIOUS FORMS OF INDWELLING

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*Abstract.* Because of similarities between some implications of Michael Polanyi's theory of personal knowledge and intelligent design, claims have been made that his theory provides support to the project of intelligent design. This essay contends that, when Polanyi's reflections on a teleological framework for contextualizing evolutionary biology are properly understood as a heuristic vision, his position contrasts sharply with the empirical claims made on behalf of intelligent design.

*Keywords:* emergence; evolution; intelligent design; personal knowledge; Michael Polanyi; teleology.

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### A CONGRUENCE BETWEEN PERSONAL KNOWLEDGE AND INTELLIGENT DESIGN?

As one whose theoretical and theological position has been strongly influenced by insights derived from the thought of Michael Polanyi, my initial understanding of several aims of the movement known as intelligent design (ID) led me to assume the possibility of some sort of congruence or convergence between these positions. Proponents of ID were challenging what they believed to be unwarranted extensions of scientific naturalism into an all-encompassing view of reality, exposing the inadequacies involved in reductivist understandings of life, and supporting efforts to detect signs of divine agency in nature—all themes that resonate with Polanyi's thought. My preliminary reading of this movement was to see it as proposing a coherent religious and theological view of the world that would acknowledge the results of contemporary science but situate them within a context

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supporting a Christian frame of reference. I expected to discover in the ID movement insights or theories that could supplement or improve my own efforts to develop a scientifically informed theological position.

The more I came to learn of intelligent design,<sup>1</sup> however, the less satisfactory it seemed to my Polanyian informed theological interests, particularly with respect to its understanding of divine agency. According to William Dembski, one of the aims of ID is to propose “a sustained theological investigation that connects the intelligence inferred by intelligent design with the God of Scripture and therewith formulates a coherent theology of nature” (1998b, 29). Normally, however, ID proponents do not make such an explicit connection between their religious and scientific agendas. The more common strategy of ID is to downplay any religious impulse motivating this movement and affirm the strong claim that empirical evidence, particularly from biology, points to the kind of teleological order in nature that requires an accounting not currently available through neo-Darwinian theory. And when we consider the “hard cases” of the origin of life (not to mention the likelihood of the antecedent conditions necessary to sustain it) or the origin of human life (Meyer 2000, 190), it must be conceded that contemporary evolutionary theory is not up to the task of providing a convincing or complete explanation. Similarly, if we consider the statistical likelihood of life’s having emerged through sheer chance, in the sense of “complex specified information,” then, the contention goes, there would have to have been more events in the universe than are possible (Dembski 1998b).<sup>2</sup> Such empirical and statistical arguments intend to point to patterns of order in nature, which lead to the conclusion that they had to be designed by an intelligence, analogous to the way a machine is designed by an engineer. And, as an engineer has to manipulate the material out of which she constructs her machine, so too any intelligence that can account for these patterns of meaning in nature had to intervene to bring them about. In short, intelligent design requires an Intervening Deity.

The leap to this sort of conclusion, however, cannot be sustained by any careful appraisal of Polanyi’s thought. This essay explores how Polanyi attempted to consider teleological features of reality. My contention is that, like most of Polanyi’s reflections, his treatment of teleology is multivalent and complex. Moreover, because of the exploratory (in the sense of his challenging reigning conceptions of scientific and philosophical assumptions) character of much of his work, Polanyi expressed many of his larger insights indirectly by focusing on elements of his view with the expectation that the reader would integrate them into his larger meaning. This larger meaning is neither simply an expansive view of science that includes teleology<sup>3</sup> nor a straightforward reading of finality in nature designed to provide empirical evidence in support of a deity. Rather, although it emerges out of a challenge to a reductionist extension of science, it is better appre-

ciated as an invitation to a more meaningful form of indwelling that can sustain the human project.

#### KNOWLEDGE AS PERSONAL

Before turning to Polanyi's treatment of teleology in nature, let us review some of the salient features of Polanyi's understanding of knowledge. First and foremost, "knowing" is always an activity, an achievement of an inquiring person; it is never merely "knowledge," something reducible to a proposition susceptible of impersonal analysis or verification. Even the relatively straightforward case of knowing some object arises out of the bodily, linguistic, cultural, and historical indwelling of the person. The person relies on all of these subsidiarily known particulars in order to integrate them into a focal whole that he can then recognize and the reality of which he can acknowledge in some propositional form.

