

INSTITUTE FOR CHRISTIAN COLLEGE TEACHING

SECULAR UNDERSTANDING IN A CHRISTIAN WORLDVIEW

ALBERT E. SMITH

PROFESSOR OF PHYSICS

LOMA LINDA UNIVERSITY

015 - 88 Institute for Christian Teaching
12501 Old Columbia Pike
Silver Spring Md 20904, USA

SECULAR UNDERSTANDING IN A CHRISTIAN WORLDVIEW**ALBERT E. SMITH, PROFESSOR OF PHYSICS****LOMA LINDA UNIVERSITY**

ABSTRACT: Scientific knowledge, as most of modern knowledge, is essentially secular and to understand or to reason in the modern world is to do so in secular terms; secular thought only becomes secularism or materialism when the claim is made that it is the end of the matter. This view is defended as not only descriptive of the state of affairs, but is given value as normative to any attempt to a dialogue between faith and learning. Doing natural theology with the results of our science is helpful neither to religion nor to science. However, devotion and praise, as religious activities, can arise from within the discipline, when one experiences wonder, awe, or ecstasy, seeing from within the natural world the possibility of other dimensions, and responds in faith.

INTRODUCTION: To be a modern person and to understand is to understand first in secular terms. This is true in the explanations of science and technology, in those of history and human behavior, in business, and in daily affairs. Christians, like others, go about doing things and thinking about the relations between things and events, but they also pray, give thanks, and sing hymns. And they take part in religious discourse and talk about God. But for the Christian in the modern world the auto accident is a result of faulty brakes, crops are lost as a result of drought, and a supernova occurs when a star exhausts its supply of fusionable material. For him, also, God is generally absent from the system of explanation about affairs in the world.

Bonhoeffer, reading a physics text and contemplating the difficulty of thinking as a Christian in the modern world, makes a judgement, more on religious than on secular thought:

It has again brought home to me quite clearly how wrong it is to use God as a stopgap for the incompleteness of our knowledge. If in fact the frontiers of knowledge are being pushed further and further back (and that is bound to be the

case), then God is being pushed back with them, and is therefore in continual retreat. (Bonhoeffer 164)

And he continues in another place.

Man has learnt to deal with himself in all questions of importance without recourse to the "working hypothesis" called God. In questions of science, art, and ethics this has become an understood thing at which one now hardly dares to tilt. But for the last hundred years or so it has become increasingly true of religious questions; it is becoming evident that everything gets along without "God"--and in fact, just as well as before. As in the scientific field, so in human affairs generally, "God" is being pushed more and more out of life, losing more and more ground. (Bonhoeffer 168)

This sense of a world of secular discourse that is complete and coherent has been agonizing to Christians and to some extent rightly so. When carried to its obvious conclusions it becomes secularism, even materialism, and indeed God has no place. Bonhoeffer, however, does not leave us there and continues with a challenge:

We are to find God in what we know, not in what we do not know; God wants us to realize his presence, not in unsolved problems but in those that are solved. That is true of the relationship between God and scientific knowledge, but it is also true of the wider human problems of death, suffering, and guilt...God is no stopgap; he must be recognized at the centre of life, not when we are at the end of our resources...The ground for this lies in the revelation of God in Jesus Christ. He is the centre of life, and he certainly did not come to answer our unsolved problems. (Bonhoeffer 164)

There is clearly a two-fold problem for the Christian who is a scientist: that of preserving the integrity of secular reasoning while finding God at the center of life. It is necessary to come to terms with this as a problem if there is to be such a thing as "the integration of faith and learning" for the sciences and the associated cognitive disciplines.

In attempting a solution we start from a position that finds the increasing secularization at the least inevitable and at the most good for human thought. We share the agony of those who believe that something essential has been lost; however, we conclude that the belief is a consequence of a misguided view of the nature of human explanation. The intent for this paper is to make a brief case for the rightness of secular thought within a larger Christian view of reality and then to attempt a demonstration of how one can move from a rigorously secular activity to a posture of faith, devotion, and praise. The problem is significant for Seventh-day Adventist educators. We have traditionally done well in educating students in the technological sciences with the objective of preparing them for the professional fields, but we have done little to stimulate philosophical reflection on the nature of the scientific enterprise. As a result there is a received natural theology and a body of quasi-scientific "creationistic" thought held uncritically that continues, probably unnecessarily, the conflict between the sciences and religion.

