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THE IMPACT OF POST-CRITICAL PHILOSOPHY ON SCIENCE AND THEOLOGY

Modern science was conceived in the womb of classicism in the Ancient world, grew up with Renaissance humanism and won its autonomy in the Age of Reason. It has now fashioned a new, more mature relationship with Christian faith. This article shall treat modernity, first, by studying the personalist revolution in the conception of science wrought by Michael Polanyi, medical doctor, physical chemist, sociologist and philosopher of culture in turn. 1/ Raymond Aron called him "a man of reconciliation" for bringing faith and science to unity in his own mind. His congenial approach found a more systematic expression in T.F. Torrance's Barthian-style theology, which will be the subject of the second section. An outline of post-critical theology follows, with a brief appreciation from a Catholic point of view.

Einstein provides the starting point for Michael Polanyi's reconstruction of our culture's cosmological and epistemological foundations. Polanyi and Torrance believe that no previous shift in scientific paradigm, from Ptolemy to Galileo and Newton, had such deep and far reaching effects. Only the revolution of Christian faith espoused by the early Church Fathers has more powerfully transformed man's worldview. Christian intellectuals have perceived fresh perspectives for the Church's evangelization of modernity in the Einsteinian worldview and its corollaries.

I. Michael Polanyi: from Positivist to Personalist Science

Positivists hold that any set of data gained from meter readings yield by induction a pattern that can be mathematically expressed. The shape and content of reality is then attributed to this pattern-forming habit of the mind. But in fact there is a potentially infinite number of mathematical functions validated by any such set of data. But only one of these is true because only that one will be confirmed by our perception of the real world. The scientist's work is no merely mechanical operation of measuring data against mathematical formulae, but is a personal refined perception of taxonomical shapes or forms already existing in nature. He strives to discover the network of relationships existing between objects and to this end uses mathematical instruments to describe their contours. He thus creatively designs a cosmic picture of the realm of intelligibly related entities. 2/ According to the positivist's ideal of objectivity, facts exist independently of the knowing

1/ The best analysis of his career and achievements that I am aware of is: E.P. Wigner and R.A. Hodgkin, "Michael Polanyi 1891-1976; Elected F.R.S. 1944." Biographical Memoirs of Fellows of the Royal Society, 23 (1977) 413-448.

2/ See Science, Faith and Society (The University of Chicago Press: Chicago, 1964), 21-24, for how he develops this argument.

mind so that the scientist can in no way be passionately involved in his search. He was thought to be detached, seeing facts without emotion, commitment, or personal dedication to this project.

In his Gifford lectures entitled *Personal Knowledge*, 3/ Polanyi shows how discoveries do not arise from organizing new facts into patterns of original mental relations, but by new acts of insight. These flow out of the mental effort to embrace reality as it reveals itself to us in depth. A theory is the mind's way of entering into the very fabric of the world to assimilate it to thought. The personal striving so aroused is carried forward by a passionate concern for truth, which is a token of the vocation to explore the unknown reaches of the universe. Polanyi claims that this is akin to mystical experience when, for a moment, the scientist stands in direct immediate contact with the real in all its wonder. There, beyond all laws of science, he exalts to be able to touch the pristine meaning and purpose of being. The scientific theories of Ptolemy, Newton and Einstein affi^views of the universe as a whole, views that are fruitful in guiding our minds to further truth that can be tested and confirmed by experiment. The scientist does not exploit the world as if it were a quarry to be plundered for facts that he will melt down into theory in the fiery furnace of his mind. As a personal knower he is part of the real world, actively participating in its life and development, consciously transcending his subjective state by grasping its structures with universal intent.

