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"The fear of the Lord is the beginning of Wisdom." Psalm 111:10

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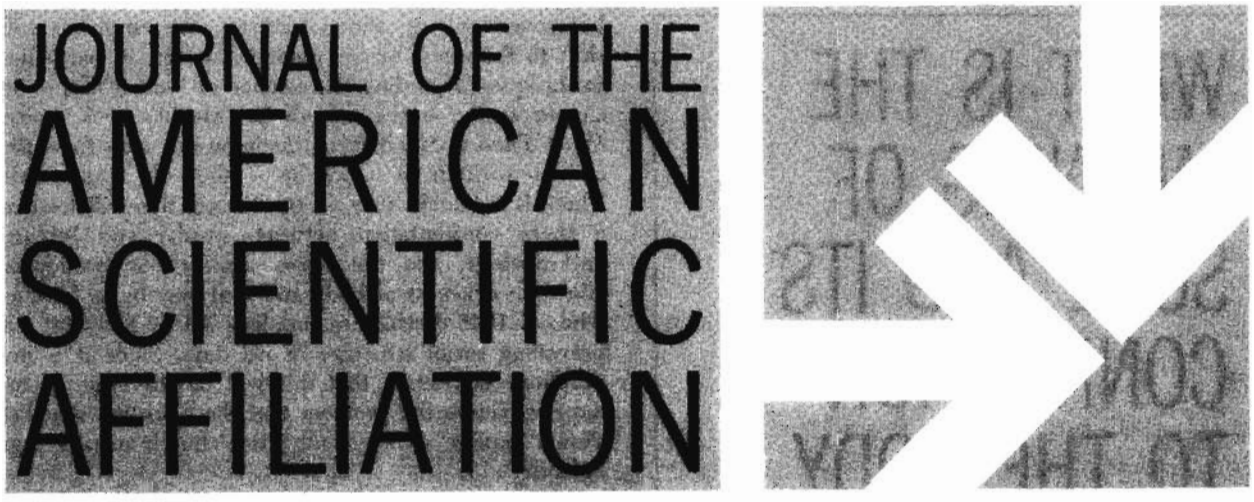

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WHAT IS THE MEANING OF SOUL AND ITS CONNECTION TO THE BODY

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In order to bridge the gap between the mental sciences and theology, we notice first of all that the concept of soul has no need for a supernatural connotation; on the contrary, it is identical with the concept of mind, preferred in scientific language. Soul and body are separate, distinguishable entities in ontological sense, but are united in inseparable existential connection. Man is body and soul, but man has spirit. After a brief psychological and physiological description of the soul, we discuss the origin of the soul and the issue of immortality versus resurrection. We adhere to the idea that man's soul is not immortal by nature; eternal life for the believer, is however, a gift of grace from God (Rom. 6:23) who alone is immortal (1 Tim. 6:15-16). The state between death and resurrection is discussed, following a pattern proposed by the theologian Cullmann.

For the order of the areas of encounter between science and religion, one can see a logical process of evolution. Some 300 years ago there was the first and major clash between Christianity and the physical sciences, when in 1633 the Clergy convicted Galileo and placed his major works on the Index of prohibited books. Despite this action, the battle was lost by the Church. Then, centuries later, the encounter moved to the biological sciences, and we are still in the battle field between creationists and evolutionists. Once this question is settled, and presumably with some recognition by the church of a process of selective evolution or speciation – be it in my opinion of a non-random but sovereignly governed nature–, the emphasis will shift to the realm of the mental sciences, in particular to the quest regarding the essence of human life; or in simple words, as the title of Dr. Meehl's book reads: *What Then is Man?* What distinguishes man from the animal world from which he – allegedly – evolved? There is no doubt that, in the future, this will lead to a sharp confrontation between secular and biblical anthropology, and the blows against our traditional Christian concepts of body and soul may be as hard as when in 1848 dialectic materialism led by Marx hit the prevailing social structure of his days. Since it is my prophetic conviction that this will be the clash of tomorrow, this is the problem that the Christian scientist should explore today (sadly, the church usually lags behind . . .).

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The Issue in History

The problem of human life has been studied at least since the time of Plato and Aristotle with some impact on the Church from time to time. For instance, the dilemma of *trichotism*[1] (man as body, soul and spirit) versus *dualism* (body and soul) was settled on the fourth Council of Constantinople (869/70 A.D.) with a vehement rejection of the tripartite division of man by the Roman Church of those days. The emerging dualistic view of man has been strictly adhered to by the Roman Catholic Church since; the reformers, both Calvin and Luther, mostly followed this same view.

There are only a few texts in the New Testament which seemingly support the trichotism hypothesis, like 1 Thess. 5:23: "May the God of peace sanctify you wholly; and may your spirit and soul and body be kept sound and blameless at the coming of our Lord Jