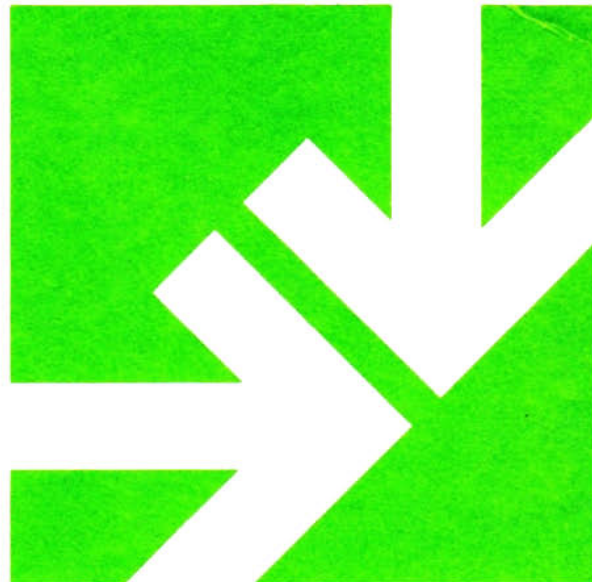


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## Recombinant DNA Research



*"The fear of the Lord is the beginning of Wisdom."*

Psalm 111:10

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## Dialogic: A Systems Approach to Understanding



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*A systems approach to philosophy is introduced in which various types of thinking or mentalities are organized according to their logical form, rather than their content. Special attention is given to the two-dimensional form, called dialogic. Examples of this logical structure in atomic physics, Aristotelian metaphysics, and Christian theology are shown, and a type of complementarity in communism is discussed. A three-dimensional form (trilogic) is suggested based on three types of relationships in the doctrine of the Trinity. Various guidelines are offered to distinguish the Christian-dialogical view from others, and to apply this view to philosophical problems. This systems approach attempts to provide a practical understanding of basic philosophical concepts, and to encourage respect for persons different from oneself.*

### Introduction

In the first half of our century, analytic or "critical" philosophy dominated Western culture. Its declared task was to arrive at precise definitions of a few legitimate terms of philosophy, and to do away with vague and unverifiable speculations.<sup>1</sup> During this period, the physical sciences also experienced a huge growth of

knowledge, but the prevailing natural philosophy (materialism and empiricism) provided a basis to keep all this scientific knowledge somewhat unified. Everyone had a source for the assurance that there was a "rational explanation for everything." Truth could be found simply by observation or experiment.

However, within the last twenty-five years, many

people in various disciplines have begun to criticize the inadequacies of critical philosophy and empiricism. (Michael Polyani's important book *Personal Knowledge: Towards a Post-Critical Philosophy*<sup>2</sup> is a survey of these inadequacies.) I think that one basic problem with such philosophy was that—in the hands of naturalistic and agnostic men—it tended to escape the traditionally ultimate questions of the meaning of life, death, personal significance and purpose, by simply relegating them to the realm of vague speculations. Thus, Wittgenstein concludes his *Tractatus* by announcing: "What we cannot speak about we must pass over in silence."<sup>3</sup>

While the general questions of life were thus "passed over" in philosophy, they emerged in other fields such as psychology, fiction literature, and modern art—not to mention the more anti-rational movements of our times. World-views that were rarely heard of in the West now confront us and our children on the street-corners and in the media. Daily we are reminded of some new moral problem or ethical dilemma, or of some new guru's doctrines. Having been left uncultivated, the intellectual common ground is being taken over by weeds.

But while "legitimate" philosophy decreased, knowledge continues to increase, in both form and variety. Today there is more and more scientific information, but less and less understanding. A glance at the titles in any recent issue of *Science* or *Nature* reveals this fragmentation of knowledge; many of the words in an issue's titles are meaningless to any one individual.

We must, of course, accept the fact that such specialization of labor is inevitable. But everyone (including every scientist) needs to have some sense of unity, significance, and meaning in his life. We now realize that the bare empiricism of the old philosophy is inadequate. But what new source of rational unity can be offered in its place? Or should existentialism and anti-science be allowed to displace rationality altogether?

### A Systems Approach to Understanding

By the 1960's, many new secular alternatives to analytic philosophy began to appear which attempted to maintain rationality without falling into the narrowness and pessimism of the critical philosophers. One of these new alternatives is called general systems theory.<sup>4</sup> It claims to be a return to synthetic philosophy, an alternative to reductionism and dualism, a new view of the unity of the world.<sup>5</sup> These claims clearly seem to be more in line with a Christian world view. (In fact, it may be fairly stated that many of the basic concepts in systems philosophy can be found in the Bible; this paper will bring out some of them.) But although there are many concepts affirmed in common by the Bible and systems philosophy, the latter still holds the old atheistic starting-point.<sup>6</sup> Therefore it fails to find a sufficient common referent to truly give unity to the world and a place for the whole person. Or, to put it another way, the modern secular philosopher faces the problem of explaining how the world-system created itself and "emerges" to "higher levels."<sup>7</sup>

It is not my purpose here to criticize modern philosophy, nor am I qualified to do that. I do feel that other Christians in the American Scientific Affiliation and

elsewhere should be more aware of the shift in direction that philosophy is taking, and offer responses to the new ideas and not old ones. Ironically, we have just recently been offered Dooyeweerd's excellent and comprehensive critique of Western "theoretical thought" from a reformed Christian point of view,<sup>8</sup> but it mainly addresses the reductionistic and analytical views that are now largely behind us.

I am grateful for the many Christians in the sciences who are concerned about the "integration" of their faith and their work. The *Journal ASA* exists as an expression of this concern, and there has been an increasing number of excellent Christian books about the unity of scientific and biblical knowledge. For instance, Bube has developed an explicit Christian view of hierarchical systems, complete with diagrams.<sup>9</sup>

These Christian approaches to systems philosophy are commendable. But much more work of this kind is needed. I believe that many Christians in science have been too silent or cautious in proportion to the quality and range of biblical answers available. The difficulty often is in simply being able to relate Christian views in concepts or forms that can communicate to modern people. And it is even more important for evangelical Christians to understand the basic kinds of philosophical and religious competitors that they may encounter in today's world, so that they are not deceived by them.

The systems approach that I describe involves a method of analyzing beliefs in terms of their logical structure. The advantage of this approach is that it avoids details of content and thus is simple to develop. The disadvantage is that it may be *too* simple; any such general organization is bound to oversimplify particular views greatly. Nevertheless I feel that some formal or systematic approach is necessary because of the need for Christians to have even a rough understanding of their philosophical and logical place in our world.

The illustrations to be developed here may at least serve the purpose of teaching aids: to clarify our basic beliefs and to show how they differ from others that are being offered. Christian doctrine may be understood, according to this approach, by seeing its place in a brief analysis of alternative thought-forms or mentalities, organized according to their logical structure without immediate regard for their particular content. Traditional classroom surveys of philosophy focus primarily on content and its development, without too much attention to the logical form that this content takes. However, I have found that philosophies fall into a small number of basic patterns which can be represented by a point, line, square, or solid figure: that is, by forms having different numbers of *dimensions*.

### Zero-Dimensional Thinking

In zero-dimensional thought there are no permanent values or categories, such as good and evil, subject and object, true and false. Among Eastern cultures, such a "synthesis" has been expressed in the highly refined literature of Zen Buddhism. Zen poets take great pains to make their mentality clear through oblique illustrations.<sup>10</sup> Such poems or anecdotes usually involve attempts to circumvent the laws of logical thought.

In the West, synthesis or "monism" has been expressed in various ways since the pre-Socratic Greeks. Xenophanes identified the sum total of reality with God (Pantheism). Parmenides referred to the One, which fills the universe with Being fully and uniformly, so that everything is actually static and identical.<sup>11</sup> Heraclitus spoke of the universe in terms of a flux of changes or opposing forces, like a flowing river or the unresolved tension in a bent bow. He identified the world with fire, the element of continuous change.<sup>12</sup> In recent times Hegel and the communist philosophers have revived the Heraclitean form of synthesis.

But no matter how such a monistic universe is described—as God or identity or change or contrariety—it is logically and formally the same. Since there are no distinct, stable categories or boundaries, all true monistic syntheses are like an isolated point: it has no dimensions, no direction, no magnitude, no ends, no parts, not even position. Thus, it cannot properly be called a "system". Since it has no relations, the Buddhists properly identified their Zen with nothingness. Buddha also taught that the less said about it, the better.<sup>13</sup>

### One-Dimensional Thinking: Monologic

Ordinary propositional thought, or classical logic, is one-dimensional. This means that it can be represented by a line or axis, along which one value is defined (truth-value).



In this figure, A and -A constitute a pair of opposite or antithetical propositions. We say that if a proposition is true, then it is always true and its opposite is always false. We say that a certain thing either fits into a certain category, or it does not. There is no third possibility. These general rules constitute examples of the "laws of thought"; they are implicit in the Bible as well as in all other propositional literature, and they are stated in any classical logic text.<sup>14</sup> I have given some examples from John's first epistle in the table below.

All propositional statements may be said to presuppose one or more of these laws, so that they cannot be negated in the context of a proposition. For example, the assertion "There are no absolute truths" is a self-contradictory and therefore a meaningless statement.

*Philosophies fall into a small number of basic patterns which can be represented by a point, line, square, or solid figure: that is, by forms having different numbers of dimensions.*

Because of this self-enforcing nature of the laws of thought, logic cannot be attacked directly. Therefore those who wish to affirm a zero-dimensional synthesis can do so only indirectly. We are told that "the Buddha preached for forty-nine years and in all that time found it not necessary to speak one word."<sup>15</sup> In the West we have Kratylus, the Sophist follower of Heraclitus, "who finally thought that nothing should be spoken but only moved his finger."<sup>16</sup> If such a position were carried to its conclusion, a person could not even think in his own head. It becomes a way to die before your time! Only when the axis of truth-value is accepted is it possible to communicate, live, and share in a society.

One-dimensional thought forms the simplest logical system, which has recently been called "monologic".<sup>17</sup> This system has generally proved adequate for conceiving and communicating most concepts in all languages and throughout history. It is the foundation of rationality, and it can never be supplanted as a basis for intelligible thinking.

However, it is becoming realized that ordinary monologic does not form a completely closed and self-sufficient system. One of the most frequently noted examples of this fact is Kurt Gödel's proof that even in a system as simple as arithmetic it is not possible to define and demonstrate all its essential propositions, without recourse to another independent system.<sup>18</sup> There is another alternative to synthesis that can expand the applicability of systematic thinking without loss of rationality. That alternative should now be clear: it is to add another dimension to logic.

### Two-Dimensional Thinking: Dialogic

This next dimension of thinking may best be introduced by describing some of the problems which led to its present formulation. People often seem to be tempted (in their use of ordinary monologic) to fall into one of three kinds of extreme or unbalanced thought-patterns or *pitfalls*, which I will call the "imperialist", the "conformist", and the "alternating."

#### The Laws of Thought

Name	Abstract Form	Statement	Biblical Example
Identity	"If anything is A it is A."	"If any proposition is true, it is always true."	"He who does right is righteous." (I John 3:8)
Contradiction	"Nothing can be both A and not-A."	"No proposition can be both true and false at the same time and in the same way."	"God is light, and in Him is no darkness at all." (I John 1:5)
Excluded Middle	"Anything must be either A or not-A."	"Any proposition must be either true or false; there is no third possibility."	"By this we know the spirit of truth and the spirit of error." (I John 4:6)

In the "imperialist" case, people may be tempted to claim views which are all-inclusive or comprehensive. This tendency leads to reductionistic thinking: often called "nothing-buttery" or "nothing-but-ness", in which alternative views are rejected as unimportant or meaningless.<sup>19</sup> Among Christians this tendency may cause overemphasis on certain doctrines, which then leads to the denial of other doctrines that are equally important. This kind of thinking is manifested in, for example, the notion that only saved people are capable of giving love. Or in teaching which emphasizes one area (such as prophecy or salvation or baptism or personal devotions), to the neglect of another (Bible history, sanctification, grace, social justice, respectively). These doctrines are not meant to be in opposition, but they often seem that way in the teaching or life of the Church.

The "conformist" pitfall has been aptly described in a little book by Francis Schaeffer, *The Church Before the Watching World*. He gives one example of the "conformist" pitfall and its consequences as follows:

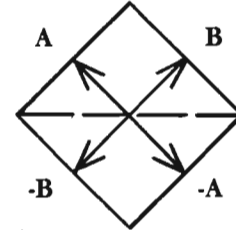
There are some Christian groups who see doctrine as being just statements of certain dogmas worded specifically according to their own terminology. If a person varies at all from this particular formulation, he is ruled out. These groups insist that there is no room for variation at all. . . . Oftentimes if a person is raised in this kind of thinking, what occurs is that as soon as he feels in any way that he cannot subscribe to the wording as it is given, then he is severely tempted to let the pendulum swing completely away from that position. . . . Not knowing that there is some freedom within the proper form, they throw Christianity away entirely. Out of such groups there is a constant stream of people turning completely away from the Christian position.<sup>20</sup>

The "alternating" pitfall is a third type of thinking that is often heard among Christians. Many appear to admit the internal evidence for "paradoxes" in Scripture, especially in the notion that God is sovereign over all things, and yet man is responsible for his actions. "Why does He yet find fault? For who can resist His will?"<sup>21</sup> Not being able to satisfactorily reconcile such issues, and yet not bold enough to discard the whole system as irrational, we keep the two sides of the "paradox" away from each other. Usually this is done by simply teaching one side and then the other, alternately. This is an especially common pitfall among preachers. They will teach God's sovereignty one Sunday, and man's responsibility the next. Or the worthlessness of human effort one Sunday, and the infinite significance of human life the next. I have heard this kind of shifty, out-of-balance teaching applied to many other issues. It is a simple way to avoid controversy and confusion. Besides, preachers are taught that for impact, a sermon should have only one main point. But in doing this, Christianity may be accused of making dualism an article of faith. By our actions we deny the oneness of God's truth. Such "doublethink" amounts to an admission that something is logically wrong with the system.

It appears to me that the Scriptures contain a different kind of mentality: one which avoids the extremes of imperialistic reduction, an insistence on precise word-by-word conformity, or alternating from one teaching to another. This mentality was described by Schaeffer as one having both form and freedom:

Christianity is not to be considered as a single point or a narrow, repetitive line but as a circle within which there is freedom to move in terms of understanding and expression. Christianity is a circle with definite limits, limits which tend to be like twin cliffs. We find ourselves in danger of falling off on one side or the other; that is, we have to be careful not to avoid one sort of doctrinal error by backing off into the opposite one.<sup>22</sup>

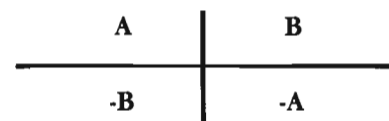
This two-dimensional mentality may be illustrated by drawing a square with two separate one-dimensional axes (A:-A, B:-B) at right angles:



The two axes are perpendicular, not parallel, which illustrates the idea that A and B are *dissimilar* concepts. But since they are *related* in some way, they cross to mark off a common area, as in the ordinary Cartesian coordinate system. In general, two-dimensional thought means a *correlation* existing between two *different* pairs of antitheses. "Different" can in general mean anything from total irrelevance to close kinship (*consanguinity*). The former case applies, for example, when two people are said to argue at "cross-purposes." Or it may apply to "paradoxical" situations in which a common relationship between two sides of an issue is not discovered. In the latter case of close kinship, A and B are dissimilar in some sense, but also a clear relationship of common origin or referent of the two sides is apparent. In this case, we can describe this relation between A and B as a *complementary* pair of antitheses, in which both pairs of ideas have a common property and yet are dissimilar.<sup>23</sup>

In the dictionary, the concept of complementarity is also said to "provide something felt to be lacking or needed . . . to putting together two things, each of which supplies what is lacking in the other, to make a complete whole."<sup>24</sup> (I would add that in general more than two things may be necessary to make a complete whole.) In writing, complementary concepts are often identified by the phrases "on the one hand . . . on the other hand." The dissimilarity of two ideas is thus shown by the fact that it takes two separate statements to express them. Their essential unity is shown in the metaphor of handedness, since both hands are connected to the same body.

At this point I define three kinds of paired relationships between the four propositions (the left-right order of the whole pattern is unimportant). The two relations A:-A and B:-B are the *antitheses*; the relation A:B is the *complement*; and the two relations A:-B and B:-A are called *EXAGGERATIONS*. The diagram is easier to use in print if I remove the axes and separate each proposition into a box.



This structure I call an expression of A and B in *dialogical form*, or simply as a *dialogic*.<sup>25</sup>

I have chosen this term because it includes four useful connotations: 1) *dia* means two, and *-log* means word; two words or statements are involved. 2) *Dia + logic* = doubling of the dimensions of classical logic. 3) Dialogic is juxtaposed to dialectic and competes with it; the former emphasizes kinship; the latter (in the Marxist sense) emphasizes contradictoriness. 4) Dialog (or dialogue) = a discussion between two people, which commonly results in an agreement in terms of a complementary pair of ideas (or else a standoff). The "dialogical model" of personal relationships is implied here. This is a principle developed out of the experience of dialogue by some modern theologians, especially Martin Buber.<sup>26</sup> Howe has described dialogue (using some of Buber's language) as "a reciprocal relationship in which each party 'experiences the other side' so that their communication becomes a true address and response in which each informs and learns."<sup>27</sup>

Actually dialogue form was a popular method of writing among the Greeks after Socrates, and among the early scientists like Galileo. In recent times it has fallen into disuse, probably because it seemed "too personal" and "subjective" for modern science. A constructive dialogue often follows a pattern such as the following, where A, B, and their opposites are seen to fit into a dialogic:

Jack: I believe A.  
Jill: But that implies -B. I believe B.  
Jack: But that implies -A. I believe A.  
Jill: I believe B, but not its exaggeration -A.  
Jack: I believe A, but not its exaggeration -B.  
Jack and Jill: Then we both agree on A and B, but reject the exaggerations -A and -B.

The dialogic pattern provides a simple way to express the outcomes of such dialogues in compact form. In fact at this point it becomes easier to reveal other properties of dialogic by giving some examples from various systems. (At present I am concerned mainly with analyzing the logical form of these ideas, not with their details of content.)

### Complementarity in Modern Physics

The concept of complementarity has received a great amount of attention since Heisenberg introduced it in quantum mechanics to express the dual wave-particle nature of light (photons). Since this subject is generally well known, I am presenting it as my first example of dialogic:

A single photon may be somewhat localized, e.g. as a spot on a photographic plate.	The precise location of a single photon cannot be determined: it is somewhat "blurry."
A CLASSICAL PARTICLE HAS A PRECISE LOCATION IN SPACE.	A CLASSICAL ELECTROMAGNETIC WAVE CANNOT BE LOCALIZED, BUT FILLS ALL OF SPACE EVENTUALLY.

In this diagram, the upper two statements describe the (complementary) outcomes of real experiments. The lower two statements describe the (paradoxical, contradictory) properties expected of classical waves

and particles. The upper formulation is the accepted pair. In this instance, the complementary pair taken together makes a whole which has a quantitative meaning as well (namely, the Uncertainty Principle: the product of the photon's location and momentum has a limiting value called Planck's constant). It is this *quantitative* formulation which constitutes a new twentieth-century application of the concept of complementarity.<sup>28</sup>

Notice that the two pairs of statements along diagonals are true antitheses. It can be seen that an overemphasis on, say, the precise localization of a photon tends to imply the notion that photons have discrete positions and hence are particles: this relation (A:-B) is an *exaggeration*. Likewise the relation B:-A is an exaggeration. Both of these exaggerations are ruled out by actual observations of light in the laboratory—more properly, by laboratory *experiences* involving light. The same is true of experiments with electrons or any other "particles". As Bohr describes it:

... any measurement of the position of an electron by means of some device, like a microscope, making use of high frequency radiation, will . . . be connected with a momentum exchange between the electron and the measuring agency, which is the greater the more accurate a position measurement is attempted.<sup>29</sup>

There is no causal, physical law describing the relationship of position and momentum. Rather, the relationship is determined in part by what the experimenter chooses to measure. Thus, his choice of instruments and settings becomes an integral part of the phenomenon being observed. The universe exists only as a whole; on the atomic scale the effects of observation become relatively large enough to cast doubt on the location of an "object". (At least this is the widely-held "Copenhagen interpretation" of atomic physics.)

Classical concepts were of course developed on the basis of experience in our ordinary scale of distances and energies. When two of these concepts are simultaneously applied to photons, however, the result is a "paradox": the relation -A:-B. The dialogic formulation offers a way to show how such paradoxical concepts may be redefined and thus reconciled.

Others have derived somewhat different implications from this example of complementarity. In my view, physical complementarity is not an expression of polarity or dualism, and the unity it offers is not mystical or inscrutable, as Bohr's later views seem to imply. His neo-Kantian notion of "reciprocal limitation" is a dualism in which particle and wave models are considered mutually exclusive concepts. Bohr says that these classical concepts are the only ones available to describe the atomic world, due to the given structures of the human mind. Certainly it is important to realize that human mental concepts can force nature into conceptual molds that can limit our further knowledge and even deceive us. Barbour attributes this self-deception not to the mind's structures but to a limitation of human imagination that can perhaps be overcome in succeeding theories.<sup>30</sup> But I believe an even stronger case can be made for the validity of two-dimensional concepts. As Leibniz often warned his contemporary scientists, *it is the classical concepts that are unintelligible!* (If there is a classical "particle", what is its inside made



of? If there is a classical "wave", what is waving?) The complementarity concept—though difficult to grasp at first—may be ultimately more intelligible because it avoids these classical problems. It simultaneously meets the requirements for expressing the unity and yet the distinctness or diversity in physical phenomena as a whole.

### The Composite in Early Greek Science

Although it has received this new recognition in physics, complementarity or two-dimensional thought is not new. It was perhaps first expressed around 350 BC by the Greek naturalists in order to reconcile a paradox in natural philosophy: the paradox of intelligibility versus "saving the appearances." Briefly the problem they faced was this: in the world of our experience we see everything in a more or less rapid state of change; nothing appears constant. But words and ideas in human languages can change only slowly. How can we describe nature in a way that is true to the changing appearances, yet in a way that is expressed in fixed word-forms so as to be intelligible to others?<sup>31</sup>

The pre-Socratic philosophers divided sharply on this issue. Parmenides argued for intelligibility: he said that everything is one Being, fixed and unchanging; all change is an illusion. But this left the changing appearances unaccounted for. Heraclitus argued for the appearances: he said that everything is in constant flux or tension; nothing is fixed. But this left the real nature of the world totally inexpressible (remember his follower, Kratylus!)

Plato suggested a solution for this "paradox" in terms of *Ideals* and *Particulars*: every particular thing is an imperfect representation of its ideal form which exists in an unchanging realm of Ideals, or Ideas, to which our human words refer. These two concepts were thus not strongly tied together—which led Plato and his followers to drift into an "imperialist" mentality which exalted the heavenly realm of Ideals over the imperfect, worldly realm of Particulars. To this day "Platonism" remains with us as an example of an unbalanced tendency towards idealism.

Aristotle was probably the first philosopher to explicitly specify a way to satisfy the scientific requirements for an intelligible explanation of appearances in the natural world of Particulars. He combined the two equally important terms of Parmenides and Heraclitus into one "composite" (*synalon*). He declared that any practical description of nature must contain *both* terms as inherent aspects of reality.<sup>32</sup> Aristotle used many names for this composite pair of terms: Being-Becoming, Species-Genus, Actuality-Potentiality, Continuity-Alteration, Form-Matter, Agent-Patient, etc. Regardless of the terminology used, the basic structure is the same. It may be briefly expressed in dialogic form in various ways, such as the following:

Form is the source of continuity in things; it provides the agent for change.	Matter is the source of potentiality in things to receive new forms; it is the recipient of change.
CHANGE IS ILLUSORY IN THE WORLD OF FIXED FORM; FORMS CANNOT CHANGE. (PARMENIDES)	FIXED FORMS ARE NON-EXISTENT; THE WORLD IS A FLUX OF CHANGING MATTER, NOT EXPRESSIBLE IN FIXED WORD-FORMS. (HERACLITUS)

In the historical development of Greek naturalism, theories alternated back and forth in the lower (paradoxical) terms until a composite solution was finally discovered. Aristotle's careful examination of the problem and its solution are fully explained in his *Metaphysics*<sup>33</sup> Here is a particular application of this composite description as it might be applied to a well-known phenomenon:

There are such times as day and night; these terms are usually intelligible.	There is a twilight period where one cannot distinguish day from night absolutely.
THERE IS NO SUCH TIME AS TWILIGHT; IT IS ALWAYS EITHER DAY OR NIGHT.	THERE IS NO SUCH TIME AS DAY OR NIGHT; THESE TERMS ARE ARBITRARY DISTINCTIONS OF A CONTINUUM.

It can be seen that (although my dialogic formulations are brief and perhaps oversimplified), the diagonal propositions in the above figures are antithetical, while the composites consist of the upper two propositions which are not antithetical. The composite is *not* an attempt to reconcile concepts that are truly opposites; if it were, this would be an attempt to violate ordinary monologic.

Aristotle's two-dimensional solution of this problem was an extremely important achievement in the early history of science. Those who rejected either the intelligibility or the appearances requirement fell by the wayside as regards physical science. History shows that these other streams of thought failed to bear any scientific fruit.<sup>34</sup> But Aristotle's composite-based inquiry went ahead; its basic method (induction-deduction or empirical-rational) was in hand. Through the continual interplay of these two kinds of inquiry, the content of scientific knowledge continues to grow.

### Complementarity in Communism

Marx and Lenin appropriated the old Greek term "dialectics" to describe their own logical system, but their use of this term is quite different. Lenin defined dialectics as "the study of contradiction in the very essence of objects."<sup>35</sup> Thus this "system" is a restatement of Heraclitus' conception of the world as a flux of opposites—a form which earlier was identified as zero-dimensional.

Modern Leninist dialectics, however, is much more sophisticated and subtle than Heraclitus' monism. Lenin, Engels, and other communist philosophers apparently saw the need for more logical structure in their philosophy, and tried to develop it. Mao Tse-Tung recognized the importance of complementarity in this connection. Referring to an ancient Chinese proverb, he wrote,

We Chinese often say, 'Things that oppose each other also complement each other.' That is, things opposed to each other have identity. This saying is dialectical and contrary to metaphysics [i.e. correct]. 'Oppose each other' refers to the mutual exclusion or the struggle of two contradictory aspects. 'Complement each other' means that in given conditions the two contradictory aspects unite and achieve identity. Yet struggle is inherent in identity and without struggle there can be no identity.<sup>36</sup>

In this and other passages, Mao uses the term "com-  
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plement" in a subtly different way from that defined by Aristotle's "composite." (And presumably different also from the original Chinese proverb from the 1st century AD, or else Mao would have exploited this historical precedent in far more detail.) The "unity" or "identity" Mao refers to in the quote above is only relative, temporary, and conditional. But the contradiction—the struggle of mutually exclusive opposites—is absolute, universal, and eternal. Therefore the two dimensions of the complementary pair, identity and contradiction, are not equally important or balanced in the dialectical system. Consequently there is an "imperialist" tendency for the system to revert to a pure Heraclitean monism of eternal contradiction. This leads to a denial of any "metaphysical" basis for a continuity or common ground along which change can occur (Aristotle's Form, Being, etc.) Thus Mao's dialectic has not really succeeded in developing a two-dimensional structure.

Mao offers only two senses in which to affirm the "identity" of mutually opposing things: (1) the existence of a thing presupposes the existence of its opposite—a moot point; (2) in given conditions, each of the pair transforms itself into its opposite.<sup>37</sup> For instance, a communist would say that there is an "identity" between the bourgeoisie and the proletariat in the sense that they can change into each other, e.g. when a revolution "happens to occur." Thus the two classes remain in a state of struggle before and after the revolution. Hopes for eventual peace and the "dissolution of the state" will always remain precisely that, for there is no formal basis for such a strong kind of unity within the dialectical system. Actually the term "polarity" seems to be more appropriate to describe Mao's "identity". Communists reject, under the epithet "metaphysical", any notion of the essential, absolute unity of humanity which cuts across class distinctions. The latter is the strong form of unity—agreement, kinship—affirmed in such statements as "all men are created equal," or "He made from one every nation of men to live on all the face of the earth."<sup>38</sup> Absence of a concept of essential unity appears to be a weakness and danger in the formal structure of communist philosophy.

### Dialogical Thought in Christian Theology

The Bible reveals a God Who has a personality characterized by holiness and love. Often in isolated passages of Scripture these two character traits seem to be contradictory: we read of a God Who loves Israel more than any other people, yet Who can break forth in holy wrath, destroying all but a small remnant. How can these two opposing patterns of God's character be satisfactorily reconciled?