MORE ABOUT THE PROBLEM: There has existed, at least since the rise of science in the 17th century, a persistent and fundamental notion that equates a secular explanation with leaving God out. This results from the religious idea that the end of an explanatory chain must be an action of Deity. It is within this tradition that natural theology has flourished; we seek for "evidences of design," and talk about "thinking God's thoughts after Him." But these are extra-scientific objectives; the explanatory principle is not accidentally, but essentially secular. The end of explanation is necessarily secular; it changes in time and is always open; it tends to leave us unsatisfied and itching for more, but to replace it with a nonsecular explanation is to destroy the whole fabric of human understanding.

The problem may be clarified by comparing a secular with a religious statement. There is a story told of Laplace presenting a copy of his work on the solar system, *The System of the Worlds*, to Napoleon. Apparently the emperor wanted to make a point for piety and asked the scientist if the rumor that the name of God did not appear in his work was true. Laplace's response is one of the myths of science, simple and to the point: "Sir, I had no need for that

hypothesis." Many have taken this as an impious statement, but not necessarily so; any theoretical scientist must take a similar position about his work. As for Laplace's subject, the whole rests completely on Newtonian principles. But contrast the scientist's view with the following statement, familiar to every Seventh-day Adventist, and the tension immediately builds:

It is not by inherent power that year by year the earth yields its bounties and continues its march around the sun. The hand of the Infinite One is perpetually at work guiding this planet. It is God's power continually exercised that keeps the earth in position in its rotation. It is God who causes the sun to rise in the heavens. (White 416)

The contrast is apparent; the scientist needs only the principles of a secular science to completely discuss the motion of the planet, while the prophet looks past the scientific explanation and proclaims God's will and continuing vital action.

Difficulty arises only when the two modes of discourse talk to each other, for then the paradox becomes evident and tension mounts. One can be a Christian and not a modern scientist or a scientist with no commitment to a God who acts, and there is no problem, but for those who are committed to both the values of modern science as a way of thought and the idea of a creative God, there is a paradox to be resolved. Berger describes the familiar problem: "Honest, sustained reflection recoils from cognitive schizophrenia. It seeks to unify, to reconcile, to understand how one thing taken as truth relates to another so taken." (Berger 29) But the tension between God-talk and secular explanation is more than accidental, and in this Berger, Bonhoeffer and Mrs. White would agree that a solution must be more than cosmetic; it must expose the fundamental question being asked in each mode of discourse to see in what sense they are in conflict.

For our purposes, "secular" is an epistemological term referring to how one knows and to what is meant when one says, "I understand" in relation to an event or a state of affairs. This finds the explanation for an event within the world of the event and claims comprehension when

there is a correspondence between events and explanations. The bases for the explanation are either from experience and analogical reasoning or, as in the case of a theoretical science, by reasoning from a fundamental principle. It is distinct from a transcendental explanation, one that uses God-talk, making no judgement on metaphysics. For this same reason, secular thought in this restricted sense is distinct from secularism, materialism, humanism, and any ontological claim about the event.

In what follows, secular discourse is generally contrasted with religious discourse, and the attempt to resolve the paradox presented by the two statements will be made by thinking about their essential differences. We shall hold to the principle that an acceptable resolution must not surrender either the faith that sees all as uniquely God's world, cherished and sustained by His word, or the essential character of secular science. To illustrate the nature of science more clearly, let us see how physics is talked about and practiced in the classroom and in teaching. The broader claim is that the other sciences, most of the cognitive disciplines, and, in fact many other human endeavors, use exactly the same explanatory principles.

PHYSICS EXPLANATION: The subject is the trajectory of the golfball or any other ballistic object. The path it follows can be described by a simple equation. When graphed or when seen, as in the trajectory of a stream of water, it has aesthetic appeal. It is a parabola. Why does it always take this particular and rather splendid form?.....The physics answer is simple. Since the only force acting on the object is the constant force of gravity straight downward, the horizontal velocity is constant while the object is accelerated downward. The result when two equations, one describing horizontal motion and the other downward motion, are put together is the equation of a parabola, in the judgement of most persons a form of beauty. Critical to the explanation are the laws of motion. They are the explanatory principles, and to "understand" in mechanics is to understand in terms of the laws of motion...no more and no less. Other competing principles might be used on another day, but the approach remains the same. We explain and understand physical events in terms of a set of principles. They are neither

intuitive nor God given, but have proved themselves in application and are consistent with other similar principles. Are they true?... Yes. This is what is meant by truth in science.