The realization that this dynamic "from-to" structure grounds the basic pattern of knowing allows us to appreciate how discovery constitutes the paradigm case of knowing for Polanyi. Ordinarily, the routine achievement of the tacit integrations that sustain knowing conceals the dynamic thrust of the person upholding a particular instance of knowledge. But in heightened instances, such as a student's imminent breakthrough into understanding something as traditional as the Pythagorean theorem, this functional or "from-to" structure of knowing is readily apparent when considered from a Polanyian perspective. The discovery of meaning operates on a continuum from the relatively routine comprehension of everyday realities requiring a minimum of personal participation to the profound realms of meaning found in the more comprehensive cultural frameworks of science, art, and religion.<sup>4</sup>

The primary challenge to Polanyi's understanding of knowing came from an objectivism that sought validation for knowledge claims by means of some formulation of an impersonal criterion. From the vantage point of today, we can observe that the history of modern epistemological reflection consisted in the formulation of a series of varying criteria, none of which could achieve the goal of an impersonal validation of knowledge. Polanyi's accounting for this failure was to disclose how the "logic of affirmation" required the participation of the knower in upholding all explicit knowledge. "This then is our liberation from objectivism: to realize that we can voice our ultimate convictions only from within our convictions—from within the whole system of acceptances that are logically prior to any particular assertion of our own, prior to the holding of any particular piece of knowledge" (Polanyi 1964, 267). Even those proposing "universal doubt" as the method for discovering truth can do so only on the basis of tacitly upholding their own hidden commitments (Polanyi 1964, 297).

When confronting the problem of how we could accredit our individual acts of knowing, which rely on our prior acceptance of culturally given

assumptions, Polanyi offers his analysis of the way commitment functions to validate our knowledge. He begins, famously, by distinguishing between the “personal” and “subjective” states of commitment (Polanyi 1964, 300). The personal in us is what actively enters into the structure of our commitments, whereas the subjective is merely passive. Polanyi contends that the assumptions carried by our commitment to our cultural ideals bring forth requirements and expectations that are independent of our subjective desires. Thus, even though we are enabled to serve these exigencies only because of our prior commitment to them, we transcend our subjective limitations by our personal affirmations to uphold their implications. Within the framework of commitment, the personal and the universal mutually reinforce each other. “Here the personal comes into existence by asserting universal intent, and the universal is constituted by being accepted as the impersonal term of this personal commitment” (1964, 308). Polanyi acknowledges, furthermore, that such a structure requires modifications in our existential stance. Truth becomes, in this understanding, the rightness of our action in accrediting it (1964, 320). This is always a risk, since the reasons we provide for accepting the truth are never fully specifiable because their force requires our reliance on them and, to that extent, the existential transformation of our selves.

The discovery of meaning thus lies on a continuum ranging from the kinds of integrations that are “self-centered” (such as those sustained by dwelling in everyday, commonsense frameworks and in much of scientific indwelling) to those that are “self-giving”<sup>5</sup> (such as those sustained by dwelling in artistic achievements or religious visions). The degree of indwelling in frameworks requiring a minimum of personal participation to those that require the maximal participation of reverence and awe correspondingly opens us to ever more profound dimensions of reality. This process of accepting responsibly the ideals of our contingently given cultural horizons and relying on them to extend our personal participation in the dimensions of reality they reveal to us constitutes our “calling” (1964, 322).

Armed with these seminal insights, Polanyi struggled throughout the middle of the past century against the dominant cultural bastions that were enthralled by objectivist understandings of knowledge and positivist interpretations of science. With an uncanny prescience, his “post-critical” philosophy anticipated the major epistemological and historical insights of the latter half of the century in what has subsequently come to be labeled postmodern thought. His careful analysis of the structure of commitment, furthermore, enabled him to overcome the paralyzing relativism that plagues so much of this contemporary cultural analysis. To be sure, he was able to accomplish this only by means of relying on his commitment to the ideals of Western culture. He believed that such an existential choice, while never wholly indefeasible, nevertheless was justified, because he lived in the hope that “the universe is sufficiently intelligible to justify

this undertaking” (1964, 318). In other words, he believed that the highest ideals of his culture enabled him to discern that the universe was fundamentally intelligible.

POLANYI’S ADUMBRATION OF A HIERARCHICALLY  
ORDERED UNIVERSE

What Polanyi attempts in Part IV of *Personal Knowledge*, accordingly, is to propose the lineaments of a heuristic vision capable of sustaining this kind of meaning. It is crucial to appreciate this point if we are to understand his purpose here. Modern Western culture, by becoming increasingly attached to an impersonal and objectivizing understanding of scientific knowledge, had reduced the meaning of the universe to its patterns of material interactions. A major consequence of this is that the universe as a whole appears devoid of purpose (Polanyi and Prosch 1973, 161–62). Polanyi believed that a necessary complement of his theory of personal knowledge was to propose an understanding of reality that included the existence of responsible persons who have evolved from earlier inanimate beginnings (Polanyi 1964, 327). This is necessary because our apprehension of meaning resides on a continuum from commonplace integrations requiring a minimum of participation to the complete participation of dwelling in a heuristic vision calling us to break out in contemplation (1964, 195–97) along with all those gradations in between, including science. Since the vision of a purposeless universe, which had beguiled modern Western culture, was, according to Polanyi, an unwarranted extrapolation from a flawed understanding of science,<sup>6</sup> his alternative vision had to examine how his understanding of personal knowledge could integrate science with less debilitating consequences for our cultural self-understanding. His reliance on cases of scientific research, therefore, did not aim at correcting or repairing anything in scientific inquiry itself;<sup>7</sup> rather, the scientific studies or principles that he incorporated into his exploration were intended to support his more comprehensive vision of a purposive universe. Keeping this observation in mind will assist us in understanding Polanyi’s aim here.

Undoubtedly the key insight upon which his reflections on emergence builds is the famous elaboration of “dual control” that functions in all complex entities, including inorganic objects such as machines.<sup>8</sup> The operational principles that define the purpose of the machine operate upon boundary conditions of its material substrate. A complete physical and chemical analysis of the material constituting any class of machines could reveal nothing more than a chaotic ensemble if it ignored the machine’s operational principles, which constitute a distinct level of reality irreducible to their physical components. Because they define the purpose for which the machine was constructed, they are recognizable as “rules of rightness”—which requires the personal appraisal of a knower to acknowledge.

An analysis based on the physical or chemical makeup of the machine can never discover such “reasons” on the basis of which the machine operates; it can only provide an explanation of “causes” for any breakdown of the component features of the machine (Polanyi 1964, 329–32).

When these reflections are extended to the phenomenon of living beings, a further question arises in the face of the activity of animals. Can the spontaneity of animal behavior (and of human beings) be accounted for solely by some mechanistic principles, or should we acknowledge an independent force (Polanyi 1964, 335) operating through the body in conjunction with its biological mechanisms? Although living beings operate with machinelike functions, they also manifest a regulation of a joint performance that can be recognized only through its comprehensive pattern (1964, 342). This leads Polanyi to conclude that we must acknowledge another level of reality operative in biotic life, namely, a center of individuality, which can only be recognized by a personal affirmation. “Individuality is, accordingly, a personal fact, and to that extent unspecifiable” (p. 343). An adequate understanding of living beings must therefore acknowledge several logical levels, including the organization of inanimate components, the mechanistic processes sustaining the life form, and the individual center that successfully meets the standards for survival and propagation of the species. Life, according to this view, is an achievement that requires the participation of the knower to acknowledge it. The higher the degree of living being, the greater participation on the part of the knower is required, until, at the level of our knowledge of another human being, we recognize the ideals to which we submit.

These initial clarifications regarding the processes of marginal control of higher-order organizing principles over the boundary conditions left open by lower levels of patterned structures in matter provide Polanyi with the grounds for asserting that “knowing life” requires a tacit awareness of its features. Thus, whether we recognize a living object as a type meeting the conditions for inclusion in a class (Polanyi 1964, 351–53) or the variations that a living being may undergo in the process of coming into existence (pp. 354–57) or morphogenesis, the scientist must always supplement the focal analysis of the material components of the entity with an appraisal of its success (or failure) in achieving a set of conditions tacitly upheld. This personal coefficient in science therefore tacitly recognizes “purpose” in living beings, even if the explicit formulation of the physical or biological theories simply focuses on the processes that sustain the individual.

We may conclude that the insights by which we recognize life in individual plants and animals, and distinguish their several kinds—and by which we appraise them as normal or abnormal, establishing thereby the success or failure of the process by which they come into existence—that these insights reveal a reality to which we have access by no other channels, and that the mechanism of morphogenesis can

therefore never amount to anything but the observation and understanding of patterns and processes expressly bearing on that reality. (1964, 359)

What sustains the discovery of meaning in the biological sciences (and, needless to say, in psychology as well) is the tacit acceptance of the teleological features of the physiological functions that constitute the explicit domain of such scientific inquiry. That is, the teleological features of the physiological functions are paramount only for the individual; the scientist focuses on the physiological "causes" that permit the functions, such as those promoting reproduction, to operate (successfully or not) according to tacitly acknowledged rules of rightness for the individual (1964, 360). To recognize such a success or failure in an individual animal tacitly acknowledges a center of operation "driving" (in the sense of organizing or controlling) the functional processes of the biological mechanisms. Such a "recognition" by the scientist requires a degree of participation in the activity of the animal that integrates the particulars known through the empirical analyses into their joint meaning. This process of participation increases on a continuum until it breaks out in the "superior knowledge" (1964, 375) afforded by ideals of excellence within human culture to which an individual person submits, even in cases of transcending them.

#### POLANYI'S HEURISTIC VISION

Let us pause to remember what Polanyi had hoped to accomplish up to this point in Part IV of *Personal Knowledge*. We must appreciate the fact that he has not made any substantive scientific claims for or about the specific content of biology or psychology. He is trying to remind us all, scientists included, that when we examine the conditions sustaining life (which he readily acknowledges is the focal point of current biological research) we rely tacitly on larger conceptions of reality. By ignoring this by means of the conceit that scientific knowledge was impersonal and objective, modern culture was beguiled to understand the analytic reduction of living beings to the conditions sustaining them to be comprehending life in its entirety. Polanyi's theory of personal knowledge was devoted to overcoming this debilitating cultural condition while fully supporting the value of science. He attempted to accomplish this not by proposing some sort of definite theory concerning the nature of things but by inviting his readers to a more comprehensive (and, he believed, more accurate) understanding of the dynamics of our knowing so that we can come to appreciate a "picture of things restored to their fairly obvious nature" (1964, 381). This requires taking into account current scientific theory, particularly evolutionary theory, by offering an alternative heuristic vision within which to situate it. His reflections, in other words, invite us to acknowledge the results of current scientific findings to be functioning in a world whose larger meaning is tacitly affirmed by us and whose larger meaning may be

contemplated by us in a way that incorporates the results of scientific inquiry.

Only in the concluding chapter of *Personal Knowledge* does Polanyi turn to his sustained interpretation of evolution. In contrast to the dominant scientific assumptions of the time, Polanyi begins by asserting that evolution describes an achievement producing fundamental innovations. This contention was grounded, as we have already seen, in his insights regarding living beings as composed of higher levels of reality controlling the boundary conditions of their mechanical processes, which, in their turn, integrated their physical and chemical constituents. Polanyi exposed the vagueness of the dominant neo-Darwinian perspective (required by its tacit commitment to a reductionist materialism) which finessed the issue of genuine emergence under the guise of natural selection producing randomly successive forms of life. His alternative account of new forms of life postulated the emergence of genuinely novel ordering principles which were released by the material conditions (1964, 383–84). Because genuine novelty requires the development of material conditions over long periods of time, these novel steps cannot be determined by a temporary adaptive advantage, another weakness in the standard reductive account of evolution. On the contrary, Polanyi contended, individual adaptations must be advantageous in a particular way in the context of what appears to be a continuous ascending evolutionary achievement (1964, 385).