In *Personal Knowledge* Polanyi proves at length that the positivists' ideal of reducing science to the mechanical application of fixed rules is utterly impractical. Personal appraisal is always at work in our understanding of probability, of order in nature, and supremely in the practice of the skills of research. These are acquired by imitation, by internship, by discriminating connoisseurship concretized in a tradition. As an alternative to the clear, distinct, and objective ideas of positivism he postulates "two kinds of awareness", i.e., focal, clearly formulated, universal conceptions, and peripheral understanding arising out of our indwelling our own living bodies, from our use of tools and instruments, from the commitments made with unspecifiable unforeseen future results. Tradition can provide clues that implicitly validate our explicit, focal statements. "The art of knowing is seen to involve an intentional change of being." This is done "by extending our person into the subsidiary awareness of particulars which compose a whole," i.e., "the inarticulate manifestations of intelligence by which we know things in a purely personal manner." 4/

In Part Two he studies the "Tacit Component" accompanying all articulate knowledge in its intramental and extramental functions. Within the mind it appears as intellectual passion dedicated to the achievement of truth. This passion manifests the scientific value

3/ *Personal Knowledge: Towards a Post-Critical Philosophy* (Routledge and Kegan Paul: London, 1958). These lectures were delivered in 1951-1952 and constitute his best known work.

4/ *Ibid.*, 64.

of theories evident in the elegance, beauty and symmetry of their formulation. It is born of private experience that leads to its public elaboration; it is precisely intellectual passion that convinces us that new discoveries and inventions are valid. Polanyi acknowledges the difference between knowledge which penetrates the structure of the real, and knowledge that molds the real into a new structure, i.e., the difference between pure science and technology. We adhere to the premisses of science in a deeply personal way because we recognize in them the mainstays for the security of our intellectual world. Personal commitment to these principles may carry us beyond them, so that when we break through them we thereafter have to shape our mental picture of the world in a new creative fashion. The need to know attracts the scientific community to explore the whole field of reality that awaits its probing. By communication these passionate convictions become convivial, i.e., intellectual passion is the binding force of the "republic of science." 5/ The community of knowers is organized according to the principles of truth and falsity, assent to which is aroused by persuasive intellectual passions. Two forms of culture result, individual and civic, which may be either authoritarian or democratic. The administration of public culture may turn from searching for truth to the control and manipulation of social ends, e.g., when society is organized in a positivist way for Marxist purposes. The magic of Marxism is that it can as an ideology invoke the persuasive power of pure science for humanly destructive purposes. In that case the guilty conscience of the intellectuals turns back on itself destroying not only its security and certainty but mental life and culture as well. Polanyi thus describes nihilism as "moral inversion."

The third part, "The Justification of Personal Knowledge", unfolds in three phases. First, our spontaneous, confident use of terms is a personal assertion, i.e., even in a seemingly objective description there is always a personal subject who lies behind and sustains this statement. "It is not words that have meaning but the speaker or listener who means something by them." Our critical capacity is applied to assertions upheld by the mind as true and certain. "It is the mind granting this acceptance which is said to have been acting critically or uncritically." The self-accrediting of intellectual statements is thus a fiduciary and self-reliant act of the mind proclaiming "intellectual excellence as a token of a hidden reality." 6/ Thus Polanyi bases his fiduciary programme on St. Augustine's insight that we can reasonably have faith that reality will unveil itself to the human spirit and this faith is a grace that bears in itself the gift of understanding. Our critical grasp of the real depends on a personal fiduciary act. Polanyi's project is to discover the framework of hidden premisses that justify articulate knowledge and on which it is existentially dependent.

^{5/} See *"The Republic of Science: Its Political and Economic Theory," Knowing and Being (Routledge and Kegan Paul: London, 1969), 49-72, for an explanation of how spontaneous order is a principle of organization and how central planning is inherently illogical.*

^{6/} These citations are found in *Personal Knowledge* 252, 264, 265.

Phase two is a critique of doubt. Since Descartes it has been commonly accepted that all dogmatism, faith and tradition could only precipitate the mind into darkness, a darkness and obscurity that needed to be burnt away in the furnace of doubt. Systematic skepticism was intended to purge voluntary elements from belief, leaving behind a residue of knowledge completely determined by objective evidence. This method has been immensely successful throughout the whole critical period that covers Descartes, Hume, Kant and Russell, and remains deeply ingrained in the modern mind as the principle of tolerance. However, today it has become so nihilistic as to imperil the very freedom of thought. Polanyi argues for reasonable doubt against agnosticism, i.e., doubt as a solvent for error and as proof of the probity of our beliefs in science, law and religion. "Today we should be grateful for the prolonged attacks made by the rationalists on religion for forcing us to renew the grounds of the Christian faith." But this does not justify the use of doubt as a universal solvent that will leave only truth untouched by will or emotion behind. Truth is the external pole of belief, and to destroy all belief is to negate all truth. He concludes that works of art, scientific systems, morality as the fundamental law of social relationships, and religion as our structured rapport with God, all of these are our homes built on the foundations of our beliefs in the reality of God, society and ourselves. These systems of belief mutually interpenetrate each other, so that "Religion can transpose all intellectual experiences into its own universe." 7/ The implicit roots of belief are given stability by 1/ answering objections one by one, 2/ so that these objections strengthen belief, and 3/ the terms used are so interlocked that they are mutually confirming.

In the third phase, Polanyi asks how commitment to belief can escape the charge of subjectivism. Heuristic passion, however, is completely different from merely subjective feeling. In science our passions are placed in the service of universal standards. "We observe here a mutual correlation between the personal and the universal in the commitment situation." After examining the constitutive elements that make commitment coherent, i.e., personal passion, confident utterance and accredited facts, Polanyi concludes that these become mere fragments without meaning when perceived from outside the horizon of commitment, i.e., as purely objective facts. "For it is self-contradictory to secede from the commitment situation as regards the beliefs held within it, but to remain committed to the same beliefs in acknowledging their factual content as true." 8/ We cannot simultaneously hold and not hold the same belief! Nor can there be regress to infinity by referring from one factual statement to another. One cannot escape acknowledging the truth of our statements and their assertion of the real. The responsible person overrules the subjective passion of freedom without limit and acts according to the universal demands of the real world. Thus responsible freedom is exercised in science with universal intent. Mechanistic philosophy is impersonal and irresponsible, e.g., Laplace's image of the world in which every event, in space and time, past or future, can be infallibly calculated, but "a result obtained by

⁷¹ *Ibid.*, 286, 284.

⁸¹ *Ibid.*, 302, 304.

applying strict rules mechanically, without committing anyone personally, can mean nothing to anyone." It is precisely the framework of commitment that makes assent responsible. Polanyi affirms a compulsion in all living things by which they reach out toward their realization. When this reaches the level of critical judgement we become consciously aware of our having grasped the real as it is; we are at the level of the person and of personal achievement. Persons are conditioned by education, by the culture into which they are born and which provides the "tacit co-efficients" for intellectual efforts. These accidents of existence are the opportunities for exercising personal responsibility. To accept them is to yield a "sense of my calling." 9/ Thus personalism validates wider powers of the mind than objectivism, which absolves us of all responsibility for our beliefs.

Part Four of *Personal Knowledge* is a study of "Knowing and Being" based on the logic of achievement. Our comprehension of a living being implies awareness of subsidiary particulars as parts of a whole not specifiable in more particular terms. To comprehend a coherent whole is to conceive a being at a higher order of existence, e.g., a machine cannot be explained completely in terms of physics or chemistry, but by its functional principles in engineering. In animals there is an active center operating in an unspecified manner sustaining vital functions and organic striving. "We start from the fact that no material process governed by the laws of matter can conceivably account for the presence of consciousness in material bodies." Thinking has features of originality and responsibility that must be conceived of as another level of reality. From an entity's total performance the scientist takes the system apart to discover how each part functions in conjunction with the others. This idea of "perceived organization" is Aristotelian rather than Democritean, for we cannot have complete knowledge without relying on our personal knowledge of these comprehensive features. Polanyi formulated his findings, "Commitment may be graded by steps of increasing consciousness; namely from primordial, vegetative commitment of a center of being, function and growth, to primitive commitment of the active-perceptive center, and hence further again, to responsible commitments of the consciously deliberating person." 10/ At the highest level where the person lives under a firmament of values that guide human life, moral ideals are only known by following them. Polanyi concludes his magnum opus with a meditation on evolution as a "heuristic field" that gathers together clues from creation pointing to the Christian God.

Polanyi elaborated this insight into "structural kinship" between what we know and our way of knowing it. Since concepts arise from the integration of a multitude of details into a focal unity or meaning, the dynamic of knowing follows reality's contours into its inner depth. In all cases of tacit knowing there is a "correspondence between the structure of comprehension and the structure of the comprehensive entity which is its object." The conditions needing to be organized by a higher principle, Polanyi, following Einstein, calls "boundary conditions." Thus each level remains open to a higher level which in turn is open

⁹¹ *Ibid.*, 311, 322.

¹⁰¹ *Ibid.*, 339, 358, 363.

to a more fully developed level. "The vegetative system which sustains life at rest leaves open the possibility of bodily movement by means of muscular action. This level leaves open the possibility of integration into innate patterns of behavior. This leaves open the sharing of intelligence." 11/The highest level in our world of the hierarchy of being is "the responsible person." The person is the pinnacle of all progress, material, cultural and spiritual. Thus these levels of reality and understanding are open upwards but not reducible downwards. The more our knowledge of the universe increases the more we are convinced that we are following "the gradient of meaning" that reveals the objective rationality of nature.

II. How T.F. Torrance Interprets Polanyi's Vision

Polanyi fashioned his intuitions from the stuff of scientific experience. Objectivism and positivism were disasters for science because they denied spiritual values intrinsic to thought. His writings are pregnant with philosophical insights suggesting a vision in bud, yet to bloom into a full blown philosophy. The charm and power of his incipient synthesis struck the Edinburgh theologian T.F. Torrance as being of primary importance for modernity's understanding of itself. 12/ By reflecting on Polanyi's sources he put them into an order that demonstrated their systematically philosophical nature.

Polanyi fits into the advances in thought made by Einstein, Bohr and Gödel. He made a discovery about discovery by reflecting on "the free creations of thought which," as Einstein said, "cannot inductively be gained from sense experience." They arise spontaneously as the intelligible universe impinges itself on our mind. In this wordless contemplation the relation between theory and practice cannot be logically deduced by induction.

The Einsteinian revolution is both motive and background to Polanyi's thought. He saw it, thinks Torrance, as a cognitive breakthrough with epistemological, social and ethical implications for man's self-image. In relativity theory space and time inhere in the very processes of nature so that there is an inseparable and intrinsic unity of structure and matter. This implies an epistemological revolution in which thought perceives the form and being of the world in an original unity. As well as rejecting the positivism of the Vienna Circle, he also rejects the dualism introduced into science by Newton, Descartes and Galileo. In place of the mechanistic universe, Einstein proposed a new unitary outlook on

11/ *The Tacit Dimension* (Doubleday: New York, 1967) 33-34, 41.

12/ Besides the two volumes *Scientific Theology* (O.U.P.: Oxford, 1969) and *Reality and Scientific Theology* (Scottish Academic Press: Edinburgh, 1985) I have used the following cyclostyled articles: "The Integration of Form in Natural and Theological Science," "Newton, Einstein and Scientific Theology," and "The Place of Michael Polanyi in the Modern Philosophy of Science." I believe these have been published in collections of his articles.

nature dominated by the matter-energy equation. On this basis Polanyi broke away from the receptacle concept of space independent of the objects that fill it, and from the idea of time as absolute measurement in which events are contingent occurrences completely separated from their measure. This implies an end to the old understanding of the distinction of absolute essence and contingent historical events. Henceforth history and reality are inseparably united. The concept of reality as a space-time field with its own ontological density presupposes a departure from Galileo's phenomenalist distinction of primary and secondary qualities. Qualities like energy, vitality and organismic form have their worth restored. Morality too had been reduced to the point of meaninglessness, because it could not be calculated in a mathematically measured quantity.