Still in physics class and using another example, the subject is the decay of the radioactive nucleus by alpha emission. The questions are why the nucleus decays and why the alpha emission has its particular observed characteristics. Nobody has observed either an alpha particle or a nucleus. The one is an inference from flashes on a phosphor screen and the other the consequence of a long chain of reasoning from several different experiments. A nucleus emits an alpha with no apparent cause; so to bring the questions of radioactivity within the world of understanding requires a set of principles quite different from the laws of motion. These are the principles of quantum physics. As a result of their application, it is understood that one can speak only of a probability of decay. The event is truly random, the explanation is not causal, and this is not a matter of an accidental but of an essential ignorance. Do we understand it? Yes, we understand it in the same way that we understand the motion of the ball. It is counter-intuitive, since it does not conform to common sense, but in the only way that scientific understanding has meaning we can claim it as understanding. Are the principles and the explanations true? Again, as in the case of the ball, we apply the tests of coherence and consistency and claim them to be true.

Examples can be multiplied, but the purpose is only to describe how physics is taught and talked about. The objective of the scientific enterprise is to "understand," and the special meaning is illustrated by the examples. Clearly physics is not unique; similar examples can be drawn from the other sciences and, in fact, from any of the cognitive disciplines. Two particular characteristics should be noticed. First, the tentative and communal nature of knowledge. A point sometimes not appreciated by students or by critics of science, is that every statement of a scientific principle or conclusion is a challenge to be shown to be wrong, and it is offered to a community for criticism. Scientists have a habit of speaking positively, but if they or their hearers begin to believe the work is ended, they have fallen into scientism; the conclusion is always a hypothesis to be tested further. And this continual probing is a

community venture. As Gerald Holton has said: "...part of the first principle of integrity is that you submit yourself to the dialogue with others to find out whether you are right" (Holton 240). This sense that scientific conclusions are "up for grabs" has been institutionalized and is not a weakness but one of the great strengths of science and the scientific community. As a result, human knowledge continues to be renewed by every generation.

Second, the explanations of science and the similar disciplines are completely secular. Someone who claims that God loves beauty and hence makes parabolic arcs will be appreciated as a poet, but not credible as a physicist. And one who rejects the random nature of radioactive decay with the assertion that God knows which atom will next decay is taking a theological, but not a scientific, position. The choice to completely secularize the world of explanation is only partly a consequence of science; it is more clearly seen as a demand placed on science by the critical and modern view of human knowledge. It is one of the most profound elements of the modern mind and certainly must be reexamined critically in any attempt to formulate a Christian worldview; to some it appears inevitable and to others sacrilege.

HOW DID WE GET THIS WAY? Modern science emerged and its characteristics became most clearly apparent early in the 17th century with the work of Galileo. Others had seen the pattern the new science was to take dimly and expressed it in sometimes ambiguous terms, but for Galileo there was no question about method or objective. Stillman Drake describes the Galilean view:

The truly influential and pervasive aspects of modern science are not its facts at all, but rather its method of inquiry and its criterion of truth. Now those are precisely the things whose introduction created modern science. They were, moreover, first made clear in the writings of Galileo, and perhaps even today there is no other source from which they may be obtained more easily.

(Drake 30)

More to the point of the present discussion, Burt sees Galilean thought as having the consequence of removing teleology from science and inverting the metaphysical relations

between God and the cosmos(Burt 99). And he continues: "...here is the last evidence of Galileo's revolutionary greatness. In an age when uncontrolled speculation was the order of the day we find a man with sufficient self-restraint to leave certain ultimate questions unsolved, as beyond the realm of positive science" (101). Or as Drake expresses it: "he was often obliged to say (and taught his pupils to say)'I do not know'" (Drake 224). Galileo spoke clearly on the difference between science as he perceived it and a science derived from the world of religion. He held a "high view of scripture" but maintained that the path to truth in science lies in the use of the "senses, reason, and intellect." He quotes an unnamed cleric in a quip: "The intention of the Holy Ghost is to teach us how one goes to heaven, not how heaven goes" (Drake 186). He subscribed to the concept of nature as being God's second book and concluded that the method of reading that book is to be found in science.

The methods and objectives of Galilean science were purely secular. Good science was one thing and good religion something quite different, but the study of nature and of the Bible each gave knowledge of God (Drake 183). In describing the method in which the language of mathematics is used and hypotheses and concepts are brought to the test by experiment and induction, Weinberg calls it the Galilean style and quotes Galileo:

"Nature is a book and the characters in which it is written are triangles, circles, and squares." In today's language, they are quantum fields and principles of invariance...But it is remarkable that physics in this Galilean style should work. The universe does not seem to have been prepared with human beings in mind, and the idea that humans can build mathematical models of the universe is remarkable. (Weinberg 176)

There is a sense of amazement, common to both Galileo and the modern cosmologist, that the method produces human understanding; this method, most clearly applied in the physical sciences, has a marvelous record of successful world-modeling in the Galilean tradition, and the alternatives, whatever they are, are clearly second best. We continue to wonder that it is

possible that it can continue to work. We will return to the sense of wonder engendered in science later in the paper.

Galileo is ahead of his time and points the way for the future science. His contemporary, Kepler, sees God as a great mathematician and perceives himself as thinking God's thoughts after Him. Newton, the grand developer of the Galilean method, still looks for a science that leads to first causes: "The main business of natural philosophy is to...deduce causes from effects, till we come to the very first cause, which certainly is not mechanical (Newton 344). Bacon articulated a pure empiricism that is the source of much of our difficulty in thinking about thinking; a general truth is always an induction from experience. He was as secular as Galileo in the methods of science, but the experimental science was itself a religious task (Burt 194). The hypothetico-deductive, model-building, experimental methods of science are neither Baconian nor positivistic but Galilean.

Although modern science is not monolithic in either philosophy or methodology, in that there is a wide variety of positions actually espoused by reputable working scientists, there is a central philosophical tendency to the sciences of the 20th century that can be traced to those concepts of the early 17th century. Science textbooks traditionally take no open philosophical position, but a list exhibiting their tacit metaphysical and epistemological positions would most likely include those in the following table. Implicit in both columns is a commitment to the pursuit of rational understanding.

Metaphysical	Epistemological
Reality is objective.*	Truth is the objective.
Things could be different.	Knowledge is relative.
The observer is part of the observed.*	Explanations are secular.

Clearly there are unresolved paradoxes between quantum physics and common sense that lead some to question the possibility of understanding in the classical sense. Some have, as a result, called this a post-modern era. What is presently only vaguely realized is that we are in an age when science, particularly fundamental physics, is answering in scientific terms

questions that belong truly to natural philosophy. For Galileo and Newton, philosophical postulates were extra-scientific and framed scientific questions, while in this post-modern era of Bohr and Einstein, some of these same questions are being answered by experiment. Depths are being probed that were only dreamed of in earlier times, but asked about God, we still respond with Laplace.

OUGHT SCIENCE TO BE SECULAR? The great gestalt shift that marked the beginning of modern secular science was not undertaken lightly; however, it was not a result of new experimental facts that showed a world acting independently of deity, nor because it was theoretically simpler than the ancient views. In fact, as Margenau describes it, it is simpler to have God as part of the explanation:

The simplest, and certainly the safest, type of epistemic correlation is one between sense data and the workings of a divine Providence. Experience can never controvert it, and if Nature alone determined theory, this would be the best possible interpretation of the sensory universe. However, scientists reject it; they reject it, not because it fails, but because it fails to satisfy them, and it fails to satisfy them because it is too blunt; it lacks, strange to say, the appropriate degree of metaphysical refinement. The very fact that it can never be shown to be in error is against it, makes it violate what might be called the spirit of science, the rules of the game. (Margenau 77)

In a sense the inherited view was bankrupt, but it is impossible to point out exactly where it failed. We find the strong feelings expressed about it in the dialogues of Galileo and in the writings of Descartes and Bacon. There is a clear expression of the need to place science on a sure foundation.

The fact is the whole way in which man saw himself and organized his society had been changing for several centuries, and the change in science was the most dramatic of a series of changes. It was not accomplished without agony; Donne expressed the pain as a sense of "all coherence gone," and the attempts to do natural theology from within science was, and still is,

an expression of the need to return to that lost center and coherence. It is this need that inspires us to integrate faith and learning.