Some sections of the Bible give answers to this question. Job saw the greatness and yet the closeness of God, as revealed in the last chapter of his book. The atonement of Christ is another example. It is summarized in Rom. 3:26 as follows:

[Christ's crucifixion] was to demonstrate His righteousness, because in the forbearance of God He passed over the sins previously committed; for the demonstration, I say, of His righteousness at the present time, that He might be just and the justifier of the one who has faith in Jesus.

*All our systems and models are only metaphorical tools of communication. They can never contain the full knowledge of God, or "absolute certainty."*

Here Christ is presented as the Just, Who in His divine holiness cannot tolerate evil and convicts all men of sin. Thus for all men the legal death penalty should follow. But also Christ is the Justifier Who, out of His love for all men, takes their death penalty upon Himself, that they may live. In Christ men can be justified, yet without negating or compromising the perfect justice of God. In Christ God's holy wrath is fully satisfied, yet without destroying all men in its wake. All this can be summarized in dialogic form:

God is holy; He demands total holiness in every person's life, as demonstrated by Christ's life.

*God is loving: He is approachable and willing that all should be saved, through the death of Christ.*

GOD'S HOLINESS MEANS HE IS NOT APPROACHABLE, BUT WOULD DESTROY OR ALIENATE ALL SINNERS FROM HIS HOLY PRESENCE FOREVER.

GOD'S LOVE IS UNCONDITIONAL, OR CONTENTLESS; IT DISREGARDS AND COMPROMISES HIS OWN STANDARDS OF HOLY LIVING; GOD SAVES EVERYONE.

Here we can see that holiness and love counterbalance each other: we would not desire either one by itself. If God's love were unconditional, if He could condone sin against His own laws, then He is not a faithful God; He is capricious. We would have no assurance of His faithfulness to save and keep us, if His other laws are not important to him. On the other hand, if God's holiness meant only His wrath and consistent application of His laws to sinners, then a personal relationship between a sinner and God would be impossible. God would be only an unapproachable ideal or "Other". As far as man is concerned, such "holiness" would amount only to alienation—an evil thing.

Therefore, not only are holiness and love non-contradictory, but *they must be held together simultaneously* to understand the character of the biblical God. This is an example of a dialogical or complementary concept in Christian theology.

There are many other examples that could be elaborated showing these dialogical structures in Christian doctrine. One of the most "paradoxical" doctrines, the sovereignty of God and the free choice and responsibility of persons, has already been shown to have a formal connection with the idea of complementarity in modern physics. This connection was suggested in an article in the *Journal ASA* by Bube, written some twenty-two years ago.<sup>39</sup> Similar connections have been recognized by others. Schaeffer, in the book mentioned earlier, shows that similar relationships exist among many of the major Christian doctrines. He uses the terminology of two cliffs; when Christians are challenged to defend the truth of one Biblical concept, there is often a tendency to "fall off the cliff" on the other side, that is, to negate another Biblical concept.<sup>40</sup> The dialogical structure provides a way to see both concepts simultaneously and thus to keep doctrines in their proper

balance.

Since some of these relations between Christian doctrines are important to us, I have illustrated them briefly, using some of Schaeffer's terminology as well as my own. In all cases the "orthodox" position, as I understand it at least, is expressed in the upper pair of statements. Of course these are not meant to be "creeds"; there may be better ways to formulate these doctrines than the ones given. The reader may wish to formulate his or her own views in dialogical form.

At this point it can be seen that the three pitfalls mentioned earlier are all attempts to squeeze two-dimensional concepts into a one-dimensional formulation. This is done either by emphasizing one aspect of the complementary pair over the other (the "imperialist" pitfall), or by defining orthodoxy/heresy as agreement/disagreement with one particular statement of doctrine (the "conformist" pitfall), or by affirming only one of the two aspects at any one time (the "alternating" pitfall). In all of these cases, a one-dimensional but distorted formulation is the result.

### Three-Dimensional Thinking—and Beyond?

For the past few years I have been "collecting" dialogical patterns such as the ones above, wherever I discovered them. After finding a large number, the natural step was to attempt to organize them into more general types. To do this required closer attention to the content of complementary ideas, since they all have the same two-dimensional form. This amounts to the development of a kind of general systems theory.

It is the Christian system in particular that I have attempted to organize in this way. After spending considerable time struggling with various arrangements of basic concepts in Christian doctrine, it became clear to me that at least one additional dimension would be necessary to express the full relationships among these doctrines. With the addition of one more dimension I arrived at a three-dimensional system, naturally called *trilogic*.

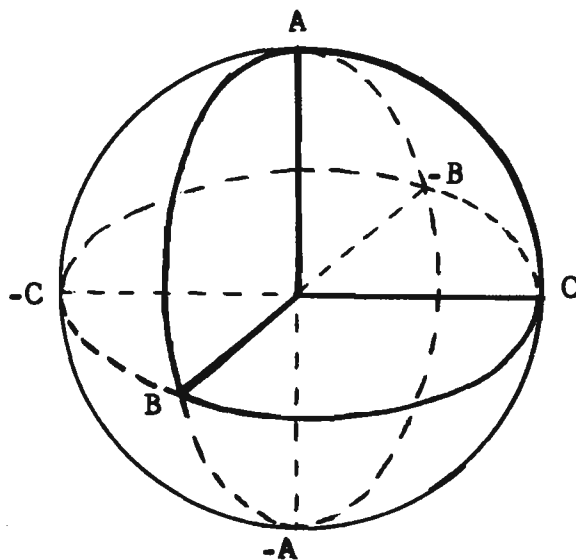


Figure 1. Three-dimensional representation of trilogic.

1. God is free, self-sufficient, infinite. He did not need to create anything.	<i>Creation is significant. Creatures can glorify God. History has real meaning. The universe has real objective existence.</i>
<b>CREATION IS NOT SIGNIFICANT; IT IS ONLY IN THE MIND OF GOD.</b>	<b>GOD IS DEPENDENT ON HIS CREATION FOR PRAISE AND LOVE. GOD IS NOT FREE OR ALMIGHTY.</b>
2. God is in control of everything in his creation; he is sovereign.	<i>Man, made in God's image, has freedom of choice. His choices are significant, and he is responsible for his acts.</i>
<b>MAN IS A ZERO. HE IS DETERMINED, PROGRAMMED. HE IS NOT RESPONSIBLE FOR HIS ACTIONS (FATALISM, ETC.)</b>	<b>THERE IS CHANCE BACK OF GOD. GOD CAN BE SURPRISED BY SOME EVENT IN CREATION (LOSS OF SOVEREIGNTY.)</b>
3. There is one God.	<i>The three persons of the Trinity must be kept distinct.</i>
<b>CONFUSION OF THE PERSONS OF THE TRINITY.</b>	<b>THREE GODS (LOSS OF UNITY.)</b>
4. The Fall and other doctrines are brute facts of history.	<i>Historic facts have a present, existential meaning in our lives.</i>
<b>DOCTRINES ARE ONLY DOGMAS, CREEDS, OR BARE PROPOSITIONS TO BE QUOTED.</b>	<b>ONLY THE PRESENT MEANING IS IMPORTANT, NOT THE HISTORIC ACCURACY.</b>
5. After the Fall we are complex people and cannot know total victory or sinless perfection in this life.	<i>Our standard is the perfection of God's holiness, nothing less.</i>
<b>SINNING IS NORMATIVE: COMPROMISE OF GOD'S HOLINESS.</b>	<b>WE MUST DEMAND TOTAL PERFECTION AND VICTORY. WE MUST HAVE THIS OR NOTHING.</b>
6. No one is completely consistent in his thinking. Tolerance and humility are called for.	<i>There is such a thing as absolute right and wrong in systems.</i>
<b>NO SYSTEM IS RIGHT OR WRONG (RELATIVISM, CYNICISM.)</b>	<b>PERFECT PURITY AND CONSISTENCY OF THOUGHT IS ATTAINABLE IN SOME SYSTEM (FEIGNED CERTAINTY, ARROGANCE.)</b>

Trilogic retains the same kinds of logical relations as in dialogic, except that there are three mutually orthogonal axes instead of two, and the complementary relation between three concepts A, B, and C encloses a volume rather than an area. There are three "degrees of freedom" and three kinds of "cliffs", or error-boundaries in this system. Figure 1 is a sketch of the relationships in geometrical form; a sphere rather than an octahedron is drawn to clarify the illustration.

In this figure the three axes are A:-A, B:-B, and C:-C. The octant ( $\frac{1}{8}$  section) ABC, which faces the viewer, contains the positive complementary trio of concepts A+B+C; the other seven octants contain more or less "heretical" combinations of views in which one or more of the primary concepts A, B, or C are negated.

(This property shows that the more freedom there is in doctrinal preferences, the more kinds of "heresies" are possible also.) This structure constitutes the *form* of trilogic. If the Christian system is the source of *content*, I would suggest that the three primary concepts to organize much of the doctrinal material would be variations on the theme of *unity*, *equality*, and *diversity*; these are the three relations described in the Westminster Confession of Faith with respect to the Trinity.<sup>41</sup>

I have only begun to explore the implications of these relationships. At this point all I can say is that trilogical formulations of Christian doctrines in the terms suggested appear to offer a remarkably complete framework for a Christian worldview, which includes views on epistemology, metaphysics, physics, values, and other aspects of philosophy.

It may be unnecessary and undesirable to extend multidimensional logic to more than three dimensions. The aim was to clarify issues, not complicate them. Besides, it becomes difficult to depict four-dimensional patterns on plane paper!

There are many situations in which we can see many "levels" of meaning or valid models of a phenomenon or doctrine; for example the atonement of Christ, which has aspects of legal, personal, theological, and social significance. Another example would be Dooyeweerd's fifteen "modal aspects" or viewpoints of the world.<sup>42</sup> It is not necessary to invoke complicated multi-dimensional structures to elucidate such concepts. They can all be understood in terms of a trilogical system with unity, diversity, and equality as the relations among the levels. In practically all cases the number of aspects or levels in such models is not tightly defined, but open to expansion or reduction somewhat. The only necessary relations are that: (1) there is a diversity of true ways of looking at reality; (2) each of the several viewpoints is equally important or valid; (3) reality is truly a unity which includes all the levels: they are all *created*, among other things.

### The Purposes of Multi-Dimensional Thinking

It is apparent that philosophical systems have differences of form as well as differences of content. Understanding the logical form taken by a system helps us to understand its content. The most fully complementary systems appear to allow a place for unity, diversity, and equality relations in the system's content; two (or more) concepts have some underlying unity so that they truly fit together, yet they also have an essential difference, so that they counter-balance each other to prevent false exaggerations. And they share equally in this balance; one concept does not predominate over the others.

The trilogical geometrical pattern is a model of these fully complementary systems. It consists of three axes in different directions; they all intersect at a common origin, and they all are mutually orthogonal and equal in length. Such a model can be used to illustrate the relationships in any system of concepts having the same form.

Do these complementary concepts really "solve" anything? I believe so, at least in the sense of providing some of the needed unity or rational integration of knowledge. But I suggest some guidelines to keep in mind when dialogic is applied to philosophical problems. (The same guidelines apply to trilogic.)

First, the dialogic form may help in determining whether any solution is possible. For example, a given "paradoxical" pair of concepts are really either contradictory or they are not.<sup>43</sup> If they are contradictory, e.g. the concepts "personal" and "impersonal", then no rational synthesis is possible. An attempt to summarize the ideas into dialogical form may help to determine which is the case. A restriction of this kind is also affirmed by Barbour in which he says:

Complementarity provides no justification for an uncritical acceptance of dichotomies. It cannot be used to avoid dealing with inconsistencies or to veto the search for unity. . . . Coherence remains an important ideal and criterion in all reflective inquiry.<sup>44</sup>

With due regard for coherence, I would suggest that if valid complementarity is really present in a model, then there is *already* a unity, viz. a common referent. There may not be semantical or mathematical unity; these may be found eventually, but they are not essential to the heuristic value of the model. The common referent is the bond or source of coherence in complementary concepts. It may be a specified subject (e.g. a photon), or a specified world-view or paradigm. Both sides of the complement must share equally in this subject-matter; as Barbour puts it, each side must have the same "logical type." Naive mixing of unrelated concepts is a common error. One example of this is the unqualified use—by Barbour and practically everybody else—of the term "religion."

Secondly, the history of philosophy shows a few cases of related concepts which cannot satisfactorily be reduced to one concept, yet which seem to be mutually necessary and valid. We may have to reconcile ourselves to the fact that the unity or coherence of such concepts is complementary, and that such a situation is final. It may not be possible to find a monological statement of these concepts. A more positive way to say this is that the *form* of a concept may be as much a part of the solution as is its *content*. (Form and content are complementary, too!) For instance, the Christian doctrine of the free will of persons and the sovereignty of God has been debated for two thousand years, encountering all of the "pitfalls". But it should not be difficult for Christians to accept the final complementary (yet still rational) nature of this particular doctrine. There appears to be no expression which does complete justice to the Creator-creature relationship in a simple sentence. (Theologians have offered a reason for this: man cannot by feigning autonomy, place himself in a vantage-point that is outside both the Creator and the creation, so as to discover some kind of commonality between them, or something "in back of God."<sup>45</sup>)

Thirdly, dialogic must be carefully distinguished from other formal approaches to philosophical problems. Dialogic is not Hegelian synthesis, nor is it communist dialectic. These forms appear to lack a real concept of the unity of the world and the stability of truth. Dialogic, when dealing with problems of the created order, cannot be an expression of relativism, dualism, "biperspectivism",<sup>46</sup> or polarities or reciprocal concepts that are mutually exclusive. These are all forms of "paradoxical" relations in which a common referent (such as createdness) is not clearly present.



We may say that such-and-such a subject has different meanings on different levels, but "God will destroy both one and the other."<sup>47</sup>

## Conclusion

The Christian world-view may be modeled as a logical structure which recognizes the essential relationships of unity, diversity, and equality in all creation. As such, it is eminently qualified to offer to the world a fully-integrated view of creation in the form of a general system.<sup>48</sup> In contrast to secular system philosophies, this Christian view does not have to search for a source of unity across the levels or "modal aspects" of life's experiences. It already has that unity: in "the divine Origin of all meaning, Whose absoluteness reflects itself in the human ego as the central seat of the image of God."<sup>49</sup>

In particular, this view recognizes the unity, diversity and equality of all kinds of persons: man/woman, believer/unbeliever, black/white, liberal/conservative, evolutionist/anti-evolutionist, and so forth. Tolerance and respect for people different from ourselves is mandatory because we have an essential unity and equality before our Creator. Views which lack such a strong source of unity and kinship find no basis for such tolerance. Likewise Christians who forget their own Creator or distort their own world-view can become intolerant and destructive. It is important for us to know, practice and communicate a full expression of the Christian world-view. Not only its full content, but its fully-developed form and mentality, may be different from that found in the world's philosophies.

It is also vital to remember that all our systems and models are only metaphorical tools of communication. They can never contain the full knowledge of God, or "absolute certainty". But they can be means to glorify Him, if offered with a clear conscience. The Apostle's formal doctrinal exposition in Romans ends with a rather informal conclusion:

O the depth of the riches and wisdom of God!  
How unsearchable are His judgments,  
And how inscrutable His ways!<sup>50</sup>

## REFERENCES

- <sup>1</sup>Ervin Lazlo, *Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought*, (New York: Harper & Row, 1973), p. 1-2.
- <sup>2</sup>Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy*, (Chicago: The University of Chicago Press, 1958), Paperback ed. published by Harper Torchbooks (New York, 1964).
- <sup>3</sup>Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, trans. by D. F. Pears and B. F. McGuinness (London: Routledge & Kegan Paul, 1961). The first German edition was published in *Annalen der Naturphilosophie* in 1921.
- <sup>4</sup>Ludwig von Bertalanffy, *General System Theory*, (New York, George Braziller, 1968).
- <sup>5</sup>Lazlo, *op. cit.* and *The Systems View of the World: The Natural Philosophy of the New Developments in the Sciences* (New York: George Braziller, 1972). These two books contain large bibliographies of contemporary literature on systems theory.
- <sup>6</sup>Namely, atheism itself, as Romans 1:17 says. I believe that theism/atheism is the basic presuppositional watershed, not some other such as belief in an "open" or "deterministic" universe.
- <sup>7</sup>Terms such as these are frequently used in modern theories of "hierarchical structures", but I think that they only beg the question. See, e.g. Lazlo, *Introduction*, p. 174ff;

- Polanyi, *op. cit.*, p. 382ff; Bube, *The Human Quest*, p. 33; Whyte, L. L. et al., *Hierarchical Structures*, (New York: American Elsevier, 1969).
- <sup>8</sup>Herman Dooyeweerd, *A New Critique of Theoretical Thought*, tr. by D. H. Freeman and W. S. Young (Philadelphia: Presby. & Reformed Pub. Co., 1969).
- <sup>9</sup>R. H. Bube, *The Human Quest* (Waco, Texas: Word, Inc., 1971). Other books include Bube's *The Encounter Between Science and Christian Faith*, D. M. MacKay's *The Clockwork Image*, John Stott's *Your Mind Matters*, and Malcom Jeeves' *The Scientific Enterprise and Christian Faith*.
- <sup>10</sup>For a good sampling of these, see *Zen Flesh, Zen Bones, A Collection of Zen and Pre-Zen Writings*, compiled by Paul Reps (New York: Anchor Books).
- <sup>11</sup>Leonardo Taran, *Parmenides* (Princeton, 1965).
- <sup>12</sup>P. Wheelwright, *Heraclitus* (Princeton, 1959).
- <sup>13</sup>Reps, *op. cit.*, pp. 35, 38.
- <sup>14</sup>Morris R. Cohen and Ernest Nagel, *An Introduction to Logic and Scientific Method*, (New York: Harcourt, Brace, & World, 1934), p. 181ff.
- <sup>15</sup>Reps, *op. cit.*, p. 49.
- <sup>16</sup>Aristotle, *Metaphysics*, 1010a12.
- <sup>17</sup>By R. Buckminster Fuller, among others.
- <sup>18</sup>Ernest Nagel and J. R. Newman, *Gödel's Proof*. (London: Routledge & Kegan Paul, 1959). For a detailed discussion of its implications, see Thomas F. Torrance, *Theological Science*, (London: Oxford University Press, 1969).
- <sup>19</sup>"Nothing-but-ness" is discussed in Donald M. MacKay, *The Clockwork Image: A Christian Perspective on Science*, (Downers Grove, Ill.: Inter-Varsity Press, 1974), ch. 4. "Nothing-but-ness" is from Viktor E. Frankl, "Reductionism and Nihilism", in *Beyond Reductionism: New Perspectives in the Life Sciences*, Arthur Koestler and J. R. Smythies, eds. (London and New York, 1969), p. 398.
- <sup>20</sup>Francis A. Schaeffer, *The Church Before the Watching World*, (Downers Grove, Ill.: Inter-Varsity Press, 1971), pp. 83ff.
- <sup>21</sup>Romans 9:19. Paul's answer to his own question is probably the clearest given in Scripture. He points out that God not only "finds fault," but also gives undeserved grace and mercy. However, he still leaves unclear what our sense of free will is. This concept must be drawn from other passages.
- <sup>22</sup>Schaeffer, *op. cit.*, p. 105.
- <sup>23</sup>In this passage I have tried to choose words which conform to the headings in the Abstract Relations section of Roget's *Thesaurus*, because this is the most well-known organization of concepts in the English language. The relations referred to here are Roget's numbers 10, 11, 12, 14, 15, 18, 27, and 46.
- <sup>24</sup>*Random House Dictionary of the English Language*, Unabridged, (New York: Random House, 1967.)
- <sup>25</sup>Kirk Farnsworth's diagrams ("Psychology and Christianity: A Substantial Integration," *Journal ASA* 27, 2 (June 1975)) resemble these in appearance, and they were also drawn from Schaeffer's thought—but they have no further relation to my diagrams. Aristotle's "square of opposition" comes closer, but it deals with statements differing in quantity, not subjects or qualities (Some A are B, all A are B, etc.) A discussion of the latter is given in logic texts such as M. Cohen and E. Nagel, *op. cit.*
- <sup>26</sup>Martin Buber, *I and Thou*, (New York: Charles Scribner's: 1970). His discourse begins: "The world is twofold for man, in accordance with his twofold attitude. . . . The basic words are not single words but word-pairs." See also *Between Man and Man* (Beacon Press), and Maurice S. Friedman, *Martin Buber*, (New York: Harper Torchbooks, 1955).
- <sup>27</sup>Reuel L. Howe, *The Miracle of Dialogue*, (New York: Seabury Press, 1963), pp. 38, 50.
- <sup>28</sup>Niels Bohr, "Discussion with Einstein on Epistemological Problems in Atomic Physics," in *Albert Einstein—Philosopher—Scientist*, ed. by Paul A. Schlipp (New York: Harper & Row, 1959). Bohr emphasizes the intense face-to-face dialogues that accompanied the development of these theories of atomic physics.
- <sup>29</sup>*Ibid*, p. 208-209.
- <sup>30</sup>Ian G. Barbour, *Myths, Models, and Paradigms: A Comparative Study in Science and Religion*, (New York: Harper & Row, 1974), p. 76.

- <sup>31</sup>This problem and its Aristotelian solution is outlined in more detail in Henry Veatch, "Aristotelianism," in *A History of Philosophical Systems*, ed. Vergilius Ferm (Totowa, N.J.: Littlefield, Adams, 1968).
- <sup>32</sup>Aristotle, *op. cit.*, 1029a3-7 *et al.*
- <sup>33</sup>Aristotle, *Metaphysics*, 995a24ff (Book B).
- <sup>34</sup>Gordon H. Clark, "The Beginnings of Greek Philosophy," in V. Ferm, *op. cit.*, p. 80.
- <sup>35</sup>V. I. Lenin, *Collected Works*, Russian ed. (Moscow, 1958), Vol. 38, p. 249.
- <sup>36</sup>Mao Tse-Tung, "On Contradiction", in *Four Essays on Philosophy*, (Peking: Foreign Language Press, 1968), p. 68.
- <sup>37</sup>*Ibid*, pp. 60-67.
- <sup>38</sup>Acts 17:26.
- <sup>39</sup>R. H. Bube, "Relevance of the Quantum Principle of Complementarity to Apparent Basic Paradoxes in Christian Theology," *Journal ASA*, Dec. 1956.
- <sup>40</sup>Schaeffer, *op. cit.*, pp. 86, 105.
- <sup>41</sup>Westminster Confession of Faith (1647), Chapter II, 3. For a profound commentary on this doctrine, see George P. Fisher, *An Unpublished Essay of (Jonathan) Edwards on the Trinity*, (New York: Charles Scribner's, 1903).
- <sup>42</sup>Herman Dooyeweerd, *In the Twilight of Western Thought*, (Nutley, N.J.: The Craig Press, 1972), p. 7.
- <sup>43</sup>The word "paradox" is ambiguous in this connection. The dictionary allows either real or apparent contradictions to be called paradoxes.
- <sup>44</sup>Barbour, *op. cit.*, p. 77.
- <sup>45</sup>Dooyeweerd, *op. cit.* p. 1ff.
- <sup>46</sup>From Lazlo, *Introduction to Systems Philosophy*, pp. 152ff.
- <sup>47</sup>From I Corinthians 6:13. In other words, the notion of metaphysical "levels" in creation may be useful, as long as some levels are not made irrelevant to or exempt from the Lordship of the Creator.
- <sup>48</sup>I Corinthians 12 offers another example of these three relationships as expressed in social living in the Church.
- <sup>49</sup>Dooyeweerd, *op. cit.*, p. 31 *et al.* Also see C. van Til, *A Christian Theory of Knowledge*, (Grand Rapids: Baker Book House, 1969), p. 51: "... there is a non-Christian as well as a Christian dimensionalism."
- <sup>50</sup>Romans 11:33.

## The Bases of Self-Esteem



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Within the Christian community there has been a history of ambivalence about the appropriateness of feeling good about one's self. Various hymns have emphasized the wretchedness of man ("Amazing grace"), and even the subhuman quality of man ("would He devote that Sacred Head for such a worm as I?"). Countless sermons have been delivered urging the renunciation or destruction of self as a pre-requisite for God's approval and blessing. Recently there has been a growing dissatisfaction with this perspective and calls for reanalysis of biblical perspectives on the meanings of self, self-centeredness and self-esteem. In view of research literature relating negative self-concepts with such things as delinquency, antisocial behavior, and both social and psychological maladjustment, such a reanalysis seems warranted.

Proper understanding of the nature of self-esteem requires an understanding of both the biblical and social

psychological foundations of self-evaluation. In this article we examine the basis of self-esteem, the effects of sin, the relationship between self-esteem, pride, and humility, the important role of the Christian community in supporting and changing self-esteem, and familial and cultural influences on self-esteem.

### Foundations of Positive Self-esteem

The biblical roots of positive self-regard may be traced initially to the creation account. In contrast to a view of man's origins which regards man as a chance mutation or impersonally evolved, the Genesis account suggests that from the beginning man was both very special and highly regarded. God created man in His own image, gave him major responsibility, provided abundantly for his needs, and considered His creation very good.<sup>1</sup> Hardly the picture of a despicable worm! This is the picture of a being that the perfect Judge has placed the highest value upon. And yet this is a picture of man before the Fall, still perfect and not yet God's enemy. Is there a scriptural basis for positive self-esteem after the Fall?

Quite clearly there is. Referring to God's creation considerably after the fall, the psalmist speaks with awe

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about both the Lord God and His creation. "What is man that thou art mindful of him, and the son of man that thou dost care for him? Yet thou has made him a little less than God, and dost crown him with glory and honor."<sup>2</sup> The tense used with reference to God's evaluation implies a present, continuing act. Even after the fall God continues to evaluate positively, or "crown man with glory and honor".

An even more convincing basis for human worth is found in the act of redemption. God did not turn away from man in disgust and consider him worthless once he had sinned. Rather, he sacrificed His Son for us while we were still very much His enemies!<sup>3</sup> It might be argued that this simply reflects God's incredible mercy because He loved us when we were worthless. Earlier in this same passage of Scripture, however, we are told that Christ died for the ungodly while we were still *helpless*, not worthless!

This points up an important distinction that perhaps has been misunderstood: to be a sinner is to be *helpless*, not *worthless*. God's mercy is expressed both in not destroying man and in providing help for the *helpless*, or those unable to meet God's standard of perfection on their own. God distinguishes between *ungodliness* and *worthwhileness*, between *sin* and the placing of positive value upon the human personality or self. Bruce Narramore referred to this when he said:

The first thing I'd like to do is suggest that we need to understand the biblical meaning of the concept of self. . . . The Greek word *ego* means I, the total personality. . . . The ego is the whole man, the total person. . . . The flesh theologically is the rebellious sin principle. . . . We fail sometimes to differentiate between the self and the flesh, or the self and the old sin nature, or the self and the old man. . . . They are distinctly different aspects of the human personality. . . . It's very clear that man has deeply fallen, but we tend to confuse righteousness and value. You see, according to Scripture we can be of immense value and worth to God, and still be very, very sinful. But sometimes we say since we are totally depraved or totally sinful we are, therefore, worthless.<sup>4</sup>

The underlying dynamic for man's self-esteem, or human worth, is the unconditional love of God, expressed in his redemptive act. "We love, because He first loved us."<sup>5</sup> We not only love God in reciprocity but we also can love ourselves because God validates our worth simply by loving His creation without conditions attached.

The establishing of our self-worth in God's unconditional love suggests two additional concepts important for a biblical understanding and personal experience of self-esteem. The first is that self-esteem is primarily shaped and sustained through social reinforcements. It is developed in an interpersonal context. Biblically, the interpersonal nature of the self is originally implied in the initial creation act ("let us make man in *our* image"),<sup>6</sup> and in the creation of a help-mate ("It is not good that man should be alone").<sup>7</sup> It is basic to man's nature, then, to require relationships for self-development. Evaluation necessitates a judged relationship. Self-esteem is initially rooted in the evaluations of significant others: "And God saw everything that he had made, and behold, it was very good";<sup>8</sup> "By this we know love, that he laid down his life for us."<sup>9</sup> Eventually it becomes partially internal-

ized so that self-judgments are made, as in the case of Adam and Eve after their sin, but it still continues largely as a function of feedback from others. In contrast to the valuing process of our society which gives reinforcements, at least for men, on the basis of achievements, i.e., conditionally, God's love is unconditional. He continuously values us, so we can value ourselves.

The second implication of God's unconditional love is its unchanging nature. In human relationships positive feedback from others, which is basic to positive self-esteem, is not always consistent. We don't always achieve sufficiently to win unbroken regard. Those who love us don't love perfectly. God's love is steadfast,<sup>10</sup> and therefore provides a stable source of positive regard which carries us through the vagaries of human relationships, and allows us to stand somewhat independent.

While God's love is unconditional and unchanging our experience of it is not always consistent. The major obstruction, biblically, in our experience of God's love is sin. Likewise the conditional nature of human valuing processes and much of the struggle to experience positive self-esteem may be traced to the effects of sin.

### The Effects of Sin

Our discussion to this point has emphasized the interpersonal nature of self-esteem. The Scriptures, as well as contemporary psychology, root self-evaluation in relationships.

The original sin was fundamentally a violation of relationship. It was not only a negating of God's authority and truthfulness, but it was also a negating of his character. In the process of God-negation, man who was made in the image of God negated himself. He could no longer look at himself with unconditional self-regard. In violating his relationship with God he cut off his central source of self-esteem and became self-centered.

Adam and Eve became knowledgeable, but knowing was painful. Their first act was to hide. Ever since that act the human race has naturally tried to hide what is bad from God, and from itself. Ego defenses are fundamentally attempts to guard ourselves from negative truth. In the act of redemption and the continuing process of forgiveness, God's grace allows us to face the truth about ourselves and restore the relationship. Nevertheless, because we are fallen, even the redeemed employ techniques designed to insulate themselves from truth and to hide from God at times.

Intertwined with hiding came blaming and violence. "Passing the buck" started with Adam and Eve.<sup>11</sup> In an attempt to get out from under the painful, bright spotlight of negative self-knowledge and to escape responsibility for breaking the relationship with God, both Adam and Eve tried to place the blame on someone else. The attempt was both to escape judgment and to preserve positive self-regard, even if the preservation was self-delusional. In our day we characteristically blame parents or circumstances which "determined" the way we are. The irony is that those who rely most heavily on such ego-defenses are characterized by extremely low self-esteem or extremely active compensation in the form of arrogance. By blaming others and deluding themselves they block off the major sources of self-esteem found in positive relationships with God



and others.

Cain's murder of Abel exemplifies the lengths to which attempts at self-justification and preservation of self-regard can go. The biblical incident is particularly fascinating in view of studies showing that low self-esteem is associated with delinquency and anti-social behaviors! Apparently God had established standards regarding offerings. Instead of accepting God's evaluation and changing his offering, Cain looked at Abel as the cause of his rejection. Perhaps his reasoning went that if he could remove Abel God would accept his offering, or, at the very least he would be rid of the painful comparison. Because self-esteem is based in interpersonal feedback, it is customary for people to look for those who are similar to aid in self-evaluation and to avoid or get rid of those who are not similar.<sup>12</sup> Similarity breeds attraction at least in part because it allows us to receive feedback which confirms our way of thinking, feeling and behaving. Making, or at least choosing others in our own image helps us to maintain that self-image.<sup>13</sup>

Another effect of sin is to create depression. (This is not an assertion that all depression is due to sin). Ronald Rottschaefer points out that self-esteem and depression are interrelated.<sup>14</sup> The psalmist suggests that the lack of integrity or covering up of sin results in depression, and by implication, negative self-esteem.<sup>15</sup> His body groaned, his soul (*psyche*) was cast down, and he was overcome by guilt. The New Testament reminds us that a double-minded man is unstable in *all* his ways.<sup>16</sup> The implication is that a person who has not clearly decided his loyalties or who has not been purified of his sin but hides it, will be unstable in his faith, his behaviors, and his self-perception.

Indeed, the pervasive effects of sin are clearly presented in Romans 3:11-18 where we see that human understanding, motivation, relationships, behavior, communication, emotions, perceptions and relationship with God are twisted and negative due to the power of sin. The way in which we feel about ourselves and go about trying to establish our own self-esteem, as well as the way in which we respond to others' needs are all affected negatively by sin.

### Self-esteem and Pride

Scripture indicates that pride is one of the sins most abhorred by God,<sup>17</sup> and was the root sin behind Lucifer's abortive coup attempt. For this reason Christians have been quick to suspect the notion of self-esteem as a cover-up for arrogance. We are told that there is no good in ourselves, and that we must be emptied of self. There is a confusion about self as personality and self-centeredness as an expression of the flesh or sin-principle.

In order to understand the relationship between self-esteem, pride and humility properly we must look at the biblical pattern of God-man interaction, the notions of perfection and goodness, and the concepts of works and grace.

Pride is characterized by an exaggerated desire to win the notice or praise of others, and the rigid taking of a superior position in which others' opinions are virtually never regarded as good as one's own. Humility is characterized by accurate self-appraisal, responsiveness to the opinions of others, and a willingness to give

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praise to others before claiming it for one's self. Biblically, pride is expressed in attempts to claim glory due to God for one's self and in the attempt to justify one's self in rejection of God's redemptive process.

From what we know of the components of positive self-esteem, humility is the biblical counterpart, not pride. The ability to face one's self and to assess and accept both strengths and weaknesses accurately, while being responsive to, but not overly dependent upon, social approval are basic ingredients of non-defensive self-esteem. On the other hand, psychologists since Adler have associated both pride and excessive self-disparagement, which some might regard as humility, as indications of basic feelings of inferiority or low self-esteem.

The biblical position is not that we shouldn't feel good about ourselves, but rather that we should love ourselves,<sup>18</sup> and accurately assess ourselves.<sup>19</sup> The critical distinction is between goodness and perfection. In his act of creating us in His image, God gave us intrinsic capacities which can be developed by human effort, enjoyed, and felt good about. The problem comes when we don't accept God's evaluation or His plan and, in attempts to justify ourselves spiritually and morally, start thinking of ourselves as overly good, or capable of becoming perfect. Pride, then, is based on an unwillingness to accept God's moral judgment of us as imperfect. Its dynamic is rooted in feelings of rejection or inferiority and expressed in over-compensation aimed at becoming so superior that one can delude himself into thinking he is perfect, without God. Pride may not be based on conscious rejection of God but may arise from a background of rejection and the failure to be exposed to and experience God's unconditional love.

Humility and positive self-esteem are not based upon self-negation or the "emptying of one's self". They are based upon affirmation of God's regard toward us and a right relationship with Him in which imperfection, weaknesses and strengths can be accepted or confessed and changed as appropriate. The biblical history of God-man interaction is not one of God manipulating "empty shells", devoid of personality, in robot-like fashion. God doesn't act in place of personality, but through personality. Christ's incarnation and human development are affirmations of this. The pattern of interaction is one of mutual influence: God acts and man responds. This should not be too surprising if we take creation in God's image and the Scriptures seriously; if the Old Testament left doubts about God's personality the incarnation removed those doubts. There is no doubt that Jesus Christ regarded himself positively. He could not have made the assertions he did if that weren't the case. On the other hand, he was marked by perfect humility. The biblical injunctions to "have this mind in you which was also in Christ Jesus"<sup>20</sup> and to "be imitators of God as beloved chil-

dren"<sup>21</sup> are directed at Christ's whole personality. We are to be marked by humility based on accurate and positive self-appraisal. For the Christian basking in God's perfect love is able to accept his imperfections more completely, acknowledge his sin, and face himself free from fear of rejection.<sup>22</sup>

Many Christians, it seems, hold to a form of humility associated with negative self-esteem in contradiction to the biblical pattern. Bruce Narramore refers to this as "neurotic humility". He says that "it's really a reversed form of pride. It's a pride in our omnipotent badness. . . . 'I am so bad that God's goodness even can't control it'."<sup>23</sup> Associated with this negative self-regard are depression and a sense of emotional unbelief or anxiety about eternal salvation, according to Narramore.

Whereas pride is inevitably connected with an achievement or power basis of self-esteem, humility frees man from the bondage of striving to gain approval by always looking superior in the eyes of others or one's self. The fundamental dynamic behind humility is Grace. The Scripture consistently emphasizes that neither spiritual salvation nor human value are rooted in works. Rather, they are founded upon Grace. Fundamentally, there are two ways in which one can gain and maintain self-esteem: the first is through power or achievement; the second is through love and relationship. For the most part our society socializes us into the former. Grace relieves us of that pressure, and also of the temptation to pride.

An understanding of Grace is essential for humility within the church. One suspects that there is a lot of pride circulating in nonobvious corridors of the church at the same time that self is decried. For example, the use of spiritual gifts seems to be an area where people who negate their self in other areas subtly get involved with pride. When one realizes that the spiritual gifts are not earned but given through grace, the emphasis shifts from how spiritual I am to how I can best use my gift. As a matter of fact, a close look at both the gifts of the Spirit and the fruits of the Spirit reveals that the gifts really don't make any sense, perhaps don't exist, unless they are seen as interpersonal. They are not something privately possessable and conducive to pride, in the sense of a child showing off his new toy which some other child doesn't have with a tone of "I'm better than you" in his voice.

### **Incarnation and Community**

Although all of the preceding may be received as conceptually correct and biblically true, it is still possible for genuine Christians not to experience positive self-esteem. The biblical emphases upon incarnation and the caring community are critically important for the emotional experience of positive self-regard.

The incarnation of Christ demonstrates God's love and valuing in physical, practical terms. He moved among the despised and rejected of society giving them hope and a basis for believing they were worthwhile. He met people in their weaknesses and gave strength. His judgments were aimed at hypocrisy or the covering over of sin, the removal of which would result in new freedom and self-esteem. The hypocrites crucified Christ because they did not understand the way of Grace and were unable to face themselves in honesty.

They were undoubtedly an insecure, achievement-oriented and depressed group who had deluded themselves into thinking they were perfect. Comparison with perfection left not only their positions but their tenuous based self-regard in jeopardy.

Throughout the New Testament Paul emphasizes the importance of incarnating Christ's love. After urging the church at Ephesus to be imitators of God in Ephesians 5 he instructs them to walk among the believers with sacrificial love. In Colossians 3:12-15 he urges the believers to be kind, meek, compassionate, patient, forbearing, and loving. Not only was this essential for corporate harmony but these characteristics are fundamental to individual self-esteem upon which corporate conflict or harmony pivots. In numerous places we are instructed to judge not, to forbear, and to consider our own sins and weaknesses.<sup>24</sup> Such an orientation is critical if a church community is to build and encourage positive self-esteem in its members. I suspect that the commandment to avoid judgment, or negative feedback that is emotionally charged, is given for the following reasons: (1) It fosters self-delusion. In Romans 2, after describing a great deal of wickedness in the previous chapter, Paul immediately warns the Roman believers not to get puffed up through social comparison but to accurately reflect themselves in comparison with the perfect standard. (2) It lowers the other person's self-esteem and results in dysfunctioning within the body. The cycle is definite; the principle on the human level is reciprocation. Judgment begets judgment and conflict; praise elevates esteem and fosters harmony. Judgment brings out natural ego-defenses that are emotionally employed unless a person is sufficiently spiritually mature and of high enough self-esteem to identify with Christ in his response rather than imitating the judge. Unfortunately most of us are not at that level of ego-strength or spiritual experience, and so churches split.

The operating principle, then, for the Christian community is love and forgiveness. In the incarnation of Christ's life in the body people will be freed from defensive striving for self-regard, will not make the church a place of power struggle and manipulation, and will be free to fully develop in the context of significant and consistent positive relationships. The church must avoid becoming "a museum for saints" in which caring relationships cannot be built because people cannot be real and share their problems and needs for fear of being judged.

### **Parent-Child Relationships**

It is in the context of the parent-child relationship that social feedback central to self-esteem normally begins.

Results of several studies support the commonly held assertion that acceptance of the child by his parents, as measured by parental warmth either in early childhood or more reflectively later on, is positively correlated with high self-esteem.<sup>25</sup> Acceptance is communicated by parents in a variety of ways. For the young infant it involves gentleness in handling, time spent holding the child, time elapsed in meeting expressed needs, appropriateness of the attempts to meet needs, expressions of delight and the amount of spontaneous, non-need-oriented interaction such as in play.

For the older child it involves gentleness of responses to transgression and in discipline, time spent encouraging and responding to the child's ideas and positive behavior, and use of praise and other language indicating delight and acceptance.<sup>26</sup> Language becomes a powerful tool in the shaping of a child's self-image as the child applies his new language to himself as he experiences it being applied by the most significant people in his world. The impact of parental feedback is especially critical during early childhood because parents are viewed as omniscient during most of the formative years of the self-concept.

Several studies support the notion that self-esteem is at least partly due to identification with the parent (usually the mother).<sup>27</sup> The results could also be explained in terms of differences in the way that mothers relate to and reinforce their children. Regardless, the evidence is consistent that high self-esteem mothers tend to have high self-esteem children and vice versa. It seems that the biblical dictate to love one's neighbor as one's self applies doubly to the necessity of loving one's self and one's closest neighbors!

There is also evidence that those who are higher in sex role identification are higher in self-esteem,<sup>28</sup> as are those who mature earlier in adolescence, and that the sources of self-esteem as mediated through socialization agents are different for boys and girls.<sup>29</sup> Among white middle-class student males it appears that self-esteem may be based more on what is accomplished and external sources of evaluation, while for females social self-esteem may not only be more stable but appears also to be less related to approval needs in an academic achievement situation and more centered in social adequacy.<sup>30</sup> These differences, of course, may be traced back to differences in the way which parents may set standards and give positive feedback for boys and girls. It is too early to tell what kind of effect current attempts at unification of socialization for the sexes during childhood will have upon the bases of self-esteem, though the stress on moving females more into male roles may lead to women becoming more achievement or power oriented.

The Stanford psychologist, Robert Sears found that high self-esteem was significantly related for both sexes with academic achievement, small family size, early birth position in the family and high warmth on the part of both parents. For boys, high self-esteem was associated with low father dominance in the marital relationship.

Stanley Coopersmith, author of a highly regarded book, *Antecedents of Self-Esteem*, found that high self-esteem was related to close relationships between parents and boys, as indicated by parental interest in the boys' welfare, concern about companions, availability for discussion of problems and joint activities. Parents of high self-esteem boys were also less permissive. They set high standards of behavior, and were consistently firm in enforcement, though they were less punitive in style. They tended to use rewards and non-physical punishment for discipline. In addition, family governance for high self-esteem boys was more democratic with parents encouraging input from the boys and allowing dissent and persuasion within the context of well-defined guidelines for privilege and responsibility. Finally, a significantly greater propor-

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tion of boys came from families marked by divorce or separation.

Both Sears and Coopersmith found that those with high self-esteem had higher goals and were more successful in achieving them. The parents of the boys in the Coopersmith study placed greater value on achievement than on adjustment or accommodation to other persons. This reflects the sex-based differences indicated in the Hollander study, and is also consistent with Sears' finding that low self-esteem was associated with femininity, which, in turn, is not associated with achievement as a base of self-esteem. The fact that a non-achievement base is associated with lower self-esteem is undoubtedly a reflection of societal values, as well as possibly due to the greater difficulty in discriminating evaluation that is not contingent upon specific responses. At least one study partially contradicts these findings and concludes that praise of the person rather than praise of task performance is generally positively related to self-esteem.<sup>31</sup> This is consistent with another study which suggests that privileged adolescents of parents intensively engaged in academic work have lower self-esteem.<sup>32</sup>

Nevertheless, it certainly seems true that competence and confidence are closely interrelated, each fostering the other.<sup>33</sup> In our society the greatest reinforcements come for competence in task achievements, at least for boys, though at least minimal levels of interpersonal competence must also be demonstrated for positive feedback.

### Community and Culture

Perhaps the most powerful influence shaping the valued characteristics of Americans is the media. Through the presentation of various "heroes" and the selection and reinforcement of certain behavior, standards and characteristics, television in particular feeds into and actually defines the "ideals" which become part of our ideal self. Most children watch television for 2-3 hours per day, and 78% of America's families use the TV as a babysitter.<sup>34</sup>

There has, of course, been extensive debate as to whether TV conditions responses and creates socially undesirable responses, or allows for the cathartic release of emotions and aids the society's adjustment. Beginning with early studies of vicarious imitation<sup>35</sup> and considering more recent conclusions, the results seem reasonably conclusive: TV acts as a model and shaper of responses.

What kind of models or ideals are being presented? Liebert *et al.* indicate that the single most characteristic value presented by TV is violence.<sup>36</sup> It has been estimated that in 1968 the average American child between 5 and 15 sees the violent destruction of more than 13,000 persons on TV. Despite some promises made by major broadcasters in the early 1970's, things seem



to be about the same, with the addition of increasingly explicit sex and the presentation of both romance and broken families as the norms/ (ideals?) for life. Liebert found that the most powerful group on TV was the white American male, usually middle-class, unmarried and involved in violence as an aggressor. Women are increasingly portrayed with a kind of feminine machismo: slick, single, aggressive, and power hungry. Other misconceptions and consequently distorted values involve racial and ethnic groups, occupational roles, normal family life, and the routine of living.

In summary, contemporary American television tends to offer a distorted view of real life and to place value, by virtue of characteristics portrayed and rewarded on the screen, on power and success, with manipulation of others the way to the goal. Stable and mature love in the context of friendships, marriages and family life are grossly under-represented, and therefore undervalued. To the extent that television shapes our values and consequently our self-images, it leads us away from the biblical basis of self-esteem and into a misleading search for esteem that can be only unstable and negative in results.

A second major influence upon self-esteem is that represented by the intertwining of education and capitalism. It should be understood that capitalism, or perhaps more correctly, greed for money, also is a major determinant of what is shown on television. At any rate, the American educational system strongly rewards the characteristic of achievement, as demonstrated in the 1950's by McClelland and his colleagues. Human value comes to be measured in terms of how much one produces. We subtly come to judge ourselves comparatively in terms of salary levels. Simple decisions as to who should be treated first in the hospital, for example, come down to perceived value as judged by evident material success or economic class. The result, of course, is that those who, for one reason or other can't achieve adequately are surrounded with negative feedback and come to view themselves negatively. The problem is not only that an unstable basis for self-esteem is created through the emphasis on achievement, but that modern industrial production techniques (factory or office) make it difficult for a sense of achievement even to be experienced. Work is fragmented, routinized and separated from end creation or is aimed at such artificial ends that it becomes meaningless and also unable to confer a sense of accomplishment. Some find themselves so identified that they face continuous obstacles in gaining the tools necessary to achieve or to reach economically valued positions, such as in the case of rejected minorities (the aged, poor, racial minorities, and physically handicapped, for example). Unemployment rates among Blacks in central cities are typically 3-4 times higher than for comparable white groups, among those looking for work!

The devaluing begins way back in the educational process when such individuals begin to fail because they don't meet the middle-class standards of achievement. In one classic study of teacher expectations it was shown that teacher expectations strongly and subtly influence the performance of children.<sup>37</sup> Children that teachers expected greater intellectual gains from showed significant gains, and were described as

having a better chance of being successful and happy in later life. The children were randomly assigned to the experimental groups so that intellectual promise at the outset was merely in the mind of the teacher. Furthermore, children whom the teachers perceived as "slow track" were not only rated negatively, but were rated even less favorably if they showed unexpected gains. It is exactly these kinds of expectations which tend to be expressed toward lower class and minority children, thus, beginning a vicious negative cycle in which, for many, death becomes the only relief.

In addition to achievement, both the media and our educational system highly value physical beauty. Dobson points out the pernicious effects of this valuing upon the self-esteem of countless people.<sup>38</sup> Research evidence exists which indicates that the mesomorphic or athletic body type is rated most favorably and that heavy children report less positive self concepts than their more athletic peers.<sup>39</sup> Finally, the media in particular tends to foster an attitude of disdain and rejection toward those who are physically or functionally different, such as the physically handicapped or mentally retarded. At least these persons are met with anxiety by those unsure how to relate, and at the most, they are actively scorned and rejected with consequent effects upon their self-esteem.

### Self-Esteem and Other Characteristics

Levels of self-esteem seem to be associated with a wide variety of other personal and interpersonal characteristics. Persons high in self-esteem are more active and expressive in group discussions, not particularly sensitive to criticism, show little anxiety, and are much less afflicted with psychosomatic illnesses than low self-esteem persons. Those with low self-esteem feel isolated, unlovable, too weak to overcome their deficiencies, and unable to defend themselves, as well as afraid of angering others or drawing attention to themselves in any way.<sup>40</sup> In addition, low self-esteem children have been found to have higher anxiety levels, and to receive generally more negative reactions from peers.<sup>41</sup> Intelligence and curiosity are positively associated with self-esteem,<sup>42</sup> as are self-disclosure<sup>43</sup> (except for results from one conflicting study which shows highly neurotic and cycloid individuals disclosing more personal information), field independence,<sup>44</sup> and lower vulnerability to delinquency.<sup>45</sup> Finally, those with low self-esteem are more likely to be submissive and dependent, more vulnerable in interpersonal relations, more concerned about what others think of them, and more likely to have their feelings hurt.<sup>46</sup> Self-esteem seems to operate at least partially as a mediating variable<sup>47</sup> which interacts with significant stimulus characteristics in affecting such responses as trust.<sup>48</sup>

In summary, self-esteem affects a wide variety of characteristic feeling, behavior and motivational patterns. The development of positive self-esteem is seen as critical to the most positive forms of human experience and interaction as understood biblically and psychologically.

### Changing Self-Esteem

If positive self-esteem is so important for healthy psychological, interpersonal and spiritual functioning, it is critical that we identify some of the factors or

strategies which might be used to make one's self-esteem more positive.

**Affirmation:** The first strategy would be to increase the level of approval or acceptance expressed toward an individual. This would have to be done in relation to realistic, objective assessment if it is approval of achievements or performance, and must be done genuinely and not too abruptly if it is the expression of affection and acceptance. Baron theorizes that large deviations in social reinforcement from an individual's social self-concept, whether positive or negative in direction, result in negative feelings.<sup>49</sup> The perception of substantial discrepancies leads initially to behaviors on the part of the individual to reduce the difference. The behaviors may include such things as avoidance of the reinforcing agent, attempts to bring the agent under control, and increases or decreases in behaviors which have typically brought reinforcement, depending upon the positive or negative discrepancy currently being experienced. If the feedback received from others continues to deviate substantially from the individual's social self-concept over a prolonged period, the person will change his self-concept. In addition, Baron suggests that more moderate discrepancies in a positive direction will produce positive feelings. Initial research results have tended to confirm these predictions.

The implication is that the Christian community can have an important role in changing self-concepts through the medium of acceptance, but that care must be taken not to initially overwhelm, and to be genuine in one's use of such reinforcement. The Christian has a powerful change message that should speak to the millions who feel negatively about themselves. The directional dynamic shifts the primary basis of positive esteem from the stresses and uncertainties of seeking approval from others to that of pleasing God and receiving His perfect evaluation of well-done as well as his non-contingent reinforcement of Grace. This is certainly, in part at least, the thrust of Colossians 3:17, 23-24, and the experience of Paul, who experienced so much disapproval from others but centered his esteem in God's approval, as in II Timothy 4:7-8. Not only is the message that God unconditionally loves and will make a new creature out of the person,<sup>50</sup> with behavioral and self-evaluational effects, but the medium is that of a caring community which extends specific positive reinforcement over an extended period of time in the context of caring interpersonal relationships.<sup>51</sup>

**Alteration:** Another strategy that can be used within the general church community, small groups or in one-to-one relationships is to change the basis of evaluation. As we have mentioned already, the values espoused by the society which are used as content for self-concepts and the basis of evaluation are mainly power or achievement oriented. This is in radical opposition to the biblical standard of self-esteem, though the Bible certainly makes ample use of contingent reinforcement.<sup>52</sup> The church community ought to be a cross-cultural reinforcement center, where individuals are reinforced for shaping their ideals and self-images counter to the culture if those values conflict with biblically understood values. If the church can begin to reject some of the materialism and success/achievement-orientation which it seems to have quietly accepted during this century, it will become both an

alternative for the culture at large and a dynamic supporting community for its members. Such a position will inevitably lead to conflict with the culture at-large, and may lead to the effects of social comparison and change-attempt that Jesus experienced when he tried to move the basis of acceptance from achievement to love. Nevertheless, consistent with Scripture, individuals accepting and supported in such values will experientially verify the reality of God's love and the benefits of positive self-esteem based on stable sources.

On a more individual scale we can assist others by helping them to choose more appropriate social comparison standards. People who think poorly of themselves because they can't play sports like professional athletes will be helped, for example, to change their evaluation standard to other non-professionals of their age, or to enjoyment of the activity and awareness of other more effective means than that to gain self-esteem. In addition to changing the social comparison standard we can help in the selection of more appropriate evaluation criteria. It is not necessary, for example, to do everything perfectly in order to receive positive reinforcement. The perfectionist must be aided in adopting a more realistic criterion. This may involve systematic social reinforcement for other than perfection, conversation, or even specific forms of therapy in the extreme.

**Acquisition:** Finally, on a practical level, we can concentrate on helping individuals acquire new skills or improve old ones. Through the process of competency acquisition confidence will increase, new efforts that will in turn bring reinforcement will be tried, and self esteem will be elevated. Within the church community older members of the congregation could be very positive influences upon adolescents in the acquisition of various occupational or professional skills, for example. A given church or churches might sponsor adult education nights aimed at the sharing of practical skills for members, within the context of the caring Christian community, and without the usual negative correlates of education based on achievement and evaluation stresses.

## REFERENCES

- <sup>1</sup>Genesis 1:26-28, 31; 5:1 (R.S.V. used throughout).
- <sup>2</sup>Psalms 8:4-5. May be translated "angels"; Heb., *Elohim*.
- <sup>3</sup>Romans 5:8, 10.
- <sup>4</sup>Remarks made in his Presidential address for the Western Association of Christians for Psychological Studies, Westmont College, May 1975.
- <sup>5</sup>John 4:19. Unconditional love does not mean that God has no standards or requirements. Redemption is conditioned upon repentance. Nevertheless, God continues to love us even if we reject Him.
- <sup>6</sup>Genesis 1:26.
- <sup>7</sup>Genesis 2:18.
- <sup>8</sup>Genesis 1:31.
- <sup>9</sup>I John 3:16.
- <sup>10</sup>Psalms 36:5-10.
- <sup>11</sup>Genesis 3:11-13.
- <sup>12</sup>Festinger, L. A theory of social comparison processes. *Human Relations*, 1954, 7, 117-140.
- <sup>13</sup>It is not clear that this holds for those with extremely negative self-images. In fact these individuals tend to introject blame and may look for others who are more dominant and dissimilar to help them maintain their poor self-image.
- <sup>14</sup>Rottschaefer, R. H. Self-esteem and depression. In section 4 of this book.

- 15Psalm 32:1-5; Psalm 38.
- 16James 1:8; 4:8.
- 17Proverbs 6:16-17; James 4:6-7.
- 18Mark 12:31; Ephesians 4:28-29.
- 19Romans 12:3; Galatians 6:3-4.
- 20Philippians 2:5.
- 21Ephesians 5:1.
- 22I John 4:18.
- 23Presidential address, Western Association of Christians for Psychological Studies, Westmont College, May 1975.
- 24Ephesians 1:15-16; Philippians 1:3-5; Colossians 1:3-5; I Thessalonians 1:7, 8. The difference between judgment and proper correction is that judgment involves a putting down of the other person while correction points out error but seeks to provide ways to build the person up. There is a biblically ordained place for correction that is motivated by such love. It is important to realize that both correction and judgment may make the recipient feel bad momentarily. That is not the test. The test is the extent to which the messenger is willing to become involved, to help.
- 25For example, Luck, P. W. Social determinants of self-esteem. *Dissertation Abstracts International*, 1969, 30, (2-A), 810; Sears, R. R. Relation of early socialization experiences to self-concepts and gender role in middle childhood. *Child Development*, 1970, 41 (2), 267-289; Coopersmith, S. *The antecedents of self-esteem*. San Francisco: W. H. Freeman, 1967.
- 26It is important here to introduce the notion of non-contingent reinforcement, or reinforcement that is given simply for who the child is and not in relation to some set of behaviors. Praise might be regarded as contingent, or performance oriented reinforcement, while delight and acceptance refer to non-contingent. Baron, R. M., Bass, A. R. and Vietze, P. M. Type and frequency of praise as determinants of favorability of self-image; an experiment in a field setting. *Journal of Personality*, 1971, 39 (4), 493-511, found that praise of the person is generally more effective in enhancing self-concept than praise of task performance.
- 27Pederson, D. M. and Stanford, G. H. Personality correlates of children's self esteem and parental identification. *Psychological Reports*, 1969, 25, 41-42; Tocco, T. S. and Bridges, C. M., Jr. Mother-child self-concept transmission in Florida Model Follow Through participants. Paper delivered at American Educational Research Meeting, New York, February 1971.
- 28Connell, D. M. and Johnson, J. E. Relationship between sex role identification and self esteem in early adolescents. *Developmental Psychology*, 1970, 3, 268.
- 29Hollander, J. Sex differences in sources of social self-esteem. *Journal of Consulting and Clinical Psychology*, 1972, 38 (3), 343-347.
- 30Douvan, E. and Adelson, J. *The adolescent experience*. New York: Wiley and Sons, 1966.
- 31Baron, R. M., Bass, A. R. and Vietze, P. M., *op cit.* (26).
- 32Rosenberg, M. *Society and the adolescent self image*. Princeton, N.J.: Princeton University Press, 1965.
- 33White, R. Motivation reconsidered: the concept of competence. *Psychological Review*, 1959, 66, 297-334.
- 34Liebert, R. M., Neale, J. M., and Davidson, E. S. *The early window: effects of television on children and youth*. New York: Pergamon Press, 1973.
- 35Bandura, A., Ross, S. Transmission of aggression through imitation of aggressive models. *Journal of Abnormal and Social Psychology*, 1961, 63, 575-582.
- 36Liebert, R. M., *et. al.*, *op. cit.* (34).
- 37Rosenthal, R. and Jacobson, L. F. Teacher expectations for the disadvantaged. *Scientific American*, 218 (4), April 1968, 19-23.
- 38Dobson, J. *Hide or Seek*. Old Tappan, New Jersey: Fleming H. Revell Co., 1974.
- 39Johnson, P.A. and Stafford, J. R. Stereotypic affective properties of personal names and somatypes in children. *Developmental Psychology*, 1971, 5, 176; Felker, D. W. Relationship between self-concept, body build, and perception of father's interest in sports in boys. *Research Quarterly*, 1968, 39, 513-517.
- 40Coopersmith, S. Studies in self-esteem. *Scientific American*, 1968, 218, 96-106.
- 41Felker, D. W. The relationship between anxiety, self ratings, and ratings by others in fifth grade children. *Journal of Genetic Psychology*, 1969, 115, 81-86.
- 42Maw, W. H. and Maw, E. W. Self concepts of high and low curiosity boys. *Child Development*, 1970, 41, 123-219; Ringness, T. A. Self-concept of children of low, average and high intelligence. *American Journal of Mental Deficiency*, 1961, 65, 543-561.
- 43Jourard, S. M. *The transparent self*. Princeton: Van Nostrand, 1964; Vosen, L. M. The relationship between self-disclosure and self-esteem. *Dissertation Abstracts*, 1967, 27B (8-B), 2882.
- 44Mossman, B. M. and Ziller, R. C. Self-esteem and consistency of social behavior. *Journal of Abnormal Psychology*, 1968, 73 (4) 363-367.
- 45Reckless, W. C. and Dinitz, S. Pioneering with the self-concept as a vulnerability factor in delinquency. *Journal of Criminal Law, Criminology and Police Science*, 1967, 58, 515-523. It should be noted that some studies such as Jensen, G. F. Delinquency and adolescent self-conceptions: a study of the personal relevance of infraction. *Social Problems*, Summer 1972, 84-102, contest the self-concept and delinquency relationship found by Reckless and his colleagues in several studies. A host of other factors including parent-child and marital relationships support the self-concept notion indirectly, though.
- 46Luck, P. W., *op. cit.*
- 47Ziller, R. C., Hagey, J., Smith, M. D. C., and Long, B. H. Self-esteem: a self-social construct. *Journal of Consulting and Clinical Psychology*, 1969, 33 (1), 84-95.
- 48Ellison, C. W. and Firestone, I. J. Development of interpersonal trust as a function of self-esteem, target status, and target style. *Journal of Personality and Social Psychology*, 1974, 29 (5), 655-663.
- 49Baron, R. M. Social reinforcement effects as a function of social reinforcement history. *Psychological Review*, 1966, 6, 529-539. Also, Baron, R. M. The SRS model as a predictor of negro responsiveness to reinforcement. *Journal of Social Issues*, 1970, 26 (2), 61-81.
- 50I Corinthians 5:17; Ephesians 4:22-24, ff.
- 51Colossians 3:12-17; Ephesians 4:1-19.
- 52Ephesians 2:10; James 1:12.

*The question may be raised whether the acknowledgment that only God can do miracles means that he then works in a supernatural way interfering with the regular cadence of natural events. He who accepts this concept begins with a belief in an autonomous nature in which he allows God from time to time to operate from the outside as a deus ex machina. This way of thinking is absolutely unscriptural.*

Johann H. Diemer

*Nature and Miracle*, Wedge Publishing Foundation, Toronto (1977), p. 17.



# Spiritual Well-Being: A Challenge for Interdisciplinary Research



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Interest in enhancing the spiritual quality of human life is no longer viewed as an esoteric subject appropriate for consideration only by members and leaders of peculiar cults. The subject has become a prominent one in public discussions of the need to develop and sustain a holistic orientation toward people and the world. Journalists, politicians, evaluators of American society, educators, and many others besides preachers are giving attention to it. In this paper I develop the research need, the research task, and some of the consequences of research on this significant subject.

## The Research Need

When plans were made for the 1971 White House Conference on Aging, the sticky problem of church and state intruded to make it difficult to plan a session explicitly on religion and aging. The planning groups resolved the problem by developing a Technical Committee on Spiritual Well-Being, which commissioned the writing of a background paper on the subject, engaged in preliminary discussions of recommendations to suggest to the delegates, and in general guided the process of discussion at the Conference (Moberg 1971). This procedure drew direct attention to the spiritual dimension of human life while avoiding the verbal and legal battles about separation of church and state. It gave tangible recognition to the relevance of governmental concern for the totality of human life, and it overcame the limited perspective that viewed spiritual

needs as residing exclusively in the context of religious institutions.

The Background Paper on Spiritual Well-Being (Moberg 1971) identified six areas of spiritual need as deserving special attention. These were (1) the need for assistance for coping with the sociocultural sources of spiritual needs, (2) the anxieties and fears associated with losses suffered and problems anticipated during the declining years of life, (3) preparation for death and dying, (4) personality integration, (5) the blow to personal dignity that often afflicts the aging, and (6) the need to cultivate and strengthen a satisfactory philosophy of life. The last of these was viewed as a spiritual necessity that cuts across all the others, getting at such questions as "Who am I?," "Why am I?," and "What is the meaning of my life?"

Needs of these kinds are not limited to the elderly. The lack of spiritual "weight" and purpose for life contributes to a thirst for wisdom, a quest for the uplift of relevance, and a hunger for fulfillment (Clebsch and Jaekle, 1964: Introduction). With ever more effective and extensive means of electronic communication, urban residents are in danger of becoming increasingly isolated socially, with impaired well-being as a result (Warthman 1974: 137). The success ethic, and its successor, the personality ethic that stresses positive thinking and self satisfaction, has left many people spiritually empty under the pressures of competitive individualism (Huber 1971).

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*The author is interested in learning about any research or theoretical studies pertinent to spiritual well-being and related topics. During 1977-78 he is on sabbatical leave with a fellowship from the Institute for Advanced Christian Studies to do research on social indicators of spiritual well-being. He is the organizer/convenor of two sessions on "Religion and Spiritual Well-Being" at the Ninth World Congress of Sociology in Uppsala, Sweden, August 1978.*

Mankind may be on the way to losing more and more contact with the realm of the mystery which transcends all knowledge possible via natural science. There is an increasing number of people who will no longer recognize that any limits are definitely set to all man's endeavors to understand the universe, macrocosm as well as microcosm. The sensitivity to spiritual values, which for centuries and millenia were associated with the concepts of God and religion, is fading rapidly (Obermayer 1975: 110).

Kelsey (1974) has pointed out that life without myth

is likely to be dead and sterile, and religion without myth is but a flat, rational substitute for the real thing. Calling for the remythologizing of Christianity, he indicated that in addition to having too small a God, many modern people also have too small and narrow a concept of man.

Spiritual hunger is evident, allegedly, in a wide range of contemporary problems. Alcoholism, mental illness, psychosomatic ailments, industrial and occupational accidents, drug abuse, divorce, maladjusted family life, and numerous other problems of society are attributed at least in part to spiritual problems by those who attempt to introduce or restore spiritual values. The popularity of mystical cults, spiritual missions, occult groups, and eastern religions in the West are probable reflections of a hunger that is not being satisfied through conventional channels.

This problem also pervades Soviet society. Early in 1974 the Communist Party newspaper *Pravda*, called for a crackdown on individualism because it was hampering development of the "new man." The basic duty of the Communist Party was reported as the shaping of a new man combining "spiritual richness and moral purity" ("Individualism Worries Soviets," 1974).

Also in 1974 the Reverend Josif Ton, a Baptist pastor in Romania, sent a paper to the Romanian Head of State. In an excellent scholarly discussion, he pointed out the attributes of "the new man" which was to result from the Socialist revolution and then indicated how Marxist Socialism operated in such manner as to prohibit the very development of that new man because of its atheistic, materialist ideology working against the interests of the society at large. He cited research that had been done to determine the extent of such forms of delinquency and crime as drunkenness, scandals, fights, violence, vandalism, thefts, and killings by the youth of the "neo-Protestant" denominations. To the surprise of the researchers, they found almost no evidence of such problems among these youth, whereas terrible statistics of the rising incidence of these were evident from the rest of the nation. This was part of the evidence Reverend Ton used to indicate that the problems of the Socialist society could be resolved only by a Christ Revolution, and that therefore the Socialist state should allow the evangelical believer to enjoy full religious freedom and to grant the possibility of showing that as a Christian he has something definite to contribute to society.

Thus in both capitalist and socialist societies (and in every other type, I hypothesize!) there is a spiritual hunger and need which deserves the attention of scientists and scholars.

Meanwhile, a recent research development in trying to identify and measure the level of well-being in society pertains to the quality of life. Various subjective and objective measures are used in this part of the Social Indicators Movement to determine the level of well-being of a population. Nearly all of these sets of indicators completely omit any reference to religion and spiritual life. The obvious implication of those who observe the findings of such studies is that the spiritual circumstances of people have nothing whatever to do with their mental health, social participation, family life, leisure and recreation, education, employment, environmental quality, and other areas of concern.

The longer this subject is ignored, the less its relevance will be noted, contributing to even greater ignoring of the total subject.

In summary, research on spiritual well-being is essential because of the needs of people who have spiritual hunger and because of the need to make scholars and researchers aware of the relevance of this subject to human welfare.

### The Research Task

I acknowledge the fact that doing research on the subject of the spiritual domain of human nature carries with it the danger of imprisoning the spirit of human beings in a three-dimensional universe of space, time, and matter. Through strictly scientific approaches, it is impossible to analyze the totality of the spiritual components of human life. Scientific reductionism must be avoided by giving careful attention to the limitations and boundaries of the scientific research process and appropriate qualifications of findings. The spiritual component of life is so profoundly central to human experience, yet so difficult to observe and to verbalize, that the research process must remain open to allow for diversity of expression and experience much longer than might be the case on other topics of investigation.

In spite of these and related problems, there is a great deal of research that can be done in the context of the social and behavioral sciences on the subject of spiritual well-being. I suggest four categories of such work under the headings of conceptual, methodological, substantive, and applied research.

### Conceptual Research

A first and basic task is to delimit the scope of the concepts "spiritual" and "spiritual well-being." My own studies in preparing the background paper on Spiritual Well-Being for the 1971 White House Conference on Aging (Moberg 1971) has shown that there are a wide variety of definitions of the concept. There has been no systematic effort to gather and classify these definitions, although some work under the National Interfaith Coalition on Aging (NICA) has contributed in part to that goal. Under its Education and Research Committee a special sub-committee was established in July 1974 to clarify and interpret the term "Spiritual Well-Being" which had been inherited from the WHCA. After various discussions and a meeting in November 1974, the sub-committee called a Consultation on February 6-7, 1975, with representatives from Roman Catholic, Eastern Orthodox, Jewish, and Protestant religious bodies, together with special consultants with backgrounds in theology and in the sociology of religion. As a result of plenary sessions and meetings of sub-sections under the chairmanship of Reverend Jack Ahlers and Project Director Thomas C. Cook, Jr., a working definition emerged from the consultation which it was hoped would be appropriate in every religious group and in other contexts. It simply makes the following statement, "Spiritual well-being is the affirmation of life in a relationship with God, self, community and environment that nurtures and celebrates wholeness."

These concepts were elaborated in a commentary as follows:

*Spiritual Well-Being Is the Affirmation of Life*

The *Spiritual* is not one dimension among many in life; rather it permeates and gives meaning to all life. The term *Spiritual Well-Being* therefore indicates wholeness in contrast to fragmentation and isolation. "Spiritual" connotes our dependence on the source of life, God the Creator.

What, then is *Spiritual Well-Being*? We cannot regard well-being as equated solely with physical, psychological, or social good health. Rather, it is an *affirmation of life*. It is to say "Yes" to life in spite of negative circumstances. This is not mere optimism which denies some of life's realities; rather, it is the acknowledgement of the destiny of life. In the light of that destiny it is the love of one's own life and of the lives of others, together with concern for one's community, society, and the whole of creation, which is *the dynamic of Spiritual Well-Being*.

A person's affirmation of life is rooted in participating in a community of faith. In such a community one grows to accept the past, to be aware and alive in the present, and to live in hope of fulfillment.

*... A Relationship with God, Self, Community, and Environment ...*

Affirmation of life occurs within the context of one's relationship with God, self, community, and environment. God is seen as "Supreme Being," "Creator" of life, the Source and Power that wills well-being. All people are called upon to respond to God in love and obedience. Realizing we are God's children, we grow toward wholeness as individuals, and we are led to affirm our kinship with others in the community of faith as well as the entire human family. Under God and as members of the community of faith, we are responsible for relating the resources of the environment to the well-being of all humanity.

*... That Nurtures and Celebrates Wholeness*

Human wholeness is never fully attained. Throughout life it is a possibility in process of becoming. In the Judeo-Christian tradition(s) life derives its significance through its relationship with God. This relationship awakens and nourishes the process of growth toward wholeness in self, crowns moments of life with meaning, and extols the spiritual fulfillment and unity of the person. (National Interfaith Coalition on Aging, 1975)

The statement was subsequently adopted as the "working definition" for use by the National Interfaith Coalition on Aging. The intent is that each religious body can adapt the statement to fit its own traditions, theology, language, and special situation, but that this would serve as an over-arching frame of reference for future activities dealing with the subject.

The above definition needs considerable adaptation and development if it is to become the basis for a relatively objective instrument for the evaluation of spiritual well-being. The response of the member bodies of NICA has not yet been reported, and the results of the questionnaire collecting data on their programs for the aging, which included a question on how each specific program or project contributes to spiritual well-being, have not yet been analyzed. (The project report was subsequently published by Cook in 1977.) Such materials, however, can be valuable input in the process of conceptual development.

Another source of conceptual perspectives on spiritual well-being is the literature that has been written with direct or implicit reference to it. Some of this is in the context of religion. For example, *acedia* or spiritual torpor, which is one of the seven deadly sins that gives rise to others in the manner of a final cause or motivation, is one of the basic concepts in traditional

*Spiritual hunger is evident in a wide range of contemporary problems.*

Catholic theology. Study of the use of words like "Spirit" and "spiritual" in the Bible could contribute to this goal, as could the various commentaries and interpretations of those concepts.

The psychosynthesis movement uses the word "spiritual" in its broader connotation to include much more than a specifically religious experience,

... but all the states of awareness, all the functions and activities which have as common denominator the possessing of *values* higher than the average, values such as the ethical, the esthetic, the heroic, the humanitarian and the altruistic. We include under the general heading of "spiritual development" then, all experiences connected with awareness of the contents of the super-conscious which may or may not include the experience of the Self (Assagioli 1965:38).

The analogous French word *spirituel* has the meaning of both spiritual and witty, suggesting that these traits have something in common. "The spiritual person and the witty or humorous person both have a perspective that enables them to see beyond appearance and rise above transitory sufferings." (Faraj 1974)

In his syllabus for a course in the Institute of Applied Gerontology of St. Louis University on the subject of "Spiritual Values in Old Age" the Reverend A. H. Scheller, S. J., defined the basic concept as follows:

By spiritual values we mean non-material good such as dignity, respect, love, affection, purpose or philosophy of life, a sense of belonging, friendships, conversation and communication. Spiritual values also include religious beliefs in a future life, belief in God, in His goodness and mercy, or reward for good life (Scheller 1973).

Cooney (1972), in critiquing the WHCA paper (Moberg 1971), adds a distinction between the spiritual well-being facet of the churches' task and the central, specifying facet of their task, religious well-being, noting that the distinction is very subtle:

It is the essence of "Church" to nurture man in his relationship with the Transcendent. Though not the sole function of the Churches, nurturing man in his relationship with the Transcendent is their specifying function, that which sets the Churches apart from all other social institutions (Cooney 1972:19).

The distinction between religion and the spiritual is fairly common. Tamney (1975:43-44) points out that in order to understand people, sociologists must clearly recognize a distinction between spiritual involvement and institutional or church involvement. This is reflected in a "Mirthful Moment" cartoon which appeared in *The Lutheran Layman* in December 1974. A high school boy is pictured saying to a girl, "I'm not as spiritual as I could be? I bowl in *three* church leagues, don't I?"

Another approach to the conceptual question is to determine the ways in which the concept actually is used in religious bodies through study of literature and theological statements and in the actual language of

people. Developing pertinent in-depth interviews with people on the subject is one step in that direction. Similarly, case studies of persons who are alleged to have or to lack spiritual well-being to a marked degree can help to identify their characteristics in contrast to those of other people. One project already has been conducted using this method in part. While its findings are diverse and diffuse, each of the four principal investigators coming up with different conclusions as to the definition of "spiritual maturity," it is instructive and helpful in indicating the riches and complexity of the subject (Edwards, *et al.* 1974).

### Methodological Research

A next task is to analyze the large number of definitions that are found in appropriate literature, interview reports, and similar resources to determine which elements or categories of the human condition are common to all definitions of spiritual well-being and spiritual illness. Implicit and explicit norms and standards by which the relative levels of spiritual quality of life may be measured will emerge during the identification of such indicators.

It is possible that different philosophical, ideological, and theological frames of reference will produce different definitions of spiritual health. If so, it may be necessary to develop each of these as a separate entity. Consultation with experts from a wide range of religious, therapeutic, philosophical, and behavioral perspectives can contribute much to this analysis.

The criteria for spiritual health and illness that are identified through such research can give rise to the identification of specific indicators—behavioral acts, attitudinal perspectives, etc.—which can be relatively objectively identified as being present, absent, or even present in varying degrees. These can be combined to form an *index of spiritual well-being* that yields a specific score for each individual analyzed and thus for each group of persons. The development, refinement, and standardization of the instrument could occur during the next stage of research activity. Care must be taken to remain sufficiently flexible to allow for the variations in value orientations of ethnic, racial, religious, and ideological groups. The premature establishment of rigid criteria could constitute an injustice to minorities and a violation of human dignity. Ample time, numerous opportunities for dialogue with a variety of persons, and deliberate procedures to collect constructive criticism must be built into the research process.

### Substantive Research

Once an instrument or a set of instruments by which to measure spiritual well-being is available, its relationship to other variables can be studied. There are contradictory findings about the relationship between religion and mental health (Sanua 1969), and there is some evidence that religious factors are related to physical health (Comstock and Partridge 1972). Several studies have found religion related to personal adjustment in old age (Moberg 1965), and the relationship of it to satisfaction in later life, fear of death, and other indicators has similarly received some attention (Moberg 1974). It may be related even to the

QWL—Quality of Work Life—which is increasingly recognized as an important factor in employee satisfaction and production (Kleinschrod 1973).

During this research it will be necessary to differentiate between spiritual well-being and other forms of well-being. It may be impossible to find clear dividing lines between these because they are all so inter-related. Greeley and McCready (1975:18) found, for example, the highest correlation ever discovered with scores on Bradburn's Psychological Well-Being Scale in their studies of ecstatic experiences or mysticism, a subject that very likely is related to spiritual well-being.

I hypothesize that spiritual well-being is correlated with physical health, psycho-emotional health, social health (good social relationships, ethical-moral behavior, concern for others, etc.), and other forms of well-being. This correlation is not a result of a coincidental inter-relationship but rather is a consequence of what I believe will be revealed, namely, that spiritual well-being transcends all of the other forms of well-being and constitutes the most important single variable affecting the others. In other words, I hypothesize that spiritual well-being is not merely parallel to other forms of well-being, but cuts across all of them by virtue of being on a different and higher level. It is an independent variable.

Research of this kind will make it possible to test such theoretical problems as those related to the competing disengagement, activity, and continuity theories in the field of Social Gerontology. The consequences for the level of spiritual well-being of various kinds of geriatric programs can be identified. For example, in a total institution, such as a retirement home or a nursing home, it can be determined whether the spiritual health of the patient rises or falls following the introduction of certain kinds of activity programs, religious services, counseling, chaplaincy activities, or small group Bible discussions. Although it is likely that there will be no easily observable short-term results, yet repetitive observation over a period of time should make it possible to chart the valleys and peaks of spiritual health and thus to determine how it has been influenced by alternative types of controllable activities. It is probable that developmental stages in religious faith commitments and practices will be discernible through the study of spiritual well-being.

The identification of levels of spiritual well-being under various sets of circumstances will deserve attention. For example, family arrangements and place of residence may have a discernible relationship to spiritual well-being. Persons who are in husband-wife family units may differ from those who are separated or divorced. Grandparents who reside in a three-generation family may have a quite different level of spiritual health from those who live in isolated "efficiency" apartments. Whether the church-sponsored retirement home has a more wholesome impact on the person than the secular retirement community could be analyzed. Circumstances of prosperity and good health could be compared with those of poverty and ill health. Spiritual well-being in relationship to dying, bereavement, grief, and widowhood could be studied.



### Applied Research

As a corollary to some of the research projects mentioned above, evaluation research activities would be possible if we had adequate measures of spiritual health. Tests could be made of the effectiveness of various kinds of religious education programs. The relationships between spiritual well-being and Christian social concern could be analyzed. Its impact upon evangelistic effectiveness of Christian persons and groups could make a contribution to evangelistic efforts.

In recent years many clergy and church leaders have assumed that the greatest contribution to man's spiritual need is made when church programs focus upon the social needs of the world. In contrast, fundamentalist groups have emphasized their belief that taking care of individuals' spiritual problems through conversion to Jesus Christ or Spirit baptism is the way to solve social needs as well as personal problems. Once a good research instrument has been designed, the complications and problems of these relationships could be analyzed relatively objectively. The belief of many people that combining evangelism with social concern is the ideal Christian solution (Moberg 1972) could then receive an objective test.

### Research Consequences

Systematic behavioral and social science research on spiritual well-being has a number of consequences that can improve policy decisions. It is probable that not a single aspect of the work of the church would remain untouched if there were a major research drive to deal with this complex subject.

Such research also would reveal the extremely complex interdisciplinary dimensions of this subject. Academic disciplines that could reasonably be involved include several of the humanities, such as Theology and Biblical Studies, Philosophy, History, and Literature, in addition to the social and behavioral sciences of Anthropology, Sociology, and Psychology.

Similarly, numerous applied disciplines and professional fields of study also are concerned with this complex subject. The various disciplines that deal with mental health, including marriage and family counseling, clinical psychology, counseling psychology, psychiatry, and social work will all be influenced by research on this subject if its results are appropriately disseminated. The pastoral care dimensions of the clergy, including chaplaincies, are very directly affected. Public and private education at all levels are related to spiritual well-being, from the perspective of both teachers and pupils. Workers' satisfaction, the level of economic and other types of production, and various types of "human engineering" might be very much affected by the findings of systematic research on spiritual well-being.

What this means, in effect, is that the approach of any one person or of persons from but one discipline or professional orientation is likely to be too limited to do full justice to the subject. Just as an educational model of religious studies which isolates the study of religion from the methods and content of other disciplines or which identifies it as belonging exclusively to the humanities is likely to reinforce the belief that religious thinkers are continuing an undignified retreat

*Absolutists of any particular religious perspective who are certain that they know the precise formula or approach for the development of spiritual well-being are likely to be unhappy with such research.*

from the modern world (Power 1973:671), so also a constricted perspective toward this complex subject of spiritual well-being is likely to alienate many people from its implications and contribute to a narrowness of perspective which may do more harm than good to both the scientific study of religion and its practice and application.

The complications of interdisciplinary research are great because of the financial elements involved as well as the diverse approaches to reality which prevail within them. Possibly a good first step toward dealing with these realities would be to have several persons conduct projects from their own frame of reference and then meet together in conference to discuss the similarities and differences that emerge from their findings. Out of such a workshop could come published papers and critiques, which in turn would filter into the academic and scientific communities, giving rise to additional research by students working on dissertation projects, by faculty members preparing papers for professional meetings and publications, and by action-oriented groups in the fields of mental health, social work, the counseling professions, and religion.

Not the least of the consequences of such research will be criticism. Many devout but traditionally-oriented Christians will argue that this demotes the church to an unscriptural level of human institutionality and manipulation which is inconsistent with its ultimate purpose. It is likely that such persons within their own religious bodies have criteria as to who are "members in good standing," "in fellowship," "communicants," "spiritual rather than carnal persons," "backsliders," etc. Each of these criteria typically involves identifiable behavior or verbalized beliefs and attitudes of the very kind that can be incorporated into an index of good spiritual health.

Absolutists of any particular religious perspective who are certain that they know the precise formula or approach for the development of spiritual well-being (under whatever conceptual label they may use) are likely to be unhappy with such research. Some have a simple creed to which a person must make an affirmation of belief and which they believe takes care of all spiritual needs. Some follow certain rituals (baptism being the most common). Some have an experiential-emotional criterion for spiritual health. Many accentuate an intellectual approach of memorizing information, studying various facts, doctrines, and ideological perspectives, and passing appropriate tests. Others see good deeds as the behavioral criterion. Some accentuate a communal orientation of joining or belonging to a particular group. Still others accentuate the dispositions, saying that those who have a joyful spirit are the most spiritual persons. Whatever the particular

criterion that is used as the most important one, any questioning or intonation implying that there may be other criteria as well and any threat that may come from an attempt to determine objectively whether the alleged consequences actually do flow out of that particular absolutist formula will be resisted.

## Conclusions

Systematic research to specify more sharply the content of spiritual health and illness can lead to the development of appropriate research instruments for the measurement of spiritual well-being. Such instruments, in turn, can contribute to a series of important research projects and programs on the characteristics and correlates of spiritual well-being, viewing it as an independent variable which has a profound impact on the totality of human life. Out of the research can come many applications for the work of churches, health care institutions, counseling centers, schools, and even businesses and industry.

Such research can be interpreted from a Christian perspective as efforts to enable us to "test all things; hold fast that which is good" (I Thess. 5:21). It can also help us to understand better the quality of the "eternal life" which Jesus Christ came to give, the "abundant life" (John 10:10) which he promises to his "sheep."

## REFERENCES

- Assagioli, Roberto, *Psychosynthesis: A Manual of Principle and Techniques*. New York: Viking Press, 1965.
- Clebsch, William, and Charles Jaekle, *Pastoral Care in Historical Perspective*. Englewood Cliffs, NJ: Prentice-Hall, 1964.
- Comstock, George W., and Kay B. Partridge, "Church Attendance and Health," *Journal of Chronic Diseases*, 25:665-672, 1972.
- Cook, Thomas C., Jr. *The Religious Sector Explores Its Mission in Aging: A Report on the Survey of Programs for the Aging Under Religious Auspices*. Athens, Georgia: National Interfaith Coalition on Aging, 1977.
- Cooney, Cyprian J., "Spiritual Well-Being and Aging," unpublished paper, Gerontology Program, North Texas State University, Nov. 1972.
- Edwards, Tilden H., Jr., Loren B. Mead, Parker J. Palmer, and James P. Simmons, *Spiritual Growth: An Empirical Exploration of Its Meaning, Sources, and Implications*. Washington, DC: Metropolitan Ecumenical Training Center, 1974.
- Faraj, Rosemary, "In My Opinion: In This World of Meat and Potatoes, We Need a Little Good Humor, Man," *Milwaukee Journal*, Aug. 18, 1974, Part 5, p. 3.
- Greeley, Andrew M., and William C. McCready, "Are We a Nation of Mystics?" *New York Times Magazine*, Jan. 26, 1975, pp. 12-25.
- Huber, Richard M., *The American Idea of Success*. New York: McGraw-Hill Book Co., 1971 (based on review by Paul Goodman, *Annals of the American Academy of Political and Social Science*, 412:211-212, March 1974).
- "Individualism Worries Soviets," *Milwaukee Journal*, April 1, 1974, Part 1, p. 9.
- Kelsey, Morton T., *Myth, History and Faith: The Remythologizing of Christianity*. Paramus, NJ: Paulist Press, 1974.
- Kleinschrod, Walter A., "Editorial: Yes, You May Pay Pretty Well, but How's Your QWL?" *Administrative Management*, 34(8):17, Aug. 1973.
- Moberg, David O., "Religiosity in Old Age," *The Gerontologist*, 5(2):78-87, June 1965.
- Moberg, David O., *Spiritual Well-Being: Background and Issues*. Washington, DC: White House Conference on Aging, 1971.
- Moberg, David O., *The Great Reversal: Evangelism versus Social Concern*. Philadelphia: Lippincott Co., 1972 (rev. ed. 1977).
- Moberg, David O., "Spiritual Well-Being in Late Life," Chapter 12 in Jaber F. Gubrium, Editor, *Late Life: Communities and Environmental Policy*. Springfield, IL: Charles C. Thomas Publisher, 1974, pp. 256-279.
- National Interfaith Coalition on Aging, "Spiritual Well-Being: Report of the Special Study Consultation," in Fourth Annual Meeting Registration Book, April 29-30, 1975.
- Obermayer, Klaus, "State and Religion in the Federal Republic of Germany," *Journal of Church and State*, 17(1):97-111, Winter 1975.
- Power, William L., "Interpreting Man's Religions in Academe," *Religious Education*, 48(6):659-672, Nov.-Dec. 1973.
- Sanua, Victor D., "Religion, Mental Health, and Personality: A Review of Empirical Studies," *American Journal of Psychiatry*, 125(9):1203-1213, March 1969.
- Scheller, A. H., S. J., Syllabus for AG 200 IC, "Spiritual Values in Old Age." St. Louis, MO: Institute of Applied Gerontology, St. Louis University, 1973.
- Tamney, Joseph B., *Solidarity in a Slum*. New York: John Wiley and Sons, 1975.
- Ton, Josif, "A Christian Manifesto to the Socialist Society," *The Christian Graduate*, 28(2):34-42, Summer 1975.
- Warthman, Forrest, "Telecommunication and the City," *Annals of the American Academy of Political and Social Science*, 412:127-137, March 1974.

*Within the harmonious calling to cultivate and preserve, man, the image-bearer of God, is to serve in love. . . . Whenever man submits himself to the guidance of this meaningful motive, he will be in a position . . . to accept his task in technology willingly and responsibly. . . . Technology will be able to alleviate the fate forced on man "by nature." It will offer greater opportunities for living: reducing the physical burdens and strains inherent in labor, diminishing the drudgery of routine duties, averting natural catastrophies, conquering diseases, supplying homes and food, augmenting social security, expanding possibilities for communications, increasing information and responsibility, advancing material welfare in harmony with spiritual well-being, and helping unfold the abundance of individual qualities in people.*

Egbert Schuurman

*Reflections on the Technological Society*, Wedge Publishing Foundation, Toronto (1977), p. 59.

# The Recombinant DNA Controversy

## Could Anything But Good Come Out?

Having worked in the molecular biology field for most of my academic life, I've found it difficult to deal briefly with my first academic love. Experimentation with bacterial and bacteriophage genetic systems has the unique quality of incisiveness—relatively simple interpretation—which make many experiments things of beauty and high expectation. It is easy to feel with Jacques Monod that molecular biology and the science it represents is the gateway to all the essential knowledge and even the ethical systems to guide the future of man.<sup>1</sup> And, too, the land is peopled by giants—Nobel laureates like Monod, Luria, Watson, Crick, Dulbecco, Kornberg, to name a few—and I recall with considerable pleasure the many scintillating seminars I received at their hands during my two decades in Boston. To hear Francis Crick talk about the triplet code or Arthur Kornberg about the details of bacterial DNA replication, was surely to be at near-center stage in the most exciting drama of this century. Could anything but good come out of such a setting?

But early in this decade, a few molecular biologists began to ask that question of some of the work about to be carried out in the field of molecular recombination. The major concern was expressed for gene transfer between animal and bacterial cells, a process made possible by new chemical and enzymatic methods for generating gene segments which were then capable of reconstitution in almost limitless combinations. The immediate concern was for the production of dangerous pathogenic bacteria by introduction of tumor-virus genes into bacterial cells capable of growing in the human body.

The wider recognition of the dangers has come slowly. A 1973 Gordon Conference chaired by Maxine Singer belatedly and briefly examined the issue and voted to request the National Academy of Sciences to make a study. That body appointed a study committee chaired by Paul Berg which took the extraordinary step of publishing a letter in *Science* and in *Nature* in July of 1974 calling for a temporary moratorium on certain molecular recombination experiments.<sup>2</sup> As a sequel to the announced moratorium, a conference was convened in Asilomar, California, in February of 1975, to

plan a future course. Some 140 scientists doing molecular recombination research and a few lawyers and reporters met for several days. Most of the time was devoted to scientific presentation, but on the final day, the lawyers had occasion to present something of the legal liabilities of molecular recombination research.

That revelation, together with the reaction of several influential members of Congress and the Senate, placed the discussion of recombinant DNA research squarely in the public arena. Senator Edward Kennedy's critique of Asilomar was that its deliberations were "commendable but inadequate . . . because scientists alone decided to impose the moratorium, and scientists alone decided to lift it. Yet the factors under consideration extend far beyond their technical competence."<sup>3</sup> *Atlantic* writers, Bennett and Gurin, wrote of yet another scientific limitation. In their view, "The scientists came to Asilomar like the barons to Runnymede . . . running their laboratories as personal fiefs . . . to forge an agreement they feared might affect them for decades to come. The clash of armored egos was noisy."<sup>4</sup>

All of this must begin to sound familiar to the Christian. Science is no special repository of moral sensitivity or self-sacrifice. In fact, that realization on the part of educators may be the most important consequence of these debates. Indeed, it is this writer's conviction that the present situation provides the Christian with the best ammunition with which to storm the twin edifices of scientific reductionism and educational specialization. A hundred years ago the Ph.D. program often carried with it generous exposure to theology and the humanities. A student in the natural sciences was expected to know something of the history and culture in which his science had flowered. The "philosophy" part of his degree had significance! Today, every aspect of professional qualification in the sciences, and in the healing arts as well, is designed to force the scholar into ever-narrowing areas of specialization. It is no wonder that the protagonists on the side of complete freedom of scientific inquiry are unable to understand the fears of ethicists and theologians. Their language, their sources, their goals are totally foreign to him! In the face of this moral vacuum at the scientific workbench, may the teacher in the Christian college be challenged to realize his potential to prepare young men and women who are broadly and expertly trained to enter this and other arenas—nuclear engineering, mind-control, world food production, whole-person medicine—in which the very way we perceive and evaluate our-

*This Symposium was conceived and organized by Dr. Jerry Albert, Consulting Editor.*

selves is at stake. May the boards of trustees of these same institutions be led by God to mobilize support for these efforts, and may we Christians of the scientific community who are so small of voice discover the prophetic power of a Jeremiah and the courage of a John the Baptist in our crucial position in a culture which surely has lost its way.

<sup>1</sup>Jacques Monod, *Chance and Necessity*, Vintage Books, N.Y., 1972.

<sup>2</sup>P. Berg, et al. *Science*, 185, 303, 1974.

<sup>3</sup>B. J. Culleton, News & Comments, *Science*, 188, 1187-1189, 1976.

<sup>4</sup>W. Bennett and J. Gurin, "Science That Frightens Scientists—The Great Debate over DNA" *Atlantic*, pp. 43-62, February 1977.

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## Dangers Less Serious Than Earlier Believed

Since World War II the general public has been increasingly concerned with the pervasive influence of science and technology on everyday life. The spectre of nuclear holocaust has haunted the world and influenced international politics for a generation. The message of a few lone environmentalists effectively addressed by Rachel Carson has become a multitude of voices, and the word ecology has entered our vocabulary. Questions formerly resolved (or ignored) by scientists, plant managers or the military are handled in the halls of Congress, at the ballot box or in the courts. Laetrile and saccharin now vie for attention along with taxes and law enforcement.

The effects of science "going public" have been mixed and there is some feeling that "the people" are unable to make rational decisions on complex issues. The high emotions and street corner debate that characterized some of the discussion of recombinant DNA research in 1976 and early 1977 tend to support this view. The initial outcry has subsided and procedures to regulate the research are being developed on the national level. It is interesting to note that research interests and government officials in most of the European nations have been able to develop standards for recombinant studies in a much cooler climate.

My comments on genetic research refer only to the work with recombinant DNA. There are two basic types of questions that should be asked. First, is the research worth doing? Is there potential for a fuller understanding of nature or are the products of the research of benefit to mankind? Secondly, does the research meet commonly held standards of morality and safety?

In answer to the first question, academic, govern-

mental and industrial researchers alike are convinced that these experiments will enhance our understanding of genetic mechanisms and offer the possibility for developing new or cheaper antibiotics, nitrogen-fixing plants, microorganisms to clean up oil spills, etc.

The second type of question has raised the bulk of the discussion. There are those who feel that the proposed experiments are precursors to genetic manipulation in humans and eventual loss of freedom and individuality. I fail to see the inevitability of this chain of events. Surely, when and if genetic studies reach the level of sophistication where genetic manipulation becomes possible, decisions can be made on a value basis at a point where the issue is clear. To forbid a particular line of research because of a possible value judgment which could appear far down the line, reduces one in the widest view to suggest that we should have stopped with the work of John Dalton or Gregor Mendel. It may be that some short term project should be avoided because it degrades the human condition (research on poison gas) yet one generally cannot assess the potential effects of a particular kind of knowledge until it has come to development. In general (and especially in this case), we should go slowly so that our ability to evaluate moral and ethical implications of an action will come to maturity at the time an action becomes possible.

The safety issue appears to be less important at this writing than was earlier believed. The June 1977 Gordon Research Conference on Nucleic Acids, in a letter to *Science* indicated that "the experience of the last four years has not given any indication of actual hazard." Until all evidence of hazard is removed, I would support a regulatory system at the national level which can monitor the safety provisions for the work being done yet impede this work as little as possible—wishful thinking in this age of bureaucracy. For the Christian in science the challenge to use his gifts in a responsible way will continue to expand as science and technology push further to the heart of human existence.

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"Some people will tell you that  
DNA research is dangerous . . ."

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## Published Pros and Cons

*Science* and *Time* have adequately stated the pros and cons of research in combining DNA's of differing organisms, so a review of their contributions will let the reader make up his mind as to whether or not to approve this research.

The stated advantages of trying to add a few genes from various sources into the colon bacillus are: preparation of research and diagnostic agents in studying disease, development of vaccines against influenza and hepatitis, production of interferon, the agent counter-acting viruses;<sup>1</sup> a 500-fold increase in the enzyme that permits the fractionation of DNA, the possibility of examining the genes of organisms with formed nuclei;<sup>2</sup> obtaining cheaper insulin, a clotting factor for hemophiliacs, vitamins, antibiotics, nitrogen-fixing capacity in bacteria, enzymes to degrade oil spills, a vaccine against diarrhea, location of many human genes, the unlocking of genes causing cancer, a safe microbe not causing any infection even if possessing introduced genes;<sup>3</sup> and, I suppose as usual, a few accomplishments not yet imagined.

But opponents of DNA research in making hybrid strains state the following: the risks are terrifying, a slight increase in disease could result which our present techniques cannot detect;<sup>4</sup> a tumor and a cold virus combined could have disastrous results, a gene yielding an enzyme for cellulose added to the colon bacterium may spread diarrhea, a tumor virus may be inserted into the colon bacterium;<sup>5</sup> the military or industry might misuse research results or scientists would engage in genetic manipulation of humans;<sup>1</sup> some of the pus-forming bacteria are now resistant to antibiotics;<sup>6</sup> and science is not justified in tinkering.<sup>4</sup>

Here are a few reactions to the worries of the opponents of laboratory manipulations of hereditary substances: the whole mass of criticisms are overblown;<sup>4</sup> knowledge would be suppressed, citizenry should be willing to accept the risks as research is continued;<sup>7</sup> the opponents of recombinant DNA research have been criticized unjustly by colleagues and have feared for their tenure if not already having it;<sup>8</sup> biological warfare is already forbidden by agreement between the Soviet Union and the United States, National Institutes of Health Guidelines already forbid inserting new toxins or antibiotic resistance into pathogens, public health measures would certainly control any epidemics started by the intestinal germ, recombinant DNA research and genetic engineering should not be confused, Congress will probably make research guidelines apply to all scientists;<sup>1</sup> the added amount of new genetic material is a mere fragment of the receiving organism (for example, only 1 millionth of a mouse's genes are inserted into a bacterium), so that the bacterium is still itself, no lab worker has ever had an illness as a result of his research;<sup>2</sup> science itself is at stake if research is hindered;<sup>9</sup> the hazards are in the imagination;<sup>10</sup> 137 scientists at the Gordon Conference on Nucleic Acids recommend nothing beyond the NIH guidelines;<sup>11</sup> *E. coli* K12 which is used in bacterial genetics cannot be made epidemic;<sup>12</sup> the long career of nature has brought

*The prospective benefits must be taken seriously by the Christian, and should push him towards this work as long as it is continually balanced by responsible guidelines governing the protection of researchers, the public and future generations.*

on epidemics such as bubonic plague, smallpox, yellow fever, typhoid and cancer, and surely the wisdom of scientists will not yield such results.<sup>8</sup>

A full discussion of both sides should be welcomed.<sup>13</sup> The citizens' review board in Cambridge did an admirable job of holding such a conference and the Archdiocese of Boston agreed that the confrontation should be settled by scientists themselves.<sup>14</sup> It can be assumed that future scientists will be as willing to control their research then as now. Any attempt by the national government to control research is temporarily in abeyance.<sup>12</sup> We must "... distinguish carefully between the acquisition of knowledge and its application" writes Maxine Singer.<sup>9</sup>

What does Scripture say? "What your hand finds to do, do it with all your might." "You shall know the truth and the truth shall set you free." "Fill the earth and subdue it . . . till it and keep it." It is like the knowledge and use of atomic energy: we need the information; we need to use the scientific findings wisely.

<sup>1</sup>Nicholas Wade. *Science*, 1 Apr. 1977.

<sup>2</sup>John Abelson. *Science*, 8 Apr. 1977.

<sup>3</sup>*Time*, Apr. 18, 1977.

<sup>4</sup>Nicholas Wade. *Science*, 12 Nov. 1976.

<sup>5</sup>Nicholas Wade. *Science*, 28 Jan. 1977.

<sup>6</sup>*Time*, Apr. 8, 1977.

<sup>7</sup>Nicholas Wade. *Science*, 21 Jan. 1977.

<sup>8</sup>Nicholas Wade. *Science*, 4 Feb. 1977.

<sup>9</sup>Maxine Singer. *Science*, 8 Apr. 1977.

<sup>10</sup>Philip Handler. *Chemical and Engineering News*, May 9, 1977.

<sup>11</sup>Walter Gilbert. *Science*, 15 July 1977.

<sup>12</sup>Philip Abelson. *Science*, 19 Aug. 1977.

<sup>13</sup>Clifford Grobstein. *Science*, 10 Dec. 1976.

<sup>14</sup>Nicholas Wade. *Science*, 21 Jan. 1977.

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## Examine the Dangers and Benefits Carefully

During the twelve years I have taught a one semester course in Biochemistry I have seen a great outpouring of information particularly in the area of molecular biology involving nucleic acids and proteins. During

this time the text in this course has increased in size from 393 pages in the first edition to 628 pages in the 4th edition. In spite of this increase in knowledge about the living cell the surface has barely been scratched and much remains to be done. One of the most controversial areas of research is the area of recombinant DNA. This basically involves splitting open a small usually circular DNA molecule from a host cell, splicing in foreign DNA from an entirely unrelated cell, recombining the open ends into circular DNA, and introducing this DNA back into the host cell. These new cells carrying recombinant pieces of DNA or plasmids may in some cases express the newly acquired genes in some way. It is this possibility upon which many of the benefits of this research are postulated but upon which the fears of others are based.

One of the most often voiced fears is that the recombinant technique may lead to the emergence of a new strain of virulent pathogen which will decimate the ranks of man. The fact that a large percentage of this research centers on the use of strains of *Escherichia coli* as host cell increases these fears since the parent *E. coli* exists in symbiotic relationship with the human intestine. Other concerns deal with the possible extension of this technique to the cells of man in genetic manipulation, with the possibility that the calls for regulation of this research may lead to overregulation and stifling of free scientific inquiry of all types, and with the possibility that a great deal of time, money, facilities, and scientific personnel will be wasted by a rush into this new and possibly faddish research area. Also, voices are heard asking if man even has the right to tamper with God's creation especially by crossing species barriers between procaryotes and eucaryotes.

The list of possible benefits of recombinant DNA is understandably a bit thin, since it is usually somewhat difficult to visualize how one will benefit from a discovery before it is made. However, I feel it is safe to conclude that no matter what new discoveries are made, some men will find good uses for them and other men will find evil uses for them. I have only to mention a few examples, such as the printing press, dynamite, drugs, and nuclear energy. At present the suggested but unproven benefits include the use of recombinant DNA to yield bacteria which could produce human hormones such as insulin, could synthesize antibiotics and vitamins, and be able to convert nitrogen into a form usable by plants. A more certain benefit would seem to be a better understanding of the genetic equipment of the cell.

How should a Christian scientist, cultural mandate in hand, approach the question of whether or not recombinant DNA is a permissible research area for man? I feel that as a Christian and a scientist I should have an open-minded attitude toward the question and examine carefully both the dangers and the benefits of this type of research.

Having examined as many of both as I could as summarized above, I have concluded that we will through the use of recombinant DNA research undoubtedly be able to uncover more and more of the pattern of creation, especially as it reveals itself in the DNA of the cell and genetic expression. By so doing, we can praise and glorify God all the more for His

created order. This type of research will undoubtedly also provide benefits to mankind not even yet imagined.

On the obverse side must also be the balancing realization that the influence of sin will also lead some to exploit this new research into new ways to make a profit. Not that profit is bad in itself, but quite often a new market must be created for a potentially profitable but often unnecessary product whose mutagenic and carcinogenic effects have not been investigated, such as Red Dye No. 2, PBB, PCB, and more recently, the soil fumigant DBCP. Since the development of biological weapons has been actively pursued in the past, it would seem that the use of recombinant DNA would be a natural area for attempting to find a super-pathogen or poison. Even though the use of DNA from venom-producing snakes and insects and bacteria producing botulinum toxins is presently banned from government-supported research, this may not deter foreign governments from carrying out this type of research using methods carefully developed and widely published by American scientists.

Recombinant DNA research is being carried out and I feel that it will be continued in the future. However, because of the possible risks involved and possible misuse of results, I feel careful regulation of this research may be necessary. This does not necessarily have to stifle research, as some claim. But regulatory groups must watch over it and should have the power to stop research proceeding in a direction dangerous to man and the world about him. Such a regulatory group should involve representatives from private industry, federal government, and education, including a number who have no vested interest in this type of research. I also think a similar organization at the United Nations level is necessary, since this problem is not only a national one, but one which will eventually be global in nature.

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## **Dangerous Territory, Not Forbidden Knowledge**

The debate about the advisability of proceeding with recombinant DNA research cannot be viewed as an isolated issue. One day it may well be seen to have played an important, and perhaps even decisive, role in the shaping of attitudes to scientific endeavour in the 1970s. This is because the opponents and proponents of this type of research are not divided simply on its postulated hazards and on their reactions to these, but on their far more fundamental response to scientific research and its applications.

I am not suggesting that there is no room for debate over the risks of various genetic procedures. There is, and there should be ample debate. Nevertheless, those who demand that these procedures be absolutely safe

with no possibility of any type of risk—or a standard approaching this absolute one—are demanding an unattainable goal. Those who press this point demonstrate, not only their scepticism towards recombinant DNA research, but also their scepticism towards the processes of scientific investigation.

Much of the risk around which debate has raged over recombinant DNA experiments has been over hypothetical and speculative possibilities rather than over expected consequences. Even the N.I.H. guidelines are framed to counteract postulated as opposed to anticipated hazards. They are demanding, to quote Stanley N. Cohen:<sup>1</sup> “not only that there be no evidence of hazard, but that there be positive evidence that there is no hazard.” Perhaps this is right; undoubtedly, there have been past occasions when far too little regard of potential and even actual hazards was taken. This current approach should, therefore, be recognized as an unprecedented one, although once it is pressed too far it takes on anti-scientific overtones.

The recombinant DNA debate has engendered such heat, because too little recognition of the *nature* of the projected hazards has been taken. This, in turn, appears to have acquired some of its basis from a fear of the unknown—the possibilities of epidemics, eugenics, the manipulation of the genetic equipment of man, upsetting evolutionary processes, and so on. While these scenarios cannot be completely dismissed they acquire special significance for those who lack faith in the scientific enterprise and who emphasize the misuse to which scientific knowledge has been put in the past. And so we find Chargaff putting together splitting of the atom and manipulation of the genetic apparatus as the two greatest deeds *and probably misdeeds* of science in recent times. In other words, it is fear of future misapplication of genetic knowledge that is uppermost in his thinking.

This introduces the distinction between fundamental and applied research. Advocates of recombinant DNA research stress both aspects of the research, whereas its opponents tend to emphasize the misuse to which it may well be put. For instance, Chargaff argues that there are forbidden uses of knowledge, while others go a step further and stigmatize this type of genetic research as forbidden knowledge. From here it is but a short step to the position that this research should be opposed because it is evil. Hence all claims to freedom of inquiry are abrogated.

What is being called in question therefore, is the nature of basic research. Two facets stand out in this regard: (1) that there is knowledge which is inherently dangerous and should not therefore be indulged in, and (2) that non-scientists should have a stake in what limits, if any, are placed on research and its applications. This latter proposal is essentially a practical one and should be debated at that level, although it needs to be borne in mind that non-scientists have to be advised by scientists on genetic issues. Great care is required, therefore, to ensure that the advice they are given is as impartial and representative of responsible opinion as it is possible to give.

The alleged danger of genetic knowledge takes a number of forms. Besides the hazards associated with experimentation and fear of its misapplication in the

*DNA research is like any other research. The potential for good and evil is always present.*

future, other aspects that are stressed touch on interference with evolutionary mechanisms, the unjustified expense of the research and the unlikelihood of any great benefits accruing from it. Underlying these objections is a profound scepticism that mankind will be helped by this, or even related forms, of research. What is demanded too is that we work within the limits of our grasp of the consequences of our immediate actions.

On the opposite side, what are stressed are the potential medical and social benefits of recombinant DNA techniques, such as the production of antibiotics, vitamins, and medically and industrially useful chemicals. More generally, the course of action advocated is that we advance knowledge and increase our vigilance in assessing the hazards and costs of possible applications.

From a Christian perspective, a number of principles emerge as significant. Scientific enterprise must not become a sacred cow, so that all research—regardless of nature, danger or costs—is legitimate. There are priorities and these need to be assessed from the human perspective. What will, as far as we can judge, benefit mankind? Into what beneficial channels should effort and money be directed? These are, of course, somewhat subjective questions, but they need to be faced and criteria enunciated to make value judgments.

Although science must not be granted a semi-divine status, neither must it be denigrated. At base, it is a God-given way of investigating the natural world, exerting control over it and living out this exercise of authority in a responsible manner. In these terms, it is difficult to concede that there is forbidden knowledge, in the sense in which that term is being used with respect to genetic research. There is dangerous territory, but that is rather different. And undoubtedly recombinant DNA research is dangerous territory.

The realization that scientific knowledge can be misused is hardly a new one. This is true of much of scientific knowledge, and it is certainly true of some aspects of genetic research. Man is a sinner, and there is no escaping the fundamental dilemmas this brings in its wake. This by itself however is no reason for turning one's back on genetic research; this, in my estimation, would be an abrogation of a God-given responsibility.

Where has this left us? For the Christian, the *reasons* for participating in genetic research are paramount. The goal of producing a master race has no place in a Christian perspective. Neither however, should a Christian desist from genetic research for fear of the unknown. The prospective benefits of recombinant DNA techniques must be taken seriously by the Christian, and should push him towards this work as long as it is continually balanced by responsible guidelines governing the protection of researchers, the public and future generations. There is no easy solution, either in going forward or turning back. To expect the opposite

demonstrates a basic lack of understanding of man's nature and of God's world.

<sup>1</sup>Cohen, S. N., *Science* 195, 654-657 (1977)

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## A Christian Perspective Favoring Recombinant DNA Research

If Christianity is to be a viable religion, it must do more than provide an escape route for sinners. It must speak to the moral and intellectual issues of today with vigor, clarity and intelligence. Christians must be effective in rebutting the claim that Hebraic religion in general and Christianity in particular is chained to ancient books and consequently lacks relevance for modern man.

As a Christian, I naturally see my faith speaking to all the great issues of mankind. It can do this because the thrust of Christianity is that man—Christian man—has a dynamic relation with the living God mediated by His Son and is indwelt by the Holy Spirit. The Christian man is thus not left to his own resources in solving moral issues, but has help. One "help" is the biblical insight that man is a sinner and that sin affects our judgment. As a Christian I'm acutely aware of my shortcomings. Another insight is that God is ultimately "calling the shots" of history. He is sovereign and hence mankind and history are not left to man's devices, nor is history just the output or consequence of mankind's actions. The thought of Thomas Aquinas, that God is the continuing ruler of the universe—the prime cause of every event although secondary causes may arise—assuages my fears.

With that as a brief backdrop, let me state my position as one who favors recombinant DNA Research. All scientific research involves risks, since in no case can the results of a new experiment or theory be known with absolute certainty before hand. The scientific method at its unavoidable core means taking risks. And the application of science—technology—continues the risks, normally even over a wider area.

Who could have foreseen that Newton's Laws and the understandings related to them would be used 350 years later to develop killer satellites or other perverse devices? Since all knowledge augments man's power, science continually enables man to do more and more. And this inevitably means to make bigger and more costly mistakes.

DNA research is like any other research. It is not and should not be philosophically isolated. The potential for both good and evil is always present. Here as in other areas of research, mankind's suffering may be alleviated and other good things may happen. But since

when must science justify itself on the grounds of practical utility? It need not do so in this case either. Perhaps, if one needs it, a justification for the Christian exists in the biblical concept of subduing the earth. Our understanding of the DNA code can be seen as a part of that process.

Science grew in the Graeco-Hebraic soil of western culture. It could flourish partly because Western man was, as he increased his understanding of nature, also understanding his creation better. Dillenber in *Protestant Thought and Natural Science* (p. 88) quotes Galileo as saying "for the Holy Bible and the phenomena of nature proceed alike from the divine word, the former as the dictate of the Holy Ghost and the latter as the observant executrix of God's commands."

While my insights suggest that the key biblical element is the personal and human participatory aspects of God, this does not mean that I cannot argue for and come to an increased understanding of God through impersonal scientific research. After the science is done, it can be reviewed in the light of biblical insights and glory given to the Creator rather than the creature.

As a citizen I naturally want that research to be done with minimum risks to the community. My biblical insights into the nature of mankind suggests that it is not wise to have the researchers "watch themselves." Hence, an outside agency, perhaps non-governmental but supported by government funds should see that NIH or other Guidelines are revised and followed.

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## Avoid Simplistic Thinking

One of the greatest pitfalls that Christians must avoid upon entering into advocacy on social issues is the temptation to simplistic thinking. This temptation is great, for simplistic thinking avoids agonizing appraisal, can be carried out without full understanding of the situation, and is well suited to receive public support. I realize that there is not the space to respond in depth on recombinant DNA—nor do I personally have the full technical competence that should be demanded—but I would like to enter a warning against certain types of prevalent simplistic thinking.

1. That it is possible to plan scientific research so that only good for the human race will result. Scientific research provides knowledge; all knowledge is dangerous. If God is not sovereign and we are *totally* on our own, then every endeavor aimed at increasing human knowledge requires a permanent moratorium. Every advance of knowledge in every field can be used or abused by human beings. The fact that it is contrary to the nature of the human being to proclaim a moratorium on new knowledge, however, cannot be escaped. Simple solutions that prescribe public con-



demnation of whole branches of scientific research cannot be sustained.

2. That recombinant DNA research represents a totally new and unique biological interference into nature. Genetic change is a process going on at all times. For centuries human beings have deliberately exercised the principles of selective breeding to change the properties of plants and animals. That we may with excellent reason believe that controlled selective breeding is not appropriate for application to human beings has not led us to reject the study and use of selective breeding *per se*.

3. That recombinant DNA research is primarily a means for altering the human population. A major application of this type of research is in the area of agriculture where developments may lead to a food supply to meet the burgeoning population in a world that finds it difficult to take population limiting seriously. Researchers in the area would welcome heartily increased research support from the Department of Agriculture, but find instead that they must seek support from the National Institute of Health, which in turn demands that they describe their research in terms of its applications to human genetics. Concern with human genetics is of course heightened by the realization that cancer research cannot proceed without recombinant DNA techniques. Still it appears that the emphasis on human genetics is as much a consequence of the distribution of government funding as it is of the actual intentions of the researchers involved.

4. That issues involving technical evaluations can be resolved by appeal to the public. I certainly favor every action that can lead to an informed public and therefore an informed public opinion of essential issues. Experience in the world indicates, however, that public opinion is a very volatile ingredient, quite at the mercy of those skilled in manipulating popular thought. I am pessimistic, therefore, of the ability to resolve questions of truth, or even of wisdom, by appeal to what is inevitably a political process. I realize the dangerous ground that this opinion may appear to involve, but not to recognize the weaknesses of the democratic process may simply be a way to hasten its demise.

Precautions in matters of safety are certainly demanded as long as they do not amount to nothing less than a complete restriction on all activities. Let's not minimize the problem. We are in a mess. The whole creation is groaning in travail, awaiting the day of redemption. But if there is danger in going forward, it is not ethically possible to go backwards. Only our trust in the sovereign God and Father of our Lord Jesus enables us to walk out into the darkness with him, seeking to be his responsible and obedient servants.

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*Christians as scientists must attempt to clarify for society exactly what its choices are by setting out the results and implications of those choices.*

## Research with the Required Protective Safeguards

In regard to recombinant DNA research, I personally thought Dr. Phil Handler's editorial in the *Chemical and Engineering News* (May 9, 1977) was good. I definitely favor continued research, but do share the view that careful guidelines need to be established. I believe proper guidelines have now been set up, and think that research should proceed in laboratories that have the required protective safeguards. I tend to think that the possibility of producing a terribly virulent organism has been greatly overemphasized. Whether this view comes from my particular Christian philosophy or from my scientific training and experience is difficult for me to ascertain.

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## No Line Between Safe and Dangerous Knowledge

To reach a Christian position on the issue of recombinant DNA, let us not lose our perspective on technology as a whole. Recombinant DNA is a technique being used by molecular biologists to study the organization, regulation, and expression of genetic material on a biochemical basis. It is a method of manipulating the DNA of organisms ranging from man to virus, and the controversy over its use centers in two areas. The first is that the risk of unexpected side effects from performing these manipulations may not be worth the benefit accrued through its use, and the second is whether society would misuse the capability of genetic engineering enough to warrant shutting off such research as attempting to attain dangerous knowledge.

The first area requires a technical assessment.<sup>1</sup> The benefits are more clear-cut than the risks, which are entirely hypothetical at this point.<sup>2</sup> Medical spin-offs are already feasible, such as the production of human insulin and human interferon (a naturally occurring antiviral protein) in large enough quantities to be used therapeutically. Examples of the feared risks are that an

unknown cancer gene could begin functioning if removed from its normal genetic environment or that a regulatory gene out of place could start regulating the wrong functions at the wrong times. Is it possible that a new combination of DNA molecules could function as described above or could provide an entirely new function to a bacterium? To date there is no evidence that this is possible, and indeed with our present knowledge it appears unlikely, but we cannot rule it out. However, we do have some information on whether such a bacterium could escape from the lab and cause havoc. If researchers follow the containment procedures outlined in the NIH guidelines, we know that the chances of such a bug escaping are very low, the chances of it surviving outside the lab are very low, and the chances of it spreading are very low. The probability of all three occurring is so low that it is considered only due to the consequences in the event that an unsuspectedly dangerous gene combination is formed.

However, we cannot pretend that this technology does not exist. It is easy and does not require more than common lab equipment (in contrast to nuclear physics), so we do not have the option of an effective way of preventing all research. The question is whether we compound the problem by openly continuing the work. I believe that by using the aforementioned safeguards, which is generally done now, the risks involved are simply those which are unavoidable in any field given our incomplete knowledge, and we have to live with this baseline of risk in all areas of life. Life does not give us the option of avoiding risk entirely. We cannot do nothing; if we chose not to do something new, we have chosen to continue as we are now, and that choice has its own risks.

Let us now look at the future impact of this research on society. We must realize that using the techniques of recombinant DNA does not make genetic engineering inevitable (or even imminent) nor does refraining from their use avoid the possibility of it. However, recombinant DNA certainly will increase our understanding of (and thus our ability to manipulate) genetics.

Is this really an example of dangerous knowledge? We have already admitted that scientific knowledge is valid and that in at least some areas it is worth pursuing by practicing science and subscribing to the statement of faith of the ASA. I do not believe one can draw a line between safe and dangerous knowledge. The Navy can use information from research on poisons to develop weapons and doctors use techniques spawned by nuclear physics to save lives. When God created us He gave us the responsibility of making choices, and we cannot avoid those choices by attempting to set aside our knowledge.

I do believe, however, that Christians have an important role, especially those of us who do know enough molecular biology and genetics to be able to anticipate what will be technically possible in the future. We as scientists must attempt to clarify for society exactly what its choices are by setting out the results and implications of those choices. And we, as Christians, must remind people of their responsibility for those choices as moral beings accountable to God.

<sup>1</sup>Further details can be found in:

B.D. Davis in "Recombinant DNA Research: A debate on the benefits and risks" *Chemical and Engineering News*, May 30, 1977, p. 27-31.

J. Abelson, "Recombinant DNA: Examples of Present-Day Research," *Science* 196: 159-160, (1977).

<sup>2</sup>I do not include here the willful avoidance of using the proper safeguards. This is not a new problem and it is just as possible with those working with Rabies virus as with those doing recombinant DNA work.

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## Worthy Goals and Genesis Mandate Outweigh Dangers

Recombinant DNA research has worthy goals in keeping with the service of science to human welfare, and thus, it should be vigorously pursued with reasonable safeguards to protect the scientists and the public they serve. Some of the goals of this research include: (1) extension of basic knowledge of molecular genetics; (2) medical applications in elucidation of the nature and control of cancers, therapy of genetic diseases (e.g., diabetes may be treated by enabling a patient to make his own insulin, instead of being dependent on injections of preparations from animal sources), treatment of other molecular lesions, vital organ repair (kidney, heart, liver, lung), cheaper and more efficient syntheses of biomolecules (hormones, enzymes, antibiotics); (3) agricultural applications in feeding a hungry world full of humans by developing faster growing, disease resistant, more nutritious plants and animals, especially plants with more efficient photosynthetic systems and with nitrogen-fixation nodules grafted on their roots; (4) energy and environmental applications in production of faster growing forests, pastures and biomass for fuel and raw materials, and in development of microorganisms to dispose of pollutants and make methane and other fuels.

*Christian and biblical perspectives:* All of the above goals are directly in line with the Genesis mandate to bring the earth and all life under our control as God's representatives, for we are to be faithful managers of God's good world. Gen. 1:26-28 (TEV):

Then God said, "And now we will make human beings; they will be like us and resemble us. They will have power over the fish, the birds, and all animals, domestic and wild, large and small." So God created human beings, making them to be like himself. He created them male and female, blessed them, and said, "Have many children, so that your descendants will live all over the earth and bring it under their control. I am putting you in charge of the fish, the birds, and all the wild animals."

This mandate was not lost as a result of our sin, but continues even after our Fall. Ps. 8:4-6 (TEV):

What is man that you think of him; mere man, that you care for him? Yet you made him inferior only to

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yourself; you crowned him with glory and honor. You appointed him ruler over everything you made; you placed him over all creation: sheep and cattle, and the wild animals too; the birds and the fish and the creatures in the seas.

We have the responsibility to manage the earth and its resources for our good and to God's glory.

Of course, there are risks and dangers (both known and unknown) in every human endeavor because we are sinful, make mistakes, have limited knowledge and wisdom, and fail to trust continually in our Creator for guidance. Therefore, we need nation-wide (world-wide, if possible) application of the NIH guidelines to provide safety margins and containment of potential hazards, which should minimize the risks and circumvent real dangers. Imaginary dangers have been exaggerated, but enforcement of safety factors will be welcome as long as the research is not stifled and discouraged by local citizen groups. We need to recognize that the potential benefits outweigh dangers and to ensure that the safety and containment guidelines be flexible enough to meet any changing assessment of the hazards.

We should not allow fears of imaginary or exaggerated

dangers to drive us to over-react against the possibilities to accomplish good for mankind. We who trust in and worship the Creator of all should take seriously our responsibilities as God's managers of the earth and be prepared to make use of this research for our good and His glory. All knowledge is from the Creator. If we refuse or otherwise fail to encourage recombinant DNA research, others who do not accept or acknowledge our Creator may boldly move ahead, for whatever motives, in another country if not in our own. As scientists who are Christians, we especially should lead in the encouragement and application of this gift from God.

Before making up your own minds on this issue, I strongly recommend that you also read the News Forum Debate on Recombinant DNA Research, *Chemical & Engineering News*, pp. 26-42, May 30, 1977, for detailed arguments by prominent scientists for and against this research.

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### *Notes on "Science and the Whole Person"—*

#### *A Personal Integration of Scientific and Biblical Perspectives*

#### *Part 7*

## Man Come of Age?



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Although in many ways times and circumstances do not change from one generation to another, and even from one century to another, there are ways in which man's responsibility does continually change. In one of Jesus' parables, he gives expression to this correlation between knowledge and responsibility, "Every one to whom much is given, of him will much be required." (Luke 12:48) As there can be no denying that man's knowledge about the world and himself has

continually increased over the years, so there can be no denying that man's responsibility has increased whether he is aware of it or not, and whether he wishes it or not. There are several different ways of responding to this situation.

(1) The growth of man's knowledge has liberated him from the superstitions and rituals of his past ignorance. Man has come of age. He is now able to stand on his own feet instead of relying upon some religious

crutch. Because man's knowledge is growing, and because knowledge is sufficient to save, the acquisition of more knowledge will eventually overcome some of the problems that only partial knowledge is currently causing us. Man is finally in charge of the world and himself. He is the master of his fate; he has become the captain of his soul. All things are possible, and anything possible should be attempted.

(2) The growth of man's knowledge has led him deeper and deeper into difficulties because of the mismatch between man's understanding of how to do and his understanding of what he ought to do. Whereas his knowledge of how has increased by leaps and bounds, his understanding of ought remains at a primitive level of self-centeredness. Man should therefore beware of increasing knowledge in many areas of life, and should willingly reject the responsibility that is thrust upon him by what he already knows. God took care of things in the past, and man only gets himself into trouble when he attempts to assume the prerogatives of God.

(3) Man has come of age in many ways and this cannot be denied; man has not come of age in many other ways and this also cannot be denied. Man's moral wisdom falls far short of his technological capability. He can neither plunge ahead with the pursuit of technology in the belief that it will eventually deliver him, nor can he forsake the responsibility and choices which his current technology places upon him. Rather he must assess the present choices and seek to inform his future decisions with as much moral and practical wisdom as he can muster. For the Christian, the basis for this moral wisdom must come from a relationship of the individual with God, as this is then shared with the community.

To speak of "man come of age" is also to imply something about God. Each of the three positions just mentioned has the following corollary implications about God. (1) God, if he ever existed, is no longer necessary. Very likely the concept of "God" was born of fear and ignorance in primitive man as an explanation for the unknown and as a palliative for his insecurity. To speak of man come of age is to declare that this God is dead. (2) God is in some way constantly striving with man. In spite of his efforts, God fails to keep man from learning more and more about the world. Man's knowledge is a threat against his belief in God. The evidence for the existence of God is to be found in his intervention in the world in areas where man not only has been ignorant but must remain ignorant. (3) All knowledge that man acquires is obtained through either the active or passive activity of God. Therefore it is God who has brought man "to age" technologically, and it is God who is able to bring man

"to age" in making responsible choices in an increasingly complex world. Future choices must neither be rejected completely, nor taken lightly without due consideration of God's purpose in the world and the nature of man made in the image of God.

Consideration of these three implications about God shows that the first two agree in regarding God as the explanation for unexplainable phenomena in the world; the first dispenses with God as these phenomena become explainable, and the second tries to prevent the explanation of these phenomena in natural terms so as to reserve some place for God. Only the third recognizes that God is Lord of the natural and the supernatural, that a natural description of a natural event does not eliminate God as the sustainer of that event, and that God must be Lord in all of life, not just in small recesses of ignorance reserved for him. The first two positions are speaking about a God-of-the-gaps, not the God of the Bible.

### The God-of-the-Gaps

The phrase "man come of age" has had contemporary emphasis given to it by its use in the letters of German theologian Dietrich Bonhoeffer<sup>1</sup> written while he was in prison for participating in a plot to overthrow the Hitler regime in World War II. Since Bonhoeffer probes the meaning of "man come of age" and "the God-of-the-gaps" out of a Christian context and yet in a manner peculiarly relevant to modern man, I have chosen to carry out this discussion of man come of age after the suggestions offered in partial and tentative form in these prison letters of Bonhoeffer. Arrested on April 5, 1943, Bonhoeffer's letters of interest to us here number just eleven, written to his friend Eberhard Bethge between April 30 and August 3, 1944. Bonhoeffer was executed at Flossenbürg on April 9, 1945, only a brief time before the end of the war, but his thoughts as noted here and in the following installment remain a challenge and an insight to us today.

It is in his letter of May 25, 1944 that Bonhoeffer first makes the clear connection between his concerns for the future of Christian faith and the concept of a God-of-the-gaps.

Weizsäcker's book *Das Weltbild der Physik* is still keeping me very busy. 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. . . . God is no stopgap; he must be recognized at the center of our life, not when we are at the end of our resources.<sup>2</sup>

With little previous inputs from the physical sciences, Bonhoeffer was quick to make the connection between Weizsäcker's comments on the worldview of physics and the larger problems of life. In particular, he saw the correlation between the fallacy of the God-of-the-gaps in physical science with the fallacy of the God-of-the-gaps in other aspects of life.

There is a long history of the attempt by Christians to prove or at least to defend their belief in the existence and activity of God by proposing that it is God alone who acts in areas in which man is ignorant of any natural mechanism. The argument runs in this way: man may now know much about physics, chemistry, biology and the like, but there remain certain

*This continuing series of articles is based on courses given at Stanford University, Fuller Theological Seminary, Regent College, and Menlo Park Presbyterian Church. Previous articles were published as follows. 1. "Science Isn't Everything," March (1976), pp. 33-37. 2. "Science Isn't Nothing," June (1976), pp. 82-87. 3. "The Philosophy and Practice of Science," September (1976), pp. 127-132. 4. "Pseudo-Science and Pseudo-Theology. (A) Cult and Occult," March (1977), pp. 22-28. 5. "Pseudo-Science and Pseudo-Theology. (B) Scientific Theology," September (1977), pp. 124-129. 6. "Pseudo-Science and Pseudo-Theology. (C) Cosmic Consciousness," December (1977), pp. 165-174.*



key physical mechanisms, chemical mechanisms, or biological mechanisms, which must forever elude him because such mechanisms do not in fact exist. These gaps in natural description are filled only by the recognition that God acts directly in these gaps above and beyond any physical, chemical or biological mechanism. In this interpretation God remains the Great Mechanician, and the possibility of a complete physical, chemical or biological description—even in principle—is forever ruled out by the very existence and activity of God.

Sir Isaac Newton invoked the God-of-the-gaps when certain irregularities in the motion of the planets could not be explained by his concurrent theory of gravitation; since the mechanics of the theory of gravity could not explain this irregularity, Newton concluded that it must be a direct manifestation of the intervention of God. Newton was wrong; subsequent analysis of the details of the planetary system provided a natural mechanism for these irregularities. Supposed evidence for the activity of God was lost.

The list of phenomena invoked by Christians to defend the God-of-the-gaps is long indeed and still very much present with us. Formerly only God could heal the sick or bring the rain; but soon men also could heal the sick and even sometimes bring the rain. Evidences for the activity of God were lost. Evolution was declared impossible in principle because the supernatural intervention of God was required to bring life into the non-living, to bring soul into the soulless, and to bring spirit into the human being. Man's exploration of space was condemned on the grounds that God had made earth man's proper domain and man should remain ignorant of outer space. Today it is still argued by some that scientists will be unable to produce life in the laboratory from non-living materials because only a supernatural intervention of God would be adequate—what will be said when life is produced in the laboratory? Only God can determine the sex or personality parameters of a fetus—what will be said when men control some or many of these characteristics? Only God can decide when a life shall end—yet men must decide whether to use "heroic" life-preserving measures or permit life to end, must choose organ donors and recipients to preserve life or watch while death comes. In the world in which God places us today, we often do not have the option between choosing and not choosing—often not choosing is already a choice.

The continuous chain of evidence in the physical and biological sciences is so compelling that most knowledgeable Christians today recognize the fallacy of the God-of-the-gaps approach. They see that such an advocacy results in the paradox of less and less evidence for the existence and activity of God resulting from more and more knowledge of his creation. They emphasize the importance of seeing God in all phenomena, the natural as much as the supernatural, and of recognizing that the very existence of the material universe depends moment-by-moment upon the sustaining activity of God. This growing consensus can be summarized in the words of Malcolm Jeeves,

God, to the theist, while being the cause of everything, is in the scientific sense the explanation of nothing.<sup>3</sup>

*There can be no denying that man's responsibility has increased whether he is aware of it or not, and whether he wishes it or not.*

Today many Christians are willing to admit that a complete description in physical and biological categories may well be possible, at least in principle, without the "God-hypothesis" supplying a missing mechanism in these categories, but they do not conclude that this invalidates descriptions in other categories as well.

Bonhoeffer's perception of the relevance of the God-of-the-gaps problem went beyond that of the physical sciences alone. If the concept of a God-of-the-gaps was insufficient and in fact destructive of effective Christian witness in the case of the physical and the biological, could it be expected to be any less insufficient and destructive in the case of the religious? If the search for the reality of God in the gaps of man's ignorance in physics and biology were doomed to failure, is it not likely that the search for the reality of God in the gaps of man's ignorance of religious matters is likewise doomed? Bonhoeffer argues for a definite correlation here.

Religious people speak of God when human knowledge . . . has come to an end, or when human resources fail—in fact it is always the *deus ex machina* that they bring on to the scene, either for the apparent solution of insoluble problems, or as strength in human failure. . . . It always seems to me that we are trying anxiously in this way to reserve some place for God; I should like to speak of God not on the boundaries but at the center, not in weakness but in strength; and therefore not in death and guilt but in man's life and goodness.<sup>4</sup>

It must be remembered that the term "religion" had a pejorative meaning for Bonhoeffer. The religious frame of mind is to Bonhoeffer a culturally conditioned perspective on life, which can in principle be almost completely separated from Christian commitment to God in Jesus Christ. So he reminds us that the weakness of the physicist in physics or of the biologist in biology at one time gave the appearance of evidence for the strength of God in filling the gap of ignorance. When the strength of the physicist in physics and of the biologist in biology became known, however, it appeared that the weakness of the God-hypothesis had been demonstrated. Bonhoeffer argues that the search for the strength of God only in the weakness of man can have no other effect than to destroy the reality of God for us.

Bonhoeffer likewise sees the emphasis upon the God-of-the-gaps in the "inner" and "private" aspects of life as a natural consequence of the squeezing out of the God-of-the-gaps from the external and public aspects of scientific life. It is a continuing attempt to preserve some small place for God where man's knowledge cannot touch, and thus to maintain an argument for the existence and activity of God immune to man's scientific advances. The distinction between the "inner" man and the "outer" man is certainly not biblical; the Bible is always concerned with the whole man, with a man's deeds and not just with a man's motives. As good deeds

do not justify evil motives, so good motives do not justify evil deeds. A man lives as much from "without" to "within" as he lives from "within" to "without." Why, then, asks Bonhoeffer, do we attempt to find God in some special way in the "inner"?

I therefore want to start from the premise that God should not be smuggled into some last secret place.<sup>5</sup>

For these reasons, therefore, Bonhoeffer argues that we must search out what it means to reject the God-of-the-gaps hypothesis in all respects of life, and to ask ourselves anew the question: What is Christ for us today in a world without the God-of-the-gaps?

### Man Come of Age

Although the phrase, "man come of age," has the ring of human exaltation about it, it should be remembered that in a profound sense, the Christian is a "man come of age" according to Paul in his letter to the Galatians 3:23-26.

Now before faith came, we were confined under the law, kept under restraint until faith should be revealed. So that the law was our custodian until Christ came, that we might be justified by faith. But now that faith has come, we are no longer under a custodian; for in Christ Jesus you are all sons of God, through faith.

Formerly under the tutorship of the law, like a student to his schoolmaster, now the Christian is set free to the maturity of freedom in Christ, not to break the law but to live responsibly in a way such that it will be fulfilled.

Man has certainly also come of age in the sense that he is called upon today to make decisions about the world and himself that he was formerly not called upon and was intrinsically unable to make. In Christian perspective, we must conclude that God is bringing man to the point where he has the ability and knowledge to respond to more and more human needs. If this is the case, not only is it possible for man to make more decisions today than ever before, but it becomes wrong for him to shirk this responsibility.

Only a few years ago many diseases had no known cure; in the intervening years cures or effective treatments for some of them have been discovered. Confronted with an incurable disease fifty years ago, a doctor told the relatives that there was nothing further that could humanly be done; the ill person was now in the hands of God who could heal him if he willed. If the ill person recovered, his relatives thanked God who had healed him. Today if a doctor is confronted with the same disease for which a treatment is now known, it would be wrong for him to withhold the treatment and tell the relatives that only prayer could meet the patient's needs. He must instead administer the treatment. If the relatives have been thinking in terms of a God-of-the-gaps, they will now thank the doctor and forget about God completely; if they have not been trapped by this fallacy, they will thank the doctor *and* they will thank God for the wisdom and skill of modern medicine as manifestations of God's free activity in the modern world. The point is that under present conditions a decision had to be made by one or more persons, the doctor and the relatives, to take an action which previously they would have considered wholly

within the province of God alone. To one thinking in the framework of a God-of-the-gaps, evidence for God used to exist in the fact that only God could heal a person from pneumonia—it was beyond the scope of contemporary medicine. But then penicillin and antibiotics were discovered and medicine rose to the occasion. The need for God apparently disappeared! Now this same approach continues to argue for evidence for God in the fact that only God can heal a person from cancer. It is a never-ending and self-restricting perspective that forces God to be squeezed out of the center of life.

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*If the concept of the God-of-the-gaps was insufficient and in fact destructive of effective Christian witness in the case of the physical and the biological, could it be expected to be any less insufficient and destructive in the case of the religious?*

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The example of medical knowledge does not ordinarily cause many problems for Christians. We accept the fact that medical knowledge should be used to cure illness. Actually this acceptance is deeply rooted in the biblical doctrine of Creation, with its teaching about the intrinsic goodness of the created universe and of the existence of suffering as an aberration on this universe because of the effects of sin. One without this worldview can easily be trapped in the dilemma of wondering whether it is God's will to combat suffering in this world; if all is in God's hands, then suffering also must come from God, and to fight against suffering is to fight against God. This is the problem raised by Camus in *The Plague*.<sup>6</sup> Should one fight against the plague, and hence be guilty of fighting against God, or should one submit to the plague as from God, and hence be guilty of allowing fellow men to die? Only the biblical perspective is competent to deal with this problem unambiguously. *Even if* the suffering can properly be viewed as judgment from God, it nevertheless is always true that the proper role for a Christian is to work to alleviate suffering; the suffering itself does not come from God but is a manifestation of the separation between the world and God because of sin.

In many other analogous areas of man's increasing knowledge and ability, the acceptance of this principle has not been so easily gained as in the field of medicine. A whole host of questions must now be faced by man, whereas previously he could simply leave them either alone or in the hands of God. Ramm<sup>7</sup> summarizes a number of such problems as they are related to genetic engineering, the definition of death, and the electrical, chemical and surgical alteration of man's behavior. To these may be added the problems associated with birth control, abortion and population limitation, euthanasia, environmental control and preservation, genetic research, heightened possibilities for psychological and sociological manipulation of persons, artificial insemination and organ transplants. As an-

other example, the essential absence of a political Christian perspective in the New Testament church can be attributed to the lack of direct responsibility of the early Christians for the political system under which they lived; contrast the potential responsibility of a citizen living in a democratic form of government which purports to represent him directly.

It is in this kind of framework that we can understand Bonhoeffer's discussion of "man come of age."

The movement that began about the 13th century . . . towards the autonomy of man (in which I should include the discovery of the laws by which the world lives and deals with itself in science, social and political matters, art, ethics, and religion) has in our time reached an undoubted completion. Man has learnt to deal with himself in all questions of importance without recourse to the "working hypothesis" called God.<sup>8</sup>

How then, shall we respond to this state of affairs? Shall we accept them and continue to emphasize the reality of God at the center of life to a "world come of age," or shall we instead attempt to recover the previous dependence of man upon the "God-hypothesis" by denying his "coming of age" and seeking to restore the secret places where God can continue to reign without challenge? Bonhoeffer argues that the common practice in Christian apologetics has too often been the latter. And since it is no longer possible to uphold the God-of-the-gaps in the physical and biological realms, the effort is all the more intense to find him in the ultimate questions of guilt and death—for which surely only such a God has the answer. But, says Bonhoeffer, just think, "What if one day they no longer exist as such, if they too can be answered 'without God'?"<sup>9</sup>

Here Bonhoeffer seems to be really borrowing unnecessary troubles. Is it possible that the problems of guilt and death can be dealt with successfully without invoking the supernatural activity of God at the critical point? To avoid the apparent extremism of Bonhoeffer's overstatement, we need to distinguish between the ultimate guilt between man and God, with which only God can deal and has dealt in Jesus Christ, and the many manifestations of guilt, with which man may be expected to be able to deal increasingly. It is of these latter manifestations that we believe Bonhoeffer speaks here. A consideration of the interaction between scientific advances and Christian theology has led Ramm to speak in terms very similar to those of Bonhoeffer.

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*What does it mean to live without the God-of-the-gaps fallacy and without the "God-hypothesis"? . . . We do not use the possibility of God's activity without us to serve as an excuse or a stopgap for our own ignorance or apathy.*

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In the light of development in behavioral sciences and psychiatry we need to take a second look at our doc-

trine of the Holy Spirit. Put in simplest and most direct terms, many of the things we now claim *only* the Holy Spirit can do with man supernaturally, man will do for himself. We see no ceiling to the control, shaping and modulation of human behavior in the future.<sup>10</sup>

Ramm argues that we must think through in the light of possible developments what it means to speak of the immanence of the Holy Spirit in every dimension of the universe. While maintaining clearly the *unique-ness* and *discontinuity* of the work of the Holy Spirit in the appropriate context, we must also be careful to maintain the *continuity* of the work of the Holy Spirit with the natural mechanisms of man's growing technological control over the world. Drugs and psychological treatment *become* the gift of God when they are used to heal and to restore the whole man as a unique human being; the same chemicals and methods can also *become* demonic when they are used to produce a creature who is less than human.

### *Etsi Deus Non Daretur*

What does it mean to live without the God-of-the-gaps fallacy and without the "God-hypothesis"? It means that we must live fully responsible for the course of events in the world. While we in no sense deny the *possibility* of God's activity in either the physical or religious realm *without* us (and indeed even trust for this activity to produce the ultimate deliverance), we do not use this possibility ever to serve as an excuse or a stopgap for our own ignorance or apathy. And so we are led to appreciate the meaning of one of Bonhoeffer's more paradoxical statements.

We cannot be honest unless we recognize that we have to live in the world *etsi deus non daretur*. And this is just what we do recognize—before God! God himself compels us to recognize it. So our coming of age leads us to a true recognition of our situation before God.<sup>11</sup>

We must live in a way that is valid "even if there were no God," but we must live in this way—before God! Bonhoeffer does not call us to repudiate God; God is not dead. He calls us to recognize that we are fully responsible for what goes on in our lives and in our world, not attempting to push off onto God those responsibilities which formerly were not ours but now are.

The God who lets us live in the world without making the working hypothesis of God is the God before whom we stand continually. Before God and with God we live without God.<sup>12</sup>

We do not arrive at Christian living by separating ourselves from the world, but rather by living fully in all of "life's duties, problems, successes and failures, experiences and perplexities."<sup>13</sup> By giving ourselves wholeheartedly and responsibly to the fulfillment of those tasks in which we find ourselves, we throw ourselves completely into the arms of God. We experience God in the totality of life, and not simply in the peripheral regions of mystical religiosity or as the answer in our moments of distress.

### Summary

In other days it was possible to sustain a religious interpretation of the physical and biological mechan-

isms of the world, i.e., to look directly to God as the immediate Cause of those physical and biological events which man was unable to describe or understand. In the historical context of growing physical and biological scientific description of the world, this religious interpretation became a concern with a God-of-the-gaps, whose existence could be demonstrated by man's ignorance of certain key physical and biological mechanisms. The consequence was that evidence for God decreased as man's scientific knowledge grew. Today we do not attempt to sustain such a religious interpretation of the physical and biological worlds. We appreciate the fact that what has happened is that God, through permitting increasing scientific knowledge, has allowed himself to be removed from the direct physical and biological context of scientific description. We no longer look for a scientific hypothesis based upon God as the secret mechanism; rather we recognize God as the very foundation for all existence. We do our physics and our biology without God—before God! The first part of that statement describes our scientific description; the second part our Christian responsibility.

Bonhoeffer challenges us to consider the validity of pressing this growing relationship one step further. What will happen (has happened?) if this same kind of continuing process applies not only to the physical and biological, but to the moral, ethical and religious as well? He concludes that a God-of-the-gaps position is no more tolerable here than it has been in the physical and biological spheres. Our relationship to God in Christ must be such that he is able to claim for himself, not just our weakness and our failure, but also our strength and our success. We must be prepared to live the whole of life with God at the center, not only on the peripheries. We must be prepared for psychological and sociological descriptions of religious phenomena; such descriptions will be significant and useful, but they will no more exclude a theological interpretation than a physical description does. God is the very foundation for all of life and its meaning; we need not seek to preserve secret places within the natural categories where his existence can be verified and defended. God is free to act as he will; sometimes we may describe this action in supernatural terms, but most often we will describe it in natural terms. We are not free to use the possibility of God's supernatural activity to excuse us from acting as participants in his natural activity.

## NOTES

<sup>1</sup>*Letters and Papers from Prison* by Dietrich Bonhoeffer, E. Bethge, Ed., The Macmillan Co., N.Y. (1968)

<sup>2</sup>*LPP*, p. 164

<sup>3</sup>M. A. Jeeves, *The Scientific Enterprise and Christian Faith*, Tyndale (London) (1969), p. 103.

<sup>4</sup>*LPP*, p. 142

<sup>5</sup>*LPP*, p. 183

<sup>6</sup>Albert Camus, *The Plague*, Modern Library, N.Y. (1948)

<sup>7</sup>B. Ramm, "Evangelical Theology and Technological Shock," *Journal ASA* 23, 52 (1971)

<sup>8</sup>*LPP*, pp. 167, 168. We may indeed feel that Bonhoeffer has fallen victim to the common fallacy that our own period of world history is unique. Certainly the completeness of man's knowledge as set forth here must be considered an unwarranted exaggeration. Yet I believe we can learn from it within the confines of its appropriate application.

<sup>9</sup>*LPP*, pp. 168, 169

<sup>10</sup>B. Ramm, "Evangelical Theology and Technological Shock," *Journal ASA* 23, 52 (1971)

<sup>11</sup>*LPP*, p. 188

<sup>12</sup>*LPP*, p. 188

<sup>13</sup>*LPP*, p. 193

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*We no longer look for a scientific hypothesis based upon God as the secret mechanism; rather we recognize God as the very foundation of all existence.*

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## Topics for Discussion

1. Should a citizen under a democratic form of government vote for a candidate only if he is almost completely in agreement with him on many issues? If voting in an election is often making a choice for the lesser of two evils, can one avoid choosing—or is a failure to make a choice already in itself a choice favoring the candidate who wins? Give other examples where failure to deliberately act out of choice is already a choice for which we should be held responsible.
2. Philosophical evolutionists often argue that man has continually become better morally with the passage of time. What evidence do you find for or against this argument? Is man morally "better" than the animals? Does this question make sense?
3. Discriminate between what is meant by saying that events which normally occur in the world have a natural (a) description, (b) explanation, and (c) interpretation. Repeat, replacing the word "natural" by "supernatural."
4. Do origins of life and spirit *require* a God-of-the-gaps? Is there some reason why such origins cannot be described in terms of natural processes?
5. How could Bonhoeffer believe firmly in the value of prayer,

I am so sure of God's guiding hand that I hope I shall always be kept in that certainty. . . . My past life is brim-full of God's goodness, and my sins are covered by the forgiving love of Christ crucified. . . . May God take care of you and all of us, and grant us the joy of meeting again soon. I am praying for you every day. (*LPP*, pp. 208, 209)

the providential activity of God, the working out of the will of God in the world—and still argue that we must live in a way that is valid "even if there were not God"? Is there a clue in his use of the prepositions, "before God and with God" as opposed to regarding God as one called in as a stopgap only in matters of emergency?

6. It is reputed that when Napoleon asked the scientist Laplace why he had not mentioned God in his book on astronomy, Laplace replied, "I had no need of that hypothesis." Can you tell from this exchange whether Laplace was an atheist or not?
7. Can you think of any situation where I would be justified to know how to help alleviate someone's suffering and not to do it? Am I not responsible then to encourage both a personal and social increase in such knowledge as well? Does it follow from such responsibility that any course of research is justified as long as the ultimate goal is the alleviation of human suffering?
8. Suppose it were known that an aggressive dangerous person could be transformed into a socially helpful and responsible person through the use of certain drug therapy. Would you be in favor of its use upon the request of his family and doctor? How about the use of certain brain surgery techniques? Do you think that such a possibility is ruled out by the very nature of the world, or do you think it a viable possibility? Would this be a case of "man come of age" acting out of mature responsibility for the world, or a case of man seeking autonomy in rebellion against God? Need it be only one or the other?

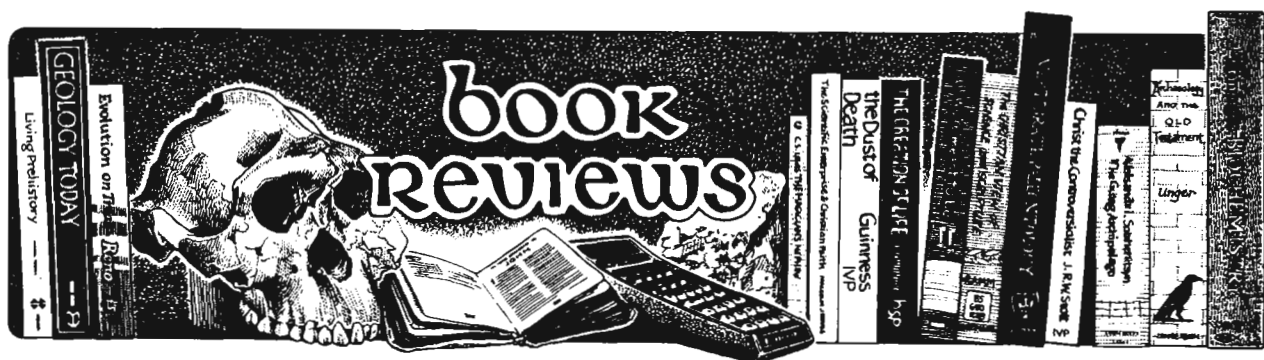
9. A question for Christians: Suppose you could make a rebellious rejecter of God open to the Gospel of Jesus Christ by the administering of a certain drug. Would you use the drug . . . openly? . . . secretly to help him? Instead of a drug, would you use psychological conditioning to make a rebellious rejecter of God open to the Gospel of Jesus Christ? Isn't this what happens at huge evangelistic rallies?
10. In view of Bonhoeffer's concept of "religion" and of a God-of-the-gaps, speculate (if you have not read *Letters and Papers from Prison*) how this leads him to the controversial topic of "religionless Christianity." Can you guess what he might have meant by this provocative term?
11. If "man come of age" means that man is responsible before God for what he does, has there ever been a time when man has not been of age in many aspects of life?

## OTHER READINGS

- D. Alexander, *Beyond Science*, Holman (1973)  
 L. Augenstein, *Come Let Us Play God*, Harper and Row (1969)  
 H. F. Beck, *The Christian Encounters the Age of Technology*,  
 Concordia (1970)  
 S. D. Beck, *Modern Science and Christian Life*, Augsburg  
 (1970)  
 D. Bonhoeffer, *Ethics*, E. Bethge, Ed., Macmillan (1961)

*We must be prepared to live the whole of life with God at the center, not only on the peripheries.*

- Letters and Papers from Prison*, E. Bethge, Ed., Macmillan (1968)
- R. H. Bube, *The Human Quest: A New Look at Science and Christian Faith*, Word (1971) "Man Come of Age: Bonhoeffer's Response to the God-of-the-Gaps," *Journal of the Evangelical Theological Society* 14, 203 (1971)
- "The Failure of the God-of-the-Gaps," in *Horizons of Science*, C. F. H. Henry, ed., Harper & Row, N.Y. (1978)
- E. L. Mascall, *The Secularization of Christianity*, Holt, Rhinehart and Winston (1965)
- W. G. Pollard, *Man on a Spaceship*, Claremont Colleges (1967)
- A. N. Triton, *Whose World?* InterVarsity Press (1970)
- K. Vaux, *Subduing the Cosmos: Cybernetics and Man's Future*, John Knox (1970)
- G. D. Yarnold, *The Spiritual Crisis of the Scientific Age*, Macmillan (1959)



**THE CHURCH UNDER SIEGE** by M. A. Smith,  
Inter-Varsity Press, Downers Grove, Illinois, 1976,  
277 pp. Paperback, \$5.95.

The past year has witnessed an increasing interest among people to learn more about their "roots." This is a phenomenon that has had widespread ramifications in travel, reading, and study. There has been an effort by many Christians to learn more about the historical "roots" of their Christian faith. As one becomes more aware of how his historical Christian brothers and sisters lived, a greater appreciation for one's own faith is realized. Guidance for meeting the many issues in life today can be obtained as the past is examined.

It is in this mold that *The Church Under Siege* written by Michael A. Smith of Lancashire is presented. This book covers a period of time in history extending from Constantine, at the beginning of the fourth century, until the reign of Charlemagne, early in the ninth century. The author makes clear in his introductory comments the ultimate aim of producing a manuscript examining Christian history of this period of time: "... to make us better fitted to serve Christ in our generation." (p. 13) It is the opinion of this reviewer that the writer's aim has been fulfilled.

The book must be highly commended. Smith does an outstanding job of covering a broad period of historical time, over five hundred years, in a relatively short volume. It is extremely well written for the layman with little historical training and background. Also it could be very beneficial to the college scholar looking briefly at the flow of Christian history during this particular period of time.

The author has documented effectively throughout the book. Anyone wishing more scholarly reading has a wealth of suggested literature to which he can turn. Also a glossary of personages who came upon the world scene during these years is very useful, as is an excellent index and time-flow chart. The book is also effectively illustrated.

This analysis of history begins with a brief review of the Roman Empire at the start of the fourth century when Constantine became ruler (312 AD). Constantine defeated Maxentius at the Battle of the Milvian Bridge in Rome to become the Roman Emperor. With the victory by Constantine came an end to the persecution of Christians. Constantine gave allegiance to the God of the Christians and sought to please Him. Thus began a long period where Christianity and the conquests of the state were closely intertwined.

During much of the fourth and fifth centuries sig-



nificant conflicts were raised over a number of theological doctrinal issues. Many of these conflicts resulted in turmoil and warfare. One that receives special attention in this volume is the controversy regarding the Trinity. At the core of this conflict were the Arians. They basically held to the belief that the Trinity existed in three distinct and different persons. Orthodox Christianity held that the Trinity was One. This important controversy is well documented and examined in this book.

One section of the volume traces the actions of several individuals and groups who took on the life of a hermit or recluse for religious purposes. This was the early beginnings of monasticism. As with most religious movements this trend had its followers from orthodox Christianity, where those involved were deeply committed to a life of service to God. Yet others went to extremes and numerous alien teachings tended to become a part of such a lifestyle. This section is well presented and certainly presents a picture of one period of history little known to most twentieth century Christians.

A latter section of the book presents a rapid review of the developments in the eastern empire (the Byzantine Churches). This chapter begins with John Chrysostom (387 AD) and ends less than thirty pages later after the rise of Islam (mid 600s). This section is a most helpful and interesting review for those in western culture who know little of this historical period of church development. If there is any weakness to this book it might be that this section is too brief and presented in a rather disjointed manner. It does not flow as well as the other sections of the book.

The author very effectively introduces the reader to a number of persons throughout the volume. One almost feels he knows such personages as Antony the hermit, Theodoric the Great, Athanasius, Augustine, plus many others. Yet the reader is left with a desire to learn more about these individuals. The book is brought to a close with the reign of Charlemagne in the early 800s.

Throughout the volume a number of concepts are very well developed. There are three that are particularly worth noting. (1) During this period of time the church "... changed from being a gathered company of believers." to "... a political entity with a visible emperor." (p. 244) (2) Throughout history as presented in this volume learning became more important as orthodox Christian faith developed. In those cultures where an orthodox faith prevailed, language, the classics, and knowledge expanded. With the regression in orthodox faith usually came a similar repression of the importance of learning. (3) An emphasis was placed on doctrine during this period of time. Preaching was dynamic and focussed upon doctrinal issues. Kings and emperors went to battle over doctrinal disputes. It is doubtful if the average twentieth century contemporary believer would be prepared to go to such extremes over doctrinal issues. Certainly the pulpits of our time do not ring with as much depth of doctrinal teaching as one might wish.

This book is a valuable follow-up to the author's previous book, *From Christ to Constantine*. Hopefully he will continue on from Charlemagne in another

## New Book Review Editor

*After ten years of faithful and creative service, Book Review Editor, Stephen W. Calhoun, Jr., is leaving this post as he transfers from Professor of Chemistry at Houghton College, Houghton, New York to Academic Dean at Central Wesleyan College, Central, South Carolina as of July 1, 1978. The Journal ASA and the American Scientific Affiliation as a whole owe a profound debt of gratitude for the excellent way that Steve has kept us supplied with high quality book reviews. We are especially fortunate, therefore, to be able to welcome Professor Bernard J. Piersma from the Chemistry Department of Houghton College as our new Book Review Editor. We appreciate his willingness to undertake this task and the smooth way that Steve has arranged for the transition.*

volume. It can only be hoped that M. A. Smith's next volume will be published sooner than the five years which elapsed between *From Christ to Constantine* and *The Church Under Siege*. We who desire to discover our Christian "roots" should not have to wait so long for so valuable a contribution as this most recent publication.

*Reviewed by Dean F. Miller, College of Education, University of Toledo, Toledo, Ohio.*

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**INDEPENDENCE FOR THE THIRD WORLD CHURCH: AN AFRICAN'S PERSPECTIVE ON MISSIONARY WORK**, by Pius Wakatama, Downers Grove, Illinois: Inter-Varsity Press, 1976, 119 pp., \$2.95.

The proposed moratorium on Western missionaries in the Third World is a controversial and emotion-packed issue among both evangelical and liberal churchmen. The first group suggesting this move were the anthropologists who met in Barbados in 1971 under the sponsorship of the World Council of churches. They claimed missionary work was detrimental to the survival of native cultures, and aided in economic and human exploitation.

The second group points to the success of missions, especially in Africa, where it is estimated that there are one hundred million professing Christians. They say the goal of evangelizing has been met. Churches there can be self-governing, self-supporting, and self-propagating.

The third group is represented by John Gatu of the Presbyterian Church in East Africa. He believes that the continued presence of missionaries hinders the growth of the church in Africa. He suggests a moratorium of at least five years on missionaries and funds. His proposal was adopted in 1974 at a meeting of the All Africa Conference of churches in Zambia.

## BOOK REVIEWS

The fourth group, with which the author identifies himself, advocates a selective moratorium. Only those with particular social and spiritual qualifications should go overseas as missionaries to meet specific needs, especially in the area of training nationals at a higher level.

The author believes the Barbados group wrong for scriptural and other reasons. Missionaries are not changing cultures, but rather failing to adapt the naked gospel to different cultures. This was because of ignorance of cultures and ethnic pride. They have been like the Judaizers in the early church, Paul's "thorn in the flesh." They insist that other people take on Western cultural ways before becoming Christians. They have condemned native customs and ceremonies, even traditional naming of children, and ethnic music, as heathen. All this the author feels, stems from a basic ignorance of anthropology, a lack of graduate education on the part of missionaries.

In addition to Africa, the author states that thousands are being added to the family of God in Asia every day, due to dedicated pastors, evangelists, and lay leaders who are filled with the Holy Spirit. In Latin America the church is growing even faster than the birth rate! God's work does not depend on man's wisdom or organization, he observes, but on God's Spirit. In Matthew 28:19-20 there is only one limitation to the Great Commission. We should go on to the end of the age. Christ expects missionary work across cultures to continue until His return.

The author suggests the biblical pattern. Paul started national churches, independent from their inception. He appointed elders and left the administration of the new churches to them. Acts 11:29 and I Cor. 16:1-3 indicate how churches should assist others in need, with financial help. In just this way he feels Western countries should assist with the birth and nurture of new churches which result from missionary evangelization, but leave the work of the churches to the nationals. He strongly urges Western assistance in the higher, even graduate school, education of leaders chosen by the national churches, in the United States and England, until native schools and colleges of academic standing are established.

Wakatama downgrades the importance of theological disputes in Africa, although some strong differences do exist. He states that he "is yet to meet an African Christian who holds the rationalistic liberalism which conservatives reacted against in the West. Africans have no problem accepting the supernatural inspiration of the Bible and the divinity of Christ, because their culture is not built upon scientific rationalism." The supernatural and the natural are all one world. The Bible is taken literally. The Holy Spirit is breaking down barriers. At Lausanne '74 black Anglican bishops sang and clapped their hands together with Latin American Pentecostals as they made "joyful noise unto the Lord!"

This book is good required reading for all missionary committees of evangelical churches in the West. It is, however, difficult to change long standing views on missions, especially when entrenched organizations and careers are involved. The author does not comment on this aspect of his commendable but idealistic sug-

gestions. It is one thing to generate financial support and missionary volunteers. It is quite another for a national to dictate specifically, as the author does, how the money should be spent and the personnel involved. Few local churches and denominational boards are that progressive, or, as the author puts it, "led by the Holy Spirit."

*Reviewed by Albert J. Fuson, Cajon Valley Union School District, San Diego, California.*

**RICH CHRISTIANS IN AN AGE OF HUNGER: A BIBLICAL STUDY** by Ronald J. Sider, Intervarsity Press, Downers Grove, Illinois (1977). Paperback, 249 pp. \$4.95.

The book *Rich Christians in an Age of Hunger: A Biblical Study* by Ronald J. Sider is a serious, thought-provoking contribution to the increasing literature on the subject of world-wide starvation and hunger. This is a subject about which most middle and upper class American Christians would prefer not to think. When presented with the facts of world hunger and related poverty most Christians tend to become defensive and rationalize their behavior. Sider, a professor of history and religion, examines the problems of hunger, poverty, and human oppression from a Biblical perspective and then calls for a variety of radical actions to be taken that he feels would improve the status of millions in the world.

The book is divided into three parts. The first part is a broad overview of the world scene today as it relates to hunger, starvation, and poverty. Part two presents a Biblical position regarding poverty, riches, hunger, economic relationships, and instructional

### Books Received and Available for Review

(Please contact the Book Review Editor if you would like to review one of these books.)

- Anderson, J. K. and H. G. Coffin, *Fossils in Focus*, (Christian Free University Curriculum), Zondervan/Probe, 1977.
- Barr, S. J. and D. Abelow, *A Woman's Choice* (whether or not to continue pregnancy), Rawson Associates Publishers, 1977.
- Clark, D. K., *The Pantheism of Alan Watts*, IVP, 1978.
- Dowell, L. J., *Signs of the Times*, Gennao Anothan Publications, 1977.
- Fryling, R. & A., *A Handbook for Engaged Couples*, IVP, 1977.
- Heyer, R. (ed), *Medical/Moral Problems*, Paulist Press, 1976.
- Hoover, A. J., *Fallacies of Evolution: The Case for Creationism*, Baker, 1977.
- Hummel, C. G., *Fire in the Fireplace: Contemporary Charismatic Renewal*, IVP, 1978.
- Jegen, M. E. and B. V. Manno, *The Earth is the Lord's: Essays on Stewardship*, Paulist, 1978.
- Linder, R. D. and R. V. Pierard, *Twilight of the Saints: Biblical Christianity & Civil Religion in America*, IVP, 1978.
- Snarey, J. R., *Jesus-Like Relationships: A Group Course*, Leader Enrichment, 1976.
- Turner, D., *Commitment to Care: An Integrated Philosophy of Science, Education, and Religion*, Devin-Adair, 1978.
- Wilson, C. A., *Rocks, Relics and Biblical Reliability*, (Christian Free Univ. Curriculum), Zondervan/Probe, 1977.

structures affecting these dimensions. In the third part the author makes some suggestions for action that if taken would help to alleviate the problems spoken of in part one. The initial focus is upon the individual, the church, and lastly the structure and institutions of western culture that cause poverty and related hunger.

In part one an attempt is made to help the reader become more aware of the world scene as it relates to hunger today. This section is adequately written for what follows in section two. No "new ground" is presented that one cannot find in other publications of a more comprehensive nature. The author draws heavily upon information and data from many excellent sources, both secular and Christian. Lester Brown and Jean Mayer are examples of outstanding food and nutrition experts who are used in the documentation of this section. Upon reading this section some less well informed individuals might think the author is using scare tactics. Yet the reality of the world-wide situation is such that it cannot be presented as a thing of beauty and with an "all is well" attitude. This section, though brief, captures the sense of urgency facing mankind in the latter part of the 1970s.

The true merit and value of this publication rests in section two. While many authors, claiming to be writing from a Christian point of view, have written recently concerning the world's problems of hunger, none have attempted to capture as completely and thoroughly as Sider the scriptural teaching and admonitions on this matter. Drawing heavily from the Old Testament prophets (Isaiah, Amos, Hosea, etc.), the Jewish Law, the teachings of Jesus Christ, the writings of Paul and others, and the Psalms, a dynamic foundation is presented focusing upon the Christians responsibility to eliminate poverty, hunger, and unjust societal actions that contribute to the oppression of other humans.

The position is taken that to oppress others and not to identify with the poor is being disobedient to God. Whereas much is heard in the average church about tithing, relatively little if anything is noted regarding two economically related items mentioned in this section. These are the Jubilee Principle and the Sabbatical Year.

In Leviticus 25 the Jubilee Principle is set forth. Every fifty years all land was to be returned to the original owners. It is the position of Sider that such a principle was established by God to equalize land ownership. This action, it is suggested, would help to eliminate extremes of wealth that are so common today due to land ownership patterns, particularly in many third world nations.

The Sabbatical Year as found in Exodus 23 and Leviticus 25 is used as another example of God's concern for the poor and the disadvantaged. At the time of the Sabbatical Year Hebrew slaves were to receive their freedom and all debts were to be canceled.

One section of part two discusses the scriptural teaching regarding private property. Though private ownership of property would seem to be an accepted norm for followers of Christ, it is suggested by the author that "the Bible insists that God alone has an absolute right to property." (p. 115) For this reason care must be exercised in how one uses the possessions God has provided.

The second section contains many other biblical concepts that apply to the topic under consideration in the

book. It is very well researched and presented. God's concern for the oppressed cannot be overlooked after reading this material and examining scripture.

Only one sub-section of one chapter in this section is questionable as to its inclusion in the book; it is entitled "Is God a Marxist?" (p. 72) Upon reading this title this reviewer was most anxious to see how such a profound question would be handled. It seems that the question was in no way addressed by the material presented. Reference was made to the destruction of Sodom and Gomorrah and to the story of Lazarus and the rich man, but no relationship or reference to Marxism was discussed.

In the third section of the book various measures are suggested that need to be taken to correct the abuses found in society and to help eliminate poverty, hunger, and human oppression. Individual actions are presented, corporate activities that the church should take are outlined, and then changes that need to be made in institutional agencies and activities are suggested. All measures outlined in this section would be considered quite radical by most people. They are not simple, easy ineffective actions. They are dynamic and lifestyle changing.

On an individual basis the author is convinced we must learn to live a simpler lifestyle. Christians must get by on less. The resources of our world should be shared with the oppressed, the hungry, and the poor. The basic mechanism presented for doing this is a graduated tithe. This measure would provide more funds for Christian causes as one's income increases. Basically the Christian is encouraged to select a base amount at which to start. The author notes that he has selected \$8000 as a base for a family of five. A ten percent tithe will be given on this amount. For every additional \$1000 income an additional five percent tithe will be given.

It is refreshing to see where this writer feels the money should go. So often in discussions of biblical giving it is suggested that the tithe must go to the local church. This kind of mentality only adds to the wealth invested in the American churches. There is little need for bigger church buildings, more buses, enlarged sports programs, and bigger and better fellowship meals in an age of world-wide hunger. Sider feels the money must be used to feed the hungry, encourage rural development in the Third and Fourth World nations, for emergency relief, and to work for societal structural change. This is excellent thinking gained from biblical insight and must be accepted by anyone seeking to follow the plan of God in their lives and in society.

The book suggests that within the community of the church Christians are "unconditionally liable for and accountable to each other." The concept leads to a variety of different action patterns. The author feels that Christians should come together in small groups to discuss reduced lifestyles, family finances, and to evaluate each others' annual budgets. It is also suggested that Christians might be encouraged to purchase houses within a block or two of each other. This would make it easier to share cars, lawnmowers, washers, dryers, garden tools, etc.

Lastly the book suggests that structural change in society is necessary. "Christians should exercise political influence to implement change in society at large." (p.

206) Several examples of change that need to be made are presented. Elimination of tariff barriers by the United States on developing nations is one example. The need for new international food policies are discussed. International aid programs must focus upon integrated rural development that will increase agricultural productivity, provide health care, and educational services rather than upon provision of more armaments.

Without any question the various suggested actions in this book will seem radical to most Christians. Yet the author must be commended for the positions he has taken. Most other books on the topic of overpopulation, hunger, and poverty define the problems well, probably more completely than Sider. However, they usually leave one with an empty feeling of "what can I as an individual do?" We then take an offering at the church, over and above what is expected to be given to the already well-to-do American church, and our consciences are pacified. Sider goes far beyond and pleads for a change in personal, corporate church, and societal lifestyle.

One may not be able to incorporate every plan of the author. It might be possible to raise serious questions as to the practicality of some suggestions. Yet every reader should begin to think about the overall concept of personal, corporate Christian, and societal lifestyle and act as God would have him do. This book provides an excellent impetus for such thinking. It should be read *and discussed* by every Christian in North America, not just those who already are aware of the problems presented in the book.

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**GENESIS ONE AND THE ORIGIN OF THE EARTH** by Robert C. Newman and Herman J. Eckelmann, Jr., Intervarsity Press, Downers Grove, Illinois (1977). Paperback. 156 pp. \$3.95.

Theories on the origin of the earth in the context of science and the biblical revelation fall into two general categories: (a) those involving instantaneous creation of a young earth and all that is in it, and (b) those involving natural process as the scientifically describable means by which God accomplished His purpose. The authors, a professor of New Testament at the Biblical School of Theology in Hatfield, Pa., and the pastor of a church in Ithaca, New York, respectively, describe themselves as considering "the Bible to be the authoritative, inerrant revelation of God." This leads them to believe that the Bible provides accurate information about scientific mechanisms "in the non-technical vocabulary of ancient Israel." These same authors, however, are respectively a Ph.D. in astrophysics from Cornell University and a research associate for many years with the Center for Radiophysics and Space Research at Cornell University, and hence they are among those who hold to an ancient earth, many billions of years old. This dilemma, faced also by Dr. Davis Young in *Creation and the Flood*, leads inevitably to an apparently viable intermediate position: "progressive creationism." It is the opinion of this reviewer, however, that this position is difficult to de-

fend, suffering the weaknesses of both positions (a) and (b) above with few of their strengths, and forming no more than a way station on the progression of thought from position (a) to position (b).

The text written by the authors occupies only 88 pages of the book, the rest being taken up by three lengthy appendices by other writers. The authors fairly generally demolish the foundations of a young earth position. They do this scientifically by considering the evidence from light travel-time, expansion of the universe, stellar structure, and meteorites and lunar material, leading to the conclusion that

according to these methods, the universe and our galaxy would be 15 billion to 20 billion years old, the sun 5 billion to 10 billion years old and our solar system about 5 billion years old. (p. 30)

To this evidence the authors add both radioactive and non-radioactive geological data, citing for the latter the paper by Daniel Wonderly, *Journal ASA* 27, 145 (1975), which is reproduced in its entirety as Appendix 1. Following this the authors summarize the data that must be taken into account in models describing the origin of the solar system.

Next the authors turn their attention to the biblical evidence usually advanced in support of a young earth and proceed to demolish this. They show that the Genesis genealogies cannot be used to date the origin of Adam and include as Appendix 2 a lengthy paper on "Primeval Chronology" written by William Henry Green, Professor of Old Testament at Princeton Seminary in 1890. Interpreting Genesis 2 as a detailed description of the events that took place during the 6th day of creation, they argue that 24-hour days are out of the question, and include as Appendix 3 a paper by R. John Snow, pastor of the Geistown Grace Brethren Church of Johnstown, Pa., to this effect.

When it comes to establishing their own theory of progressive creationism, the authors are less convincing. They seem to go out of their way to distort the Genesis record by proposing that

we are living in the creative period which intervenes between the sixth and seventh days, and that God's activity in this period is principally the creation of a redeemed mankind. (p. 66)

Following a pattern reminiscent of the dispensational insertion of the entire church age as a parenthesis before the 70th week of Daniel, the authors propose that the entire period of solar system history is a parenthesis before the seventh day of God's rest. This problem and others similar are the consequence of trying to impose a modern scientific model of the origin of the solar system upon the Genesis record without paying attention to the probable purpose of the author of this record, the significance of this account for the faith of Israel, the nature of the literary discourse involved, or the type of questions for which meaningful answers should be sought in this record. The attempt to harmonize modern science with the details of Genesis 1 requires a whole host of *ad hoc* assumptions that are not themselves derivable from the biblical text:

the account (Genesis 1:1) says that God first created the heavens and the earth, or at least the material from which he later gave them final form. (parenthesis and italics mine) (p. 69)

we suggest that Genesis 1 gives a description of what the various creation events would have looked like to an earthbound observer had one been present to see God's work. (p. 69)

we suggest that the earth at this point in the narrative (Genesis 1:2) is not yet a solid body, but is shapeless and empty, perhaps even invisible. (parenthesis mine) (p. 70)

we suggest . . . that the earth, a shapeless empty cloud, becomes dark as contraction raises the density enough to block out starlight. (p. 71)

A good fit may be made with the scientific model proposed in chapter 4 if this (*tehom*) is understood as a description of the gas cloud, now a dark, cloudy and unfathomable region of space. (p. 71)

Such hypothetical eisegesis continues for the entire Genesis 1 record. Nowhere is this more strained than when the authors seek to harmonize Genesis 1:3,4.

From the viewpoint of an observer riding along with the material of the earth as it is being formed, this is just what our scientific model would predict. When the gas cloud first begins to contract, the observer can see stars outside (not mentioned in Genesis). Later the contraction becomes sufficient to absorb light from outside the cloud, and the observer within is in the dark ("darkness was over the surface of the deep"). After further contraction and heating, however, the whole cloud lights up and the observer, immersed in light, can see no darkness anywhere ("and there was light"). Then, when the observer follows the equatorial band of gas and dust out from inside the cloud, both darkness and light are simultaneously visible. (p. 73)

Thus the authors argue that

the "days" of Genesis 1 are twenty-four-hour days, sequential but not consecutive, and that the creative activity largely occurs between days rather than on them. That is, each Genesis day introduces a new creative period. (p. 74)

In his appendix paper Snow quotes approvingly from Charles Hodge: "If the ordinary sense brings the Mosaic account into conflict with facts, and another sense would avoid such conflict, then it is obligatory on us to adopt the other." Would that the authors had followed this injunction, recognizing that there are more options than those envisioned by Snow,

Among those who hold to the inspiration of Scripture, the battle over the interpretation of Genesis 1 has tended to narrow down to the question of whether the days of God's creative activity were literal, twenty-four-hour days or figurative days of greater length. (p. 125)

By not recognizing that a far more basic view of the purpose, message, and significance of Genesis 1 may need to be taken than suggested by this narrow limiting of choices, the authors are constrained to push and pull the scientific and biblical records.

The book deserves note as another case where authentic knowledge of science forces men of integrity to forsake the apparently easy solution of a young

earth, even when this solution would fit so much more readily with their presuppositions about the interpretation of the Genesis record. Many readers will not be content to rest at this non-equilibrium attempt to harmonize the unharmonizable, however, but will seek instead for a more satisfying and authentic interpretation of the Genesis account.

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**WAY OUT** by Denis Osborne, InterVarsity Press, Downers Grove, Illinois, 1977. 95 pp. 4 1/4" x 7" paperback.

This little pocket-sized book by a worker in the Ministry of Overseas Development in Great Britain, formerly professor of physics in the University of Dar es Salaam, is subtitled, "Some parables of science and faith." It consists of some 25 "chapterettes," none more than 5 pages long and generously illustrated, dealing with perspectives on science and Christian faith after the pattern of Donald MacKay in *The Clockwork Image* or my own *The Human Quest* in a charming easy-to-read style.

Starting off with "a report by Andromedan space-men" returning from a trip to earth, who could discern only paper and ink in a earth newspaper and missed completely the presence of "the news," Osborne presses on through other parables involving three brothers answering "Why?" questions, house plans, letter sequences, Flatland, books and bodies, a soccer match, "God is Nowhere" vs "God is Now here," dreams, pictures in the snow, and countdown to blastoff.

Containing nothing new, still this book packages an authentic perspective on science and Christian faith in an ideal form for students and discussion groups.

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**CONFRONTING THE CULTS** by Gordon R. Lewis, Presbyterian and Reformed Publishing Co., 1975. 198 pp. Paperback.

Originally published in 1966, this helpful book was reprinted in 1975. The author, Professor of Theology at Conservative Baptist Theological Seminary in Denver, Colorado, considers six cults: Jehovah's Witnesses, Latter-Day Saints, Christian Science, Seventh-Day Adventists, Students of Unity, and Spiritualism. What makes the book particularly helpful is that it is written as a manual of how to respond and relate to advocates of these cults. Each chapter takes the form of cultic and biblical answers to seven major questions: (1) Do you base your teachings on revelations or secret writings other than the Bible? (2) Is your primary task preaching the gospel? (3) Do you believe that Jesus is the Messiah, the Christ, the anointed one of God who has come in the flesh? (4) Do you believe that Christ's shed blood is the only basis for the forgiveness of your sins? (5) Do you believe that Jesus rose from the dead? (6) Are you personally trusting Jesus Christ as your own redeemer and Lord? (7) Do you depend upon some achievements of your own for your salvation, or is your trust exclusively in the grace of God?

This is a useful manual to enable you to witness ef-



fectively at the front door—yours, when cultic visitors ring your bell!

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**CREATION BY NATURAL LAW** by Ronald L. Numbers, Seattle: University of Washington Press, 1977, xii + 184 pages, \$15.00.

Subtitled "Laplace's Nebular Hypothesis in American Thought," this scholarly work treats the reaction of 19th-century scientists in the United States to a theory of how the solar system originated, proposed by P. S. Laplace in 1796. A translation of Laplace's original publication is given as Appendix 2 of the book: the argument is that the operation of known physical laws would produce the present solar system from diffuse matter. Separate creative acts by the "Author of Nature" are excluded.

In chapters 1 through 6, Numbers details those discussions of the Nebular Hypothesis that considered the physical and astronomical evidence for or against it. In chapter 7, "Design and Providence," he quotes from numerous writers who argued that the Nebular Hypothesis was consistent with the Christian doctrine of creation. The next chapter, "The Mosaic Story of Creation," treats several 19th-century interpretations of Genesis 1, most derived from attempts to harmonize the Mosaic account with scientific ideas, and also the controversies that arose. In chapter 8, "The Nebular Hypothesis in the Darwinian Debate," Numbers argues that the acceptance American intellectuals had given to Laplace's hypothesis prepared them for acceptance of Darwin's theory of evolution. The book closes with an appendix on denominational attitudes towards these hypotheses of science, as evidenced by contemporary articles in the official denominational journals. Numbers refers to approximately 400 original 19th-century publications and some twenty manuscript collections in the course of his work. He mentions that it was developed from a doctoral dissertation guided by A. H. Dupree, the biographer of Asa Gray.

In his preface, Numbers declares that in the 19th century "scientific accounts of creation by natural law supplanted the religious myth of a world created by divine fiat". While that statement sounds distasteful to Christians, nevertheless in his book Numbers lets the writers he cites speak for themselves. The Christian reader will find, for example, expositions of how God's creative power is now seen in His constant sustaining of the world. It is particularly interesting to discover how many of the arguments we hear today, about what Genesis 1 means, were already in print by 1850. Potential writers on the subject might do well to peruse R. L. Numbers' study.

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*For a former review, see Journal ASA, December (1977), p. 186.*

JUNE 1978

**THE PSYCHOLOGY TODAY OMNIBOOK OF PERSONAL DEVELOPMENT** by Katinka Matson, William Morrow, New York, 1977, hard cover \$12.50, paper \$6.95, 500 pp.

This is a little encyclopedia of the human potential movement, which, according to its compiler-authoress, "documents all the different ways you can think about yourself and experience yourself," hence, the *omni*-prefix in the title.

While it is quite comprehensive and informative, the *Omnibook* has several irritating features for those professionals who think about themselves in terms of orthodox Christianity. There is an excessive emphasis on transpersonal experiences without an equal emphasis on more traditional religious experiences. There is the inclusion of faddish physical fitness programs whose inclusion in what is essentially a psychological reference book is questionable. There are many articles that are little more than summaries of pop-writings (a carry-over, perhaps, from the increasing emphasis of *Psychology Today* magazine).

It can be argued, of course, that transpersonal emphases, physical fitness programs of all sorts, and pop psychology each reflects the personal development theme of the volume; however, such an *Omnibook* should then include the activities and views of myriad charismatics, healers, and pop-mystics such as Kathryn Kuhlmann and Oral Roberts, which Matson's book does not.

In a less popular vein, nothing is said of Gordon Allport's classic contributions to the psychology of religion, although an article on Allport appears. While the book demonstrates its religio-philosophical range with the inclusion of articles on Georges I. Gurdjieff and Ludwig Wittgenstein, any mention of William James is noticeably absent.

Existentialism is presented with a strong bias toward an atheistic interpretation via Sartrean analysis, but nothing beyond mere mention is made of the more theistic stance of Gabriel Marcel or Henri Bergson. Furthermore, the author questionably implies that Soren Kierkegaard arrived at an anti-Christian position in his critique of Danish Christendom and his drive toward a philosophy of personal subjectivity.

The only mention of Jesus, whom Christians would minimally uphold as the model of personal development, is a note that he, like another Judeo-Christian model, Moses, practiced fasting.

Protestant theological thought is given short-shrift in this volume. Articles are included covering Martin Buber, the Jewish mystic, and Pierre Teilhard de Chardin, the Jesuit paleontologist and cosmologist, but the closest approximation to a protestant theologian appears in the article on Rollo May. Certainly an article on Tillich, Barth, Bultmann, or Bonhoeffer, whose writings show sympathies with the themes of human potential, would have been an intelligent inclusion.

From the perspective of the psychology of religion, which certainly has an interest and stake in human personal development, the *Omnibook* isn't so *omni*!

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## Science and The Cultural Metasystem

It is a commonly held assumption of our age that science is autonomous with respect to the rest of culture; it has a life of its own. From that premise it is argued that only science provides a way of finding truth and, therefore, of solving the many urgent problems the world faces. Science and its partner technology are seen as independent from the rest of mankind's cultural heritage. This viewpoint has recently been challenged by Victor F. Weisskopf. He has . . .

"pointed out that science itself has its roots and origins outside its own rational realm of thinking. In essence, there seems to exist a 'Goedel Theorem of Science,' which holds that science is only possible within a larger framework of non-scientific issues and concerns. The mathematician Goedel proved that a system of axioms can never be based on itself: in order to *decide* upon its validity, statements from outside the system must be used. In a similar manner, the activity of science is necessarily embedded in a much wider realm of human experience."

The methodologies, tactics, and presuppositions of science cannot be based entirely upon science: in order to decide upon their validity resources from outside science must be used. As an example science often uses the criterion of simplicity in evaluating theories; does not the justification come from the belief that the universe is harmonious and beautiful, a view long held to be true by philosophers, religious prophets, and artists? This embedding of science in a matrix of general human values taken from the larger culture is schematically illustrated in Figure 1. Also shown is the relationship between science and technology.

What are some of these basic presuppositions, human values from outside science that nourish the vitality of science? A representative collection is now presented; it is by no means to be considered exhaustive.

### *Science's Metasystem: Some Component Human Values*

1. The scientist-philosopher Michael Polanyi has argued that science is upheld by certain basic premises of the society that it is embedded in. These are restated by Richard Gelwick<sup>7</sup> as follows:

- a) "The first of the premises is the belief in obtaining the truth by free discussion and free inquiry. Every scientist is a part of the government of science and participates in the formulation of ongoing scientific understanding. There is no absolute central authority to arbitrate controversy. Issues are settled by debating them in the forum of scientific opinion. This manner of settling disputes and establishing consensus is a heritage common to our general democratic institutions."
- b) "A second and corollary premise is a belief in the reality of the truth and in our obligation and capacity to discover it. A community that resolves its disputes by free discussion and inquiry is dependent upon the belief that humans can recognize and share a rational and universal standard."

It is interesting to note that members of the scientific community

have been among the most outspoken in denouncing the lack of freedom in their totalitarian countries.

2. From the standpoint of the Judaic-Christian religion one can find much to support the scientific enterprise.

a) Pilate asked Jesus, "What is truth?" But earlier in his life Jesus made a significant statement concerning truth: "Seek the truth and the truth will set you free." Could not part of the general meaning of this statement be that the greater the understanding one has of nature, the more one will be able to control nature and use it for useful purposes? More generally, everything that a person learns makes him less susceptible to control. People with knowledge are necessarily harder to manipulate than those who lack it. Indeed the truth does make us free.

b) Again and again in the Old Testament the trustworthiness of God is seen to be responsible for the order and regularity present in the universe. To quote one such passage:

"Yes, thus says Yahweh, creator of the Heavens, who is God, who formed the earth and made it, who set it firm, created no chaos, but a place to be lived in . . . I have not said to Jacob's descendants, 'Seek me in chaos.' I Yahweh speak with directness I express myself with clarity."

c) "When we compare this train of thought (science) in Europe and the attitude of other civilizations when left to themselves, there seems but one source of origin. It must come from the Medieval insistence of the rationality of God, conceived with the personal energy of Jehovah and with the rationality of a Greek philosopher. Every detail was supervised and ordered; the search into nature could only result in the vindication of the faith and rationality. Remember that I am not talking of the expressed beliefs of a few individuals. What I mean is the impress on the European mind of the rising of the unquestioned faith of centuries. By this, I mean the instinctive tone of thought and not a mere creed of words . . ."

3. Copernicus was one of the founders of modern science. What factors motivated him in creating his sun-centered model of the universe? The following four quotes from his masterpiece *De revolutionibus* make abundantly clear that he was motivated by the conception that the universe was to be considered harmonious, beautiful and of much value to man.

a) "Among the many and various studies and arts which give the satisfaction and nourishment to the mind this, in my opinion, we should first of all devote ourselves to and most ardently cultivate which are in the realm of beautiful things and most worthy of knowing. Such are the sciences which are concerned with the celestial movements in the world, with the course of stars, their magnitude and distances, their rising and setting and the cause of other phenomena in heavens, and which finally explain the whole form of the world. And what is more beautiful than the heavens which contain everything that is beautiful?"

The names themselves: *Caelum* and *Mundus* are an evidence, of which one signifies purity and ornament and the other a work of a sculpture. It is because of its exceptional beauty that many philosophers call the heavens simply the visible deity."

b) "Nothing is more repugnant to the order of the whole and the form of the world than a thing that is out of its place."

c) "In the middle of all resides the sun. In this most beautiful temple could we have a torch in a better and different place than the one from which it can simultaneously illuminate everything? Because of this some call it the lantern of the world, others its reason, still others its ruler."

d) "In this order we have thus found an admirable symmetry of the world and an established harmonious relationship between the movement and the magnitude of the spheres which could not have been found in any other way."

4. Niels Bohr, in developing his much-disputed complementarity interpretation of the wave-particle duality of quantum mechanics, was deeply indebted to the philosophers, William James and Kierkegaard. William James defines the complementarity nature of psychological research in this way:

"It must be admitted, therefore, that in *certain persons*, at least, the *total possible consciousness may be split into parts which coexist but mutually ignore each other* and share the

objects of knowledge between them. More remarkable still, they are *complementary*. Give an object to one of the consciousnesses, and by that fact you remove it from the other or others. Barring a certain common fund of information, like the command of language, etc., what the upper self knows the under self is ignorant of, and *vice versa*.”

Of Kierkegaard's concepts as related to Bohr's, G. Holton points out that:

“Kierkegaard's stress on discontinuity between incompatibles, on the 'leap' rather than the gradual transition, on the inclusion of the individual, and on inherent dichotomy was as 'nonclassical' in philosophy as elements of the Copenhagen doctrine — quantum jumps, probabilistic causality, observer-dependent description, and duality — were to be in physics.”

The following remarks, taken from the report of a conversation of Bohr's show how events in Bohr's life taken from everyday experience opened Bohr's eyes to see the complementarian concept:

“The talk turned entirely on the complementarity between affect and thought, and between perception and reflection. (Bohr) told me that he had become aware of the psychological

depths of the concept of complementarity when one of his children had done something inexcusable for which he found himself incapable of appropriate punishment: 'You cannot know somebody at the same time in the light of love and in the light of justice.' I think that these were almost exactly the words he used. He also — talked about the manner in which introspection as an act dispelled the very emotion that one strove to describe.”

Clearly a part of reality far outside that of modern physics played a role in Bohr's understanding of physical science.

#### Some Implications of a “Generalized Goedel's Theorem”

A quite general analogy can be made with respect to “Goedel's Theorem.” No single system of concepts whether they be of science, art, religion, or other is sufficient unto itself. Concepts from outside the given system are always required to decide upon the truthfulness of some components of the system. This state I will call the “Generalized Goedel's Theorem.” As Weisskopf asserts:

“Human experience encompasses much more than any given system of thought can express within its own framework of concepts. We must be receptive to the varied, different, and apparently contradictory ways of the mind when we are faced with the reality of nature, of our imaginations, and of human relations. There are many ways of thinking and of feeling; each of them contains some parcel of what we may consider the truth. The recognition of the multifaceted character of our relations to each other and to the rest of nature is a necessary step toward groping with the problems of life and toward fathoming the potential greatness of human existence.”<sup>10</sup>

If truth is contained in the “Generalized Goedel's Theorem,” it has deep applicability with respect to the educational process particularly at the undergraduate level. A narrow specialization results in a person who is not fully able to cope with the problems of modern society. He runs into concepts whose truthfulness is not clear; input from outside the discipline he is trained in is needed. With respect to developing an educational philosophy in keeping with these thoughts Pascal has put it well:

“Since we cannot be universal and know all that is to be known of everything, we ought to know a little about everything. For it is far better to know something about everything than to know all about one thing. This universality is the best. If we can have both, still better; but if we must choose, we ought to choose the former. And the world feels this and does so; for the world is often a good judge.”<sup>11</sup>

As a further application the environmental crises can, I believe, be traced back to its roots as a failure of modern man to recognize the implications of the “Generalized Goedel's Theorem.” Environmentally important actions based upon the precepts of one discipline have ignored vital insights from other disciplines. Indeed the science of ecology has clearly pointed out that nature is an integrated whole, with most components related to one another, thus actions taken with respect to one component affect other components as well.

“Science and technology comprise some of the most powerful tools for deeper insight and for solving the problems we face—some of these problems, indeed, were created by the thoughtless application of those very tools. But science and technology are only one of the avenues toward reality; others are equally needed to comprehend the full significance of our existence. We will need all approaches to deal with the predicaments of humanity that prevent so many of our fellow beings from having a life worth living.”<sup>12</sup>

#### References

- <sup>1</sup>Victor K. Weisskopf, “The Frontiers and Limits of Science,” *American Scientist*, Vol. 65, No. 4, 1977, p. 411.
- <sup>2</sup>Richard Gelwick, *The Way of Discovery*, Oxford University Press, New York, 1977, pp. 45-46.
- <sup>3</sup>The New Testament, John 8:32.
- <sup>4</sup>The Old Testament, Isaiah 45:18-19.
- <sup>5</sup>Alfred North Whitehead, taken from N.H. Steneck, editor, *Science and Society*, The University of Michigan Press, Ann Arbor, 1975, p. 402.

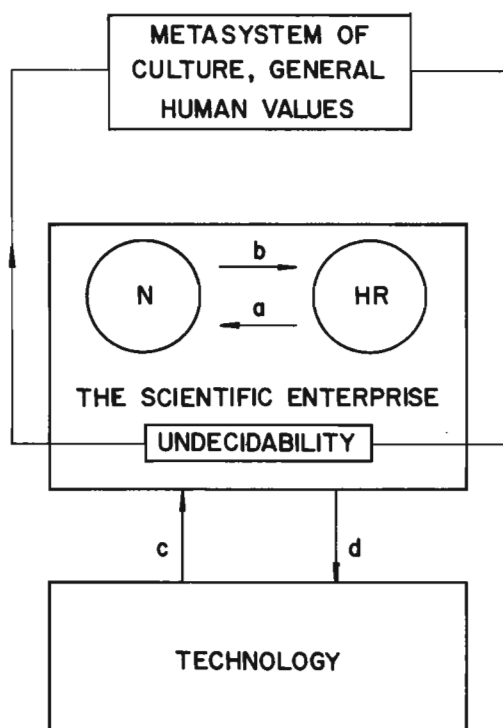


Figure 1. The embedding of science in the metasytem of general human values and the relationship of science to technology.

**THE SCIENTIFIC ENTERPRISE** — The attempt to understand nature. It is represented by the indicated cyclic process.

N - Nature. It possesses a “simple” intelligible structure.

HR - Human Reason. The cognitive powers of man.

a - Human reason guides the exploration of nature.

b - Nature's behavior modifies human conceptions of nature.

**UNDECIDABILITY** - Basic questions of science that are not decidable from within science.

**METASYSTEM OF CULTURE, GENERAL HUMAN VALUES** - The text presents a representative matrix of human values. These values assist the scientist in deciding upon the validity of certain scientific premises.

**TECHNOLOGY** - The devising of actions taken for material advantage.

c - Technology providing science with new materials and instruments. New instruments mean new observations for science.

d - Technology drawing upon the scientific “well” of basic understanding and physical principles.

<sup>6</sup>Quotes taken from Henryk Skolimowski, *The Moral Dilemmas of Modern Science*. Article contained in Steneck, *Ibid.*, pp. 132-133.

<sup>7</sup>Gerald Holton, *Thematic Origins of Scientific Thought*, Harvard University Press, Cambridge, Massachusetts, 1973, pp. 141-142.

<sup>8</sup>Gerald Holton, *Ibid.*, p. 146.

<sup>9</sup>Gerald Holton, *Ibid.*, p. 149.

<sup>10</sup>Victor K. Weisskopf, *Op. Cit.*, p. 411.

<sup>11</sup>Blaise Pascal, *Pensees*, The Modern Library, New York, 1941, P. 14.

<sup>12</sup>Victor K. Weisskopf, *Op. Cit.*, p. 411.

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## Play It Again Sam — Creation/Evolution in California Education

The following Assembly Concurrent Resolution No. 87 was introduced into the California State Assembly on January 9, 1978 by Assemblyman Dannemeyer of Fullerton.

- 1 WHEREAS, It appears that most, if not all,
- 2 state-supported educational institutions require students
- 3 to take courses in which naturalistic concepts of evolution
- 4 are taught as scientific explanations of origins of the
- 5 universe, life, and man; and
- 6 WHEREAS, Evolution is not demonstrable as scientific
- 7 fact or testable as a scientific hypothesis, and therefore
- 8 must be accepted philosophically by faith; and
- 9 WHEREAS, There is another concept of
- 10 origins - namely, that of special creation of the universe,
- 11 life, and man by an omnipotent personal Creator - which
- 12 is at least as satisfactory a scientific explanation of origins
- 13 as is evolution, and is accepted as such by a large number
- 14 of scientists, and other well-informed people; and
- 15 WHEREAS, Many citizens of this state believe in the
- 16 special creation concept of origins and are convinced that
- 17 exclusive indoctrination of their children in the
- 18 evolutionary concept (including so-called "theistic"
- 19 evolution) is inimical to their religious faith and to their
- 20 moral and civic teachings, as well as to scientific
- 21 objectivity, academic freedom, and civil rights; and
- 22 WHEREAS, Even most citizens who are not opposed to
- 23 the evolution concept at least favor a balanced treatment
- 24 of these two alternative views of origins in their schools,
- 25 thus allowing students to consider all of the evidences
- 26 favoring each concept before deciding which to believe;
- 27 now, therefore be it
- 28 *Resolved by the Assembly of the State of California, the*
- 29 *Senate thereof concurring*, That the Department of
- 30 Education and the State Board of Education is hereby
- 31 requested to recommend to all state-supported
- 32 educational institutions that a balanced treatment of
- 33 evolution and special creation be encouraged in all
- 34 courses, textbooks, library materials and museum displays
- 35 dealing in any way with the subject of origins, such
- 36 treatment to be limited to the scientific, rather than
- 37 religious, aspects of the two concepts.

Thus is resurrected on the political scene a debate that took place in California within the State Board of Education in 1972 and 1973. Facing at that time the suggestion that the teaching of creation be added to science instruction, the State Board with the advice of Christian faculty in science wisely decided not to add a basically religious teaching (creation) to the science curriculum, but rather to remove from the science curriculum such non-scientific dogmatism as constituted a scientismic "religious" approach. Thus the integrity of both scientific and religious perspectives was preserved. The charge to a Consultant Committee to the State Board of Education read,

That, on the subject of discussing origins in the Science textbooks, the following editing be done prior to execution of a contract (with a publisher): 1. That dogmatism be changed to conditional statements where speculation is offered as explanation for origins. 2. That science emphasize "how" and not "ultimate cause" for origins.

The Dannemeyer Resolution ignores the entire history of this effort, returns us back to square one with the same difficulties encountered in the past, and strives once again to accomplish for defenders of a special-creation view what they failed to accomplish previously. The Resolution is replete with misunderstandings and misstatements; Christians of whatever persuasion should value the integrity of science and their religious faith sufficiently to defeat this Resolution. Some specific comments follow, with reference to the line in the Resolution text.

3. To speak of naturalistic concepts of evolution is to suppose that "natural" is somehow necessarily opposed to God's activity in the world. This is a fundamental fallacy that interprets the availability of a description in terms of natural process as automatically excluding a description in terms of God's activity. Evolution is a theory of human science; it *must* by definition be described in natural concepts.

4. If science courses offer *ultimate* explanations for origins, then these explanations *should* be deleted. If science courses offer possible mechanisms for the origin of life and man in the form of scientific descriptions of historical events, this is right and proper.

6. No major modern scientific theory in flux can be demonstrated "as scientific fact." Even to use this phrase indicates a misunderstanding of the relationship between facts and theories.

7. Evolution is certainly testable as a scientific hypothesis.

8. All major modern scientific theories in flux must "be accepted philosophically by faith," if they are going to be accepted philosophically at all. Why is this essential? One of the purposes of science teaching should be to show the tenuous connection between scientific descriptions and grounds for philosophical acceptance.

9. To speak of "another concept of origins," is to suppose that another scientifically viable concept exists. Indeed it does: it requires one to say, "We don't understand it, but this just happened." This is always an option, but it is hardly a recommended approach for science courses.

12. Since "special creation of the universe, life, and man" is in no sense a "scientific explanation" at all, it can hardly be advanced as "at least as satisfactory a scientific explanation of origins."

13. That this view might be accepted by a large number of scientists (a highly debatable and questionable contention) is no more grounds for its acceptance than the counter view that a much larger number of scientists accepts evolution as an ultimate explanation and that therefore it must be the only view taught.

14. The opinions of "well-informed people" hardly constitute grounds for deciding on what is or is not science.

17. "Exclusive indoctrination" would be reprehensible and this is exactly what must be avoided. To include "theistic evolution" without a word of explanation is hardly responsible.

15-21. Note the dangerous precedent of having a group of citizens decide what should and should not be taught in a science course because they believe that a current view conflicts with their religious convictions. It is not science that must be held in check; it is misinterpretations or extrapolations of science into non-scientific realms.

24. Again the misstatement that we are dealing with "two

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alternative views of origins." There is no appreciation at all of the possibility that these are two alternative *modes of description* of origins, that, in fact, these two descriptions complement one another and do not contradict one another.

26. Again the false implication that a student must choose between a view which in effect states, "It just happened," and a view in which a tentative natural process is advanced that may describe how it happened. This is no choice at all; no science course could advocate "It just happened," as a responsible option.

36. If the treatment is limited to the scientific aspects of "special creation," treatment will be exceedingly brief; "special creation" is simply not assessible to scientific approaches. It is a religious interpretation of the scientific statement, "It just happened."

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