Related to this is the denial of the Kantian synthetic "a priori" by which knowledge is ordered without any penetration into the universe to uncover the content and connections between things. Both Einstein and Polanyi replaced this with a profound conviction of the inherent intelligibility of the world independent of our knowing it. Our knowing is an integrating activity of the mind guided by our intuitive contact with reality so as to penetrate into its intrinsic coherences and objective structures. "Comprehension" means the intuitive understanding of a being in its inner hierarchical structure and its relatedness to all other beings. There is a fusion of the sensory and the extra-sensory in nature, of the physical and the intelligible, so that our knowledge from its very origins is an inseparable unity of empirical and theoretical elements together.

Einstein was convinced that we could apprehend nature in its inner relations, but that this intuition was not reasoned to in logic or deduced from experiment. Our apprehensions are, as Einstein said, "free creations." At the same time as scientific concepts are intuitively perceived they are objectively determined and controlled by nature. These concepts are connected theorems which bring to light even deeper structures in reality. As with scientific discovery there is no logical bridge between scientific theories with their conclusions and the objective structure of the real world.

It is here that Polanyi goes beyond Einstein by describing the structure of the heuristic jump that connects mind and reality. It is essentially akin to perception, which is an active striving to make meaningful contact with surrounding reality. By discerning its epistemological originality Polanyi broke out of the debilitating positivism that separates facts from values. Any assertion of fact carries a personal, passionate commitment to reality. "We know more than we can tell." "Focal awareness" is always dependent on "subsidiary awareness" on which we rely in all our articulate operations. Tacit knowledge has a relational from-to or subsidiary-focal structure that forms an integrated phenomenological object composed of diverse ontological levels.

The ontological content of discovery is most evident by its beauty. Here is another way that Einstein profoundly influenced Polanyi. It is not just the testability of a theory or its conceptual systematic perfection, or the elegance of its conclusions, but a beauty that puts

scientists in wordless contact with reality and tells them it is true. In discovery nature's splendid light spills over into the human mind.

Polanyi utilizes Bohr's analogy of "the use of a stick to explore a cavern, the way a blind man feels his way by tapping," not as a principle of complementarity but to explain the "functional relation" between the two terms of tacit knowing. Viewed separately they are mutually exclusive and their relationship is destroyed, but taken together the subsidiary details become transparent so as to make us gaze on their focal meaning. Language, in particular, is transparent and referential so that words focus our attention on meaning in "two complementary efforts aimed at the elucidation of a comprehensive entity." Inquiry, learning, growth in scientific and especially in moral knowledge function by the person interiorizing a set of principles as his own mental framework. In this way the person identifies with society's tradition both intellectually and morally. Just as much as a man lives in and animates his body, a knower "indwells" his culture and tradition. His moral and intellectual principles become part of his personality and cannot be changed without a conversion of worldview. It is by means of this intellectual and moral apparatus that we as persons discover and apprehend the world about us and our relation to it.

Polanyi was stimulated by Kurt Gödel's formulation of a number of theorems illustrating the power and limits of logical and inferential reasoning in mathematical systems. Gödel showed that their consistency and completeness cannot be established completely within the system itself. No system can give a full definition of its originating principles. Commentators have shown how Gödel's theorems are valid far beyond mathematics. This reinforced an insight of Polanyi's about discovery. Consistent formal systems have an extra-logical or ontological reference that is not amenable or reducible to logical formulation. This indeterminacy is an openness to reality which corresponds with the indeterminacy and capacity of reality to reveal itself in new unexpected ways. It follows, as explained above, that real beings have a hierarchical structure of ascending ontological density and meaning.

At this point Torrance emphasizes how Polanyi, Einstein and Gödel come together wonderfully and complement each other. They claim that these levels of being are open upwards and cannot be reduced downwards. The more our knowledge of the universe advances the more we are convinced we are in contact with objective intelligible reality which transcends our actual experience and far outruns our representations of it. This means that all our science and intellectual reasoning is ultimately indeterminate and open. Thus the pattern and rationality of the real impose a controlled openness on our approach to reality. This is a proper response to the atomizing and reductionist analysis that has held sway in the philosophy of science for so long. Perhaps least harmful in the natural sciences, it has been perversely destructive of human values in psychology, social sciences and philosophy. Polanyi shows how good science does not divorce facts from their finality. When values disappear facts are left bereft of their ontological reference. Polanyi points out that when we conceive the universe as an ascending hierarchy of meaning, then seen as a whole it leads our minds forward so that "our natural knowing expands continuously" into contact and knowledge of God.

III. The Shape of a Post-Critical Theology

It is T.F. Torrance who realized that Polanyi's epistemological breakthroughs were valid in theology. He reads the history of theology as consisting of two great conversions or changes in worldview, firstly with the Greek Fathers, who struggled to overcome the features of Ptolemaic cosmology which envisaged a deep split in the cosmos between the intelligible realm of celestial realities and the sensible realm of terrestrial phenomena. There was a radical dualism built into the fabric of Greek science, philosophy and culture that separated the unchanging necessary being of things from their changeable appearances. It was against this dualism that Christianity struggled so hard so as to preach its message of a God who acts in history and of the Son of God who has become Incarnate in our contingent existence. The second great moment for conversion is the present which, he says, "I want...to challenge to follow the example of the Greek fathers in undertaking the courageous, revolutionary task of a Christian reconstruction of the foundations of culture: nothing less is worthy of the Christian Gospel." Einsteinian cosmology provides the base for a clear rejection of dualism in theology. Nothing like a monism or a pantheism is envisaged for we move beyond those ways of thinking to a reorientation of knowledge grounded in the mutual interaction of the space-time metrical field and all the matter/energy in the universe. Here structure and matter, form and being are inseparably fused together, spelling the end of the positivist era in science and of essentialism in theology. He concludes, "For the first time, then, in the history of thought Christian theology finds itself in the throes of a new scientific culture which is not antithetical to it, but which operates with a non-dualistic outlook upon the universe which is not inconsistent with the Christian faith even at the crucial points of creation and incarnation." 13/ He has in great part fulfilled the objectives of his own programme with his volumes *Space, Time and Incarnation* 14/ and *Space, Time and Resurrection*. 15/ Both of these treat the unique events of salvation history in the universe described by modern physics. God has entered contingent human history and embraced its temporal-spatial reality with his own presence. The subject of all theology is this God revealed through his real involvement in our universe as giving meaning to every ontological level. This stance presupposes a hierarchical conception of the sciences as a communion of mutually interpenetrating levels of understanding. The key to Torrance's insight into Polanyi's contribution to systematic theology comes from Calvin and Karl Barth, both of whom affirm the supremacy of faith. This is the "Copernican revolution in theology", for it was Barth who asserted the centrality of the "Wholly Other" rather than the self. Where

13/ *The Church in an Era of Scientific Change*, *The Month*, CCXXXW (April, 1973), 137.

14/ O.U.P.: Oxford, 1969.

15/ *The Hansel Press: Edinburgh, 1976.*

Polanyi had discovered that all true knowledge is other-directed, Torrance transcends this view by directing all thought under the obedience of faith to the Utterly Other who is Reality Himself. "Where is the center of all things, the Truth which embraces all things and makes them whole, is it in the self or in the other?" 16/

Torrance considers that to know God is the basic act of the human mind, and faith is the response of our mental powers to God as he makes himself known to us in his Word. Theology corresponds to the Polanyi's ideal of knowledge, for it is an

inquiry pursued in a deepening empirical as well as theoretical relation to the living God. It is a form of intense intellectual communion with God in which our minds are taken captive by his Love and we come to know God more and more through Himself. Even though we are found using third-person language, theological inquiry of this kind is carried out face to face with God so that it may properly be regarded as a form of rational worship in which awe and wonder and joy give vent to themselves in prayer and praise. 17/