To justify the secularity of science, we offer first the argument from success. No one can deny the success, although one need not accept it as sufficient. Success is a pragmatic reason; secular science works and stands as a marvel of secular understanding. Science has studied the most fundamental aspects of physical reality in the particles of physics, described the code structure of the living organism in the DNA molecule, probed close to the boundaries of space and time, and been the principal agent in producing a technology with unlimited power for good and evil. It was the realization of success, scientific success, that brought Bonhoeffer to speak of God as in retreat within the world of discourse and to challenge us to come to terms with this retreat.

A more reasonable basis for adopting secular thought in science follows from simply adopting our normal modes of thinking, speaking, and explaining events in every day life. We typically explain an event in terms of other events or states of affairs. The reasoning may be deductive, inductive, or analogical, making use of explanatory principles, laws of nature, or generally expected consequences. Characteristically, it is taken for granted that the explanatory process moves out of the secular domain only when faced with the inexplicable, i.e., when explanations available are clearly inadequate. Using God as that-which-explains-the-inexplicable leads to the "God of the gaps" idea, giving God the status of always being on a moving frontier, in continual retreat as a result of the advancement of knowledge. To accept secular explanation as a principle accepts the frontier of ignorance as simply a characteristic of human knowledge and allows God to be at the center. It validates a sense, common to most moderns, that events happen without an immediate purpose. It does not, however, deny the existence of ultimate questions, deeper than any scientific questions, that yield only to ultimate purpose, to the God who acts in the world.

Coherence in explanation is an ideal, and when the secular principle is accepted, the explanatory chain does become coherent, but that is all that can be claimed for it. Weinberg

continues that statement quoted on page eight by reflecting on the question of the openness of scientific explanation.

It is remarkable that physics in this Galilean style should work... Of course, one may question whether the mathematical ability of human beings can penetrate to the level of the laws of nature. I recall a statement by J.B.S. Haldane in which he said, in effect, that the universe is not only a good deal queerer than we know; it is a good deal queerer than we can know. Sometimes I believe that is true. But suppose it is not. Suppose that by pursuing physics in the Galilean style we ultimately come to an understanding of the laws of nature, of the roots of the chains of explanation of the natural world. That would be the queerest thing of all. (Weinberg 176)

The cognitive sciences work as though aimed to produce closure in explanation and yet wonder at the possibility. In a similar vein, Dyson identifies contrary tendencies within science that produce diversity. (Dyson 35ff) In the presence of the marvel of human explanation, we still wonder at a world that appears to have depths beyond the depths. So the argument is one for coherence with no apparent closure. The world continues to surprise our science.

We must be bold enough to attempt one other argument in defence of secular explanation, i.e., that it is not inconsistent with a Biblical worldview. Doubtless the most convincing evidence is the existence of the prophet. Most of us most of the time understand events in secular categories; as a result, the prophet is needed with that gift for seeing things otherwise. The two explanations stand over against each other but are not necessarily contradictory, and even the prophet has at times a gestalt slip and cries in agony for evidence or, as in Isaiah 45, exclaims in wonder, "Surely thou art a God who hides himself." This is our experience and it is compatible with Paul's proclamation in Acts of complete ontological dependence while allowing that He is still the "unknown God." Tillich expresses a similar idea while using the secular as a metaphysical category. "The sacred does not lie beside the secular, but it is its depths. The

sacred is the creative ground and at the same time a critical judgement on the secular." (Tillich 82)

The Biblical voices call us to look beyond the secular world and secular explanation as believers in the Creator-God. Of that there is no doubt. In the presence of the Hidden God, we are charged to tend to the affairs of this world in secular terms, though not with secular values.

IS THAT ALL? At this point, we can conclude that the secular categories are not only possible, but right for much of human thought. Science is secular, not accidentally but essentially. No reason-stopping explanation of God's purpose or action need be part of our physics and we can say, "there is no need for that hypothesis" as scientists and as those who think about affairs in the world.

But we are not satisfied. We still, as humans, feel a need for another dimension in the midst of life, even while doing science. The novelist, Wright Morris, tells how his Adventist grandfather, a homesteader on the Nebraska prairie, built a house for his growing family and only near completion realized he had neglected to put in a stairway to the second floor. For Morris it appears to be a symbol, repeatedly asking how we get up there from down here. And is that not a need we all feel? We have established the first floor as part of our learning, but if faith and learning are to be integrated, the question of getting to the second floor must be addressed.

The God "in whom we live and move and have our being" is a "hidden God." This is a fundamental fact underlying all our science. The cognitive attempts of natural theology, the seeking for evidences, the deductive arguments for existence are not helpful for most of us most of the time. We come to God through the more intimate experiences of life and as a consequence of God's movement toward us. Secular science and all secular thinking can then be done freely as expressions of praise and as children of God. We do not prove God in science nor find evidence for design in physics; we are not brought to conviction by astronomy nor do we establish our faith by logic.

We have experiences while doing science, however, that have potential faith value, though they do not lead directly to faith and in fact are shared by open-minded persons of no transcendental faith. Such experiences are best described in terms like wonder, awe, mystery, ecstasy, sense of depth, etc. They are unfocussed and diffuse, and only by a generous mind are they perceived as religious experiences. In focussing on science, it is not intended to exclude similar experiences of everyday life; as experienced in science they are more cognitive and less immediate than either the numinous or the aesthetic. However, they are not exclusive to science; in fact, Berger claims for all true knowledge the sense of ecstasy.

It is possible to make the case that existentially...true knowledge leads to experiences of ecstasy--of ekstasis, a standing outside of the taken-for-granted routines of everyday life. Bodies and modes of knowledge differ, both in the degree to which they are conducive to such ecstasy and in the character of the ecstasy they provide. (Berger 28)

He takes this as one of the signals of transcendence for it points beyond the present reality. The continued list includes the experience of play, the sense of order, humor, outrage, and hope. Berger is taking these as inductive evidences of transcendence, in effect, proofs for God's existence. Without denying his argument, a less cognitive, more existential, possibility we can developed for the same items as part of the experience of doing science and of talking science in the classroom and the laboratory. But, with Berger, in the broader sense, these or similar experiences are part of life and we can bring faith and learning together in a vital way by recognizing these experiences and allowing them to be pointers to a deeper dimension.

CELEBRATION: Pythagoras is said to have celebrated the proof of his now famous theorem by sacrificing a hecatomb of oxen. This was no mundane event for him and is at least one response to the ecstasy experience. A mathematical QED, an experiment that works, an idea that fits the problem, all lead to ecstasy. The realization of the unexpected or the perception of a depth beyond can produce the experience of wonder or awe. Celebration and even praise are then natural human reactions.

Science is typically seen, even by our students as unimaginative and flat--art, literature, and music are seen as the disciplines of human response. The facts can be quite otherwise. The physics class without a spirit-lifting demonstration, an insight that produces wonder, or a joy that comes from seeing order emerge from chaos is quite rare. A simple example may illustrate the point. In elementary physics we shoot an airgun across the room at a tin can suspended from a magnet. The gun is aimed directly at the can, but the can is released and starts to fall at the instant the ball leaves the muzzle. We call it "the shooting the monkey experiment," and it is an outgrowth of the golfball problem. The equations predict that in spite of the falling of the can the two objects will collide. In fact, they predict collision whether the ball is moving fast or slowly. Will it happen? Do the equations relying on the laws of motion actually mirror the world of flying projectiles and falling cans? If it hits at high velocity, must it not miss at low? Intuition is not a good guide. Actually it scores every time. Response is dramatic, but not complete without plodding through the equations. Spirits can be lifted by simply seeing the event, but understanding, with the realization that one does understand, produces the richer response. In this simple experiment we touch the universe of physical law.

In addition to this experience, we find a depth in knowledge that appears only as it is pursued. Some persons know this intuitively and pursue the deeper realizations while others resist and are even frightened by feelings of uncertainty. Under or beyond what we understand today is more to be understood tomorrow, and beyond this concept is a hidden one that may upset the first. It comes as a shock, as a thrill, as a challenge, as an inspiration that beyond the atom is a particle and beyond it a stranger particle. Physics is not unique in this regard, but supplies good examples of the depth of even secular knowledge.

For example, nothing is more concrete than mass, the inertial property of stuff, that makes it necessary for a force to be used to accelerate an object. But mass has another meaning that makes a body respond gravitationally. These two properties are not conceptually the same. Newton was puzzled, and pondering on the fact of their apparent identity led Einstein to the concepts of general relativity. But that is not the end; $E = MC^2$ represents the realization that

there is an identity between mass and energy, an idea that is completely foreign to either of the earlier concepts. And beyond this, current thought finds inertia not an intrinsic property of the thing localized here in space-time but a consequence of its interaction with the whole cosmos.

Schilling reflects on this depth quality of knowledge in physics and comments: "...in these depth regions matter manifests itself in radically, though not completely different ways, almost as though in each one there were a different "kind" of matter" (Schilling 65). Most students in beginning courses expect to be told truth and for it to be final. It is final, however, only if, as we say, "It is a terminal course," for beyond the surface lie depths and mysteries as though never ending. It is this apparent depth that Weinberg was marvelling about in the earlier statement: "Suppose...we ultimately come to ... the roots of the chains of explanation. That would be the queerest thing of all."

As we said , these experiences are not intrinsically religious. They are not necessarily pointers to transcendence. They are, however, human experiences that stimulate the imagination and elevate the spirit. Young children seem to have a natural sense of wonder, but college students often need to be encouraged in it. It is appropriate to pause and to reflect on the event and to share in the experience, to celebrate, to express wonder and awe, and even to praise the hidden God. The integration of learning and faith is accomplished when in the presence of the event and the secular explanation, the learner sees beyond the depth of the science the one that sustains all.

THE COMMON: We have talked of experiences of wonder and awe and claimed that they can be common, but there is still the recognizably common. Much of study is everyday, plodding, learning method, developing skill. It is simply work, necessary if we are to go anywhere. These tasks need also to be thought of as much a cause for celebration as the peak experience and the grand insight and as much in need of the integration experience. It is an act of faith to offer our good work to God as praise everyday of our lives.

CONCLUSION: The Christian thinker stands in the presence of God while doing his daily work. Still God's name is not needed in science as an explanatory principle, for science is only

confounded by it, and as Bonhoeffer and Laplace noted, gets on just as well without it. If we are to hypothesize God, it is not as part of science, but as outside it, as the ground of reality.

The highly critical activity of scientific cosmology has been the instrument for driving God from our discourse of explanation. If we see that as not all bad, we still ask if it is possible to have an epistemology in which God is part of the explanatory chain. Probably not. It is more likely that the relation of the world to God, or the possible modes of human perception, leave the secular explanation internally consistent, but not as a closed system, where we come to "the roots of the chains of explanation." We may come to the end of "understanding," quantum physics may be at this point, or we may continue to find depths beyond the depths for continued explanation. It is conceivable, but quite incredible to the modern mind, that we will find God at the end of the secular explanation chain.

But we have a bonus that need not be neglected while doing secular science. Humans have the remarkable gift of being able to stand outside themselves as critics and observers of the world of events. Part of that gift is the experience of looking at the world in wonder, the seeing of mystery and depth, the ability to celebrate the experience and to praise the God of the beyond both for the activity and for the gift that sees beyond it. It is this gift that enables us to heal the breach between faith and learning that resulted from the exercise of our more critical faculties.

REFERENCES

- Berger, Peter L. A Rumor of Angels. Garden City, N.Y.: Anchor-Doubleday, 1970.
- Bonhoeffer, Dietrich. Letters and Papers from Prison. New York.: Macmillan , 1967.
- Burt, Edwin A. The Metaphysical Foundations of Modern Physical Science. Garden City N.Y.: Anchor-Doubleday, 1954.
- Drake, Stillman, ed. Discoveries and Opinions of Galileo. Trans. with Intro. by Stillman Drake. Garden City, N.Y. Anchor-Doubleday, 1957.
- Holton, Gerald. American Scientist 74 (1986): 238.
- Margenau, Henry. The Nature of Physical Reality. New York: McGraw-Hill, 1950.
- Schilling, Harold K. The New Consciousness in Science and Religion. Philadelphia: United Church Press, 1973.
- Tillich, Paul. The Future of Religions. New York: Harper & Row, 1966.
- Weinberg, Steven. American Scientist 65 (1977): 171.
- White, Ellen G. Ministry of Healing. Boise, Idaho: Pacific Press, 1942.