Polanyi attempts to strengthen and confirm this line of speculation by considering the evolution of human life as a particular instance of emergence (and with whose consequences we have some direct experience). When considered in its broadest sweep, “anthropogenesis” (as he calls human evolution here) consists in a continuous development and proliferation of “germ plasm”<sup>9</sup> from protozoa up through the birth of a new human being. This evolutionary process can be described within the varying material systems that provide the conditions for the germ plasm to be expressed, thanks to favorable environmental conditions, in novel ways (such as from protozoa to plant and animal life and then through hominids and so on). The progression in the direction of human thought, however, requires the postulation of “an orderly innovating principle,” because the material conditions of life cannot account for the action of the emergence of a higher center of control (Polanyi 1964, 386–90). This constitutes, for Polanyi, the problem of the logic of emergence: “How can the emergent [level of reality, such as human thought] have arisen from particulars that cannot constitute it? Does some new creative agent enter the emergent system at every new stage? If so, how can we account for the continuity of the process of anthropogenesis?” (1964, 393)

These questions, while dependent upon scientific considerations, are more issues of elaborating a comprehensive picture of things for Polanyi. He develops his approach to these issues by noting the difference between



*conceptual* and *existential* levels. There are cases of conceptually distinct levels of reality, such as the knowledge of the topography of crystals and their patterns or between physical substances and their chemical properties, but these are not fully distinguished levels of existence. Randomization may produce fairly stable patterns evoking distinct levels of existence (as in a fire), but the features of such an emergent reality are weak. It is not until living beings emerge where self-sustaining principles presume an individual center that we find clear instances of higher forms of existence. What Polanyi believes happens in such cases is that random fluctuations release conditions for the higher principles to gain control of the emerging beings gradually. "No new creative agent, therefore, need be said to enter an emergent system at consecutive new stages of being. Novel forms of existence take control of the system by a process of *maturation*" (1964, 395). This suggestion calls for additional clarification, for, while its meaning is fairly straightforward in the case of human embryonic and fetal development, it is not nearly as enlightening in accounting for the emergence of novel forms of life, as evolutionary theory requires.<sup>10</sup>

To handle this difficulty Polanyi proffers the supposition that there may be some enlarged laws of nature yet to be discovered that would allow the gradual development of operational principles that could arise to control the appropriate boundary conditions for life and consciousness. A supposition of this sort would understand material properties to develop into patterns in such a way that they might provide the conditions for mental operations to function (and, at times, to fail). "This assumption," he declares, "would enable us to envisage the rise from inanimate matter of sentient, motoric, perceptive individuals, and, at a higher stage, of thinking, responsible persons. And it would allow us also to bring this process of emergence into continuous alignment with the heuristic strivings of innovators" (1964, 397).

This last observation grounds Polanyi's further expansion of the implications of this way of interpreting evolution. If the patterns of comprehension are parallel to the dynamic processes of morphogenesis, it is then fruitful to conceive of a morphogenetic field guiding emergent properties toward some pattern of equilibration. Just as in the effort to discover the unknown feature of a problem we can understand the process to be guided by a gradient of potential meaning, so also we can understand the morphogenetic field to be guiding the evolving elements along a gradient of achievement. In its highest degree of originality, a biological field would produce a phylogenetic emergence, a set of operational principles controlled by an individual center that is wholly unprecedented (1964, 399).

This conception of evolution is clearly finalistic. Yet it assumes the integration of lower levels of material organization assessed by current biological or psychological scientific practice. The material conditions sustaining life and the evolutionary process—the germ plasm, as Polanyi puts

it—embody potentialities that are evoked by the environmental conditions of the morphogenetic field (1964, 400). Random mutations and chance variation simply cannot provide us with a sufficiently adequate frame of meaning for understanding the emergence of life and thought in the manner that the conception of a gradient field evoking these possibilities can. By invoking the notion of a heuristic field, finally, Polanyi integrates the achievements of discovery with the achievements of emergence (1964, 403–4).