The epistemological structure of theology as a science has to be perceived mystically more than theoretically. The shape of such a post-critical theology would have the following features. We start with a vital sense of God not only as creating and preserving but as redeeming the rational order of the world and of history. There is therefore need of a new form of natural theology, not as an independent science prior to the science of faith but as integrated into this vision as a mediation or inter-face between Christian theology and the natural and social sciences. The change from a mechanistic worldview to a dynamic open universe reveals a truly Christian understanding of God in his dynamic and providential relation to our space-time universe. Theology is a positive and progressive penetration into the mystery of God. It is determined by his self-revelation on the one hand and by the limits of our graced rationality on the other. For Torrance "it is a human enterprise working with revisable formulations in a manner not unlike that of an axiomatic science operating with fluid axioms." These comparisons provide the matter for an analogy between theological and natural science. The social coefficient of our knowledge of God implies that all theology is an indwelling of culture, society and the Church. Community structures and paradigms of thought arise out of our relation with God. The social coefficient functions as a tacit determinant of the heuristic instruments used in theology. Dogmatic statements are focal assertions to be understood within the Church's tradition of mystical experience of life in the Spirit. Thus each lower level of understanding, as far as it is true, must be coordinated with a higher level so that there is an open structure of the sciences pointing to

16/ John Puddefoot, Logic and Affirmation; Perspectives in Mathematics and Theology (Scottish Academic Press: Edinburgh, 1987), 204, where he speaks of the supremacy of faith in Polanyi terms.

17/ Scientific Theology, xii.

God as its ontological ground, or as Clement of Alexander says, "the norm for the truth of all beings." The pinnacle of our personal knowledge is our contact with the Trinity "as the basic grammar or ground structure of Christian theology."^{18/} The Trinity provides us with the model for an intuitive apprehension of God in his saving action in history. Because the Trinity is intimately involved in the progress of the world and the affairs of men, Torrance suggests a radical revision, simplification and unification of the whole body of theological thinking. This is the project set forth for his Scientific Theology.

By contrast Catholic authors ^{19/} have generally seen Polanyi in a more personalist and less systematic light than Torrance, They tend to accent his dependence on St. Augustine and tradition as more mystical than critical in its approach to God, faith and the Church. "Unless you believe you shall not understand."

This essay closes in the hope that theologians will assimilate Polanyi's personalist ideal of science to the wider speculative tradition of St. Thomas Aquinas, whose philosophy of being could underpin the idea of indwelling as participation. The theory of analogy would clarify the distinction of the sciences in the unity of knowledge. The virtue of prudence as "the eyes of charity" can account for the fusion of perception and the practical principles of knowledge in the one act. In moderate realism the relation of scientific theory to the real world is not the central problem, but falls within God's plan for the universe in creation. Polanyi has proposed a cosmology consonant with the truths of Christian faith, with a vision of universal purpose and even with Aristotelian teleology. He has put to rest the dualism between science and theology and proved the relevance of the idea of an open universe to the salvific action of the Lord of history. The history of salvation in its spatio-temporal reality reveals not only how the universe is a hint of God, but how everything is ordered to God and is ordered by Him. Both Polanyi and Torrance would agree with St. Thomas, "Omnia autem pertractantur, in sacra doctrina sub ratione Dei quia sunt ipse Deus; vel quia habent ordinem ad Deum, ut ad principium et finem" (S.T.Ia, 1,7,in Corp.), ^{20/}

^{18/} *Ibid.*, xiv, 140, 161 for these citations.

^{19/} See for example Patrick Grant, "Michael Polanyi: the Augustinian Component," *The New Scholasticism XLVII* (1974), 438-463, and Avery Dulles S.J., "Faith, Church and God: Insights from Michael Polanyi," *Theological Studies* 3 (1984), 537-550.

^{20/} St. Thomas Aquinas, *Summa Theologiae, Christian Theology, Vol. 1, Latin text and English translation*, ed. Thomas Gilby O.P. (Blackfriars: Cambridge, 1964), 27. "Now all things are dealt with in holy teaching in terms of God, either because they are God himself or because they are relative to him as their origin and end."