What conclusions might we draw from this sketch of Polanyi's expansive interpretation of evolutionary theory? To me, his ultimate purpose in proposing this picture bears a surface resemblance to the (often unexpressed) goals of ID theorists.<sup>11</sup> By integrating a teleological dimension into a scientifically grounded picture of reality, Polanyi was aiming to restore a semblance of credibility to the comprehensive integration of meaning that religious indwelling sustains (Polanyi 1964, 405; Polanyi and Prosch 1973, 179–80). Polanyi was fully aware that his efforts to attribute a finalism to the morphogenetic fields evoking emergence would not be readily acceptable to scientists (1964, 399). They would be fearful that teleological explanations could pave the way for all sorts of proposals beyond empirical control.<sup>12</sup> In the case of ID, this indeed is the case. But such a fear completely misrepresents, in my opinion, the intent of Polanyi's challenge to scientific reduction and his alternative visionary proposal. Polanyi's use of the notion of hierarchically interlocking levels of existence had as one of its goals the aim of providing a more comprehensive level of meaning for understanding scientific claims. But it clearly expected to support scientific discovery, as an empirically driven enterprise, at its proper level of reality.

When examining any higher level, we must remain subsidiarily aware of its grounds in lower levels and, turning our attention to the latter, we must continue to see them as bearing on the levels above them. Such alternation of detailing and integrating admittedly leaves open many dangers. . . . But the principle of stratified relations does offer at least a rational framework for an inquiry into living things and the products of human thought.<sup>13</sup>

ID theorists, I contend, require an intervening deity because they have a one-dimension understanding of divine causality, and to invoke Polanyi's very rich and nuanced understanding of knowing and being in support of their perspective is to perform an analogous one-dimensional misreading of his effort to incorporate finality into a comprehensive view of the universe as though it were a simple empirical claim.

NOTES

A version of this article was presented at a Polanyi Society meeting held in conjunction with the national meeting of the American Academy of Religion, 21 November 2003, in Atlanta, Georgia.

1. My understanding of intelligent design has been shaped primarily by the work of William Dembski, Paul Nelson, and Stephen Meyer. Several other scientific (such as Michael Behe) and popular (such as Phillip Johnson) authors contribute to this movement. For a helpful overview of this movement from a Roman Catholic theological perspective, see Barnes 2002.

2. Of course, it is not at all clear that natural selection entails such a notion of chance.

3. My sense is that, in their recent reflections on Polanyi's thought, both Ursula Goodenough and Philip Clayton tend to interpret Polanyi's position primarily along these lines. See Goodenough and Deacon 2003–2004; Clayton 2002–2003.

4. Here Polanyi compares the kind of assent required in the assertion of a sentence (in a formal Gödelian system) and the act of discovery. "The difference between the two lies in the width of the logical gap that is being crossed. The gap to be crossed for the reassertion of the Gödelian sentence is extremely narrow—almost imperceptible—while in true acts of discovery it may be as large as any human mind can hope to overcome. The act of assent proves once more to be logically akin to the act of discovery: they are both essentially unformalizable, intuitive mental decisions" (Polanyi 1964, 261).

5. These expressions were used by Polanyi in some of his later lectures and published in Polanyi and Prosch 1973, 71–75. Polanyi further amplifies these reflections by distinguishing between "natural" integrations, which, while always requiring the personal participation of the knower in the establishing of a coherence among disparate, subsidiary elements, become fairly routine within their framework, and "transnatural" integrations, which always require an imaginative effort to discern the joint meanings of normally disparate particulars (pp. 125–26).

6. Here is the way Polanyi sharply expressed this contention: "The supposition that it [the world, or universe] is absurd is a modern myth, created imaginatively from the clues produced by a profound misunderstanding of what science and knowledge are and what they require, a misunderstanding spawned by positivistic leftovers in our thinking and by allegiance to the false ideal of objectivity from which we have been unable to shake ourselves quite free" (Polanyi and Prosch 1973, 181).

7. It is precisely on this point that Polanyi's thought diverges most dramatically, in my opinion, from proponents of ID who claim to offer an "alternative scientific paradigm" that provides empirical evidence for a transcendent designer.

8. Polanyi develops this insight in a variety of contexts and for varying purposes. See Polanyi 1964, 327–29, and "The Logic of Tacit Inference," 153–55, "The Structure of Consciousness," 216–18, and "Life's Irreducible Structure," 225–26 and 236–39 in Polanyi 1969.

9. According to biologists with whom I have conferred, the concept of germ plasm to refer to the nucleus of a cell was outmoded in biology by the early part of the twentieth century. It appears, then, that, although Polanyi had a fair grasp of physical and chemical science, his knowledge of contemporary biological research and theory left something to be desired. In my reading of Polanyi, however, this is not a telling criticism of his proposal, because he is not putting forward a biological theory or hypothesis but instead is advocating a heuristic context for understanding basic evolutionary notions. That is, the biological data he presents function to provide the elements that his interpretation must integrate. His intent is clear: the "material components" that provide the conditions for life need the "organizing principles" provided by an individual center. This reading of Polanyi's use of biological data is confirmed when considering his later adumbration of this argument, where he has DNA function analogously to the way the germ plasm does here (Polanyi and Prosch 1973, 164–68).

10. It does, however, at least address the issues involved in novel forms of emergence that Richard Dawkins's alternative suggestion of a "blind watchmaker" does not.

11. But to the extent that Polanyi's position could be expanded, as I am contending, into something like an "evolutionary theology" that acknowledges an appropriate role for neo-Darwinian theory at the level of the material constituents sustaining the evolution of living beings, ID theorists would vehemently challenge such a position. Dembski, for example, considers ID to be "incompatible" with "theistic evolution," since he believes—rightly, I would say—that a theology of evolution would leave intact the process of "natural selection" as the mechanism of biological evolution without any divine intervention to control it (Dembski 1999, 110).

12. This is true even today, as a recent report on the conference “The Future of Cosmology” at Case Western Reserve University illustrates (Overbye 2003). David Gross, director of the Kavli Institute for Theoretical Physics at Santa Barbara, chaired a session on the anthropic principle. He was chosen, he acknowledged, because he “hates” the principle. He believes it is “defeatist” and distracts physicists from the hard work of making the precise calculations necessary to determine the parameters of the actual universe that we have. He admits, further, that his fundamental objection is “totally emotional,” because “it smells of religion and intelligent design.” Other panelists included Steven Weinberg, who gave a grudging acknowledgment of the role the principle might play in contemporary physics, and Arthur Peacocke, who declared it to be an advance for physics. The problem, it appears, involved the scientists’ inability to acknowledge a larger vision, such as the one proposed by Polanyi, within which to contextualize their physical theories. Weinberg at least hinted at this characteristic of the principle when he described it as “a nice nontheistic explanation of why things are as nice as they are.”

13. “Life’s Irreducible Structure,” in Polanyi 1969, 237.

#### REFERENCES

- Barnes, Michael Horace. 2002. “Intelligent Design: the New Creationism.” *Horizons* 29 (Fall): 344–62.
- Clayton, Philip. 2002–2003. “Emergence, Supervenience, and Personal Knowledge.” *Tradition & Discovery* 29 (3): 8–19.
- Dembski, William A. 1998a. *The Design Inference: Eliminating Chance through Small Probabilities*. New York: Cambridge Univ. Press.
- . 1998b. “Introduction: Mere Creation.” In *Mere Creation: Science, Faith and Intelligent Design*, 13–30. Downers Grove, Ill.: InterVarsity.
- . 1999. *Intelligent Design: The Bridge between Science and Theology*. Downers Grove, Ill.: InterVarsity.
- Goodenough, Ursula, and Terrence Deacon. 2003–2004. “From Biology to Consciousness to Morality.” *Tradition & Discovery* 30 (3): 6–21.
- Meyer, Stephen C. 2000. “The Scientific Status of Intelligent Design.” In *Science and Evidence for Design in the Universe*, ed. Michael J. Behe, William A. Dembski, and Stephen J. Meyer, 151–211. San Francisco: Ignatius.
- Overbye, Dennis. 2003. “Zillions of Universes? Or Did Ours Get Lucky?” *The New York Times* (October 28).
- Polanyi, Michael. 1964. *Personal Knowledge: Towards a Post-Critical Philosophy*. New York: Harper and Row, Torchbook ed.
- . 1969. *Knowing and Being*. Ed. Marjorie Grene. Chicago: Univ. of Chicago Press.
- Polanyi, Michael, and Harry Prosch. 1973. *Meaning*. Chicago: Univ. of Chicago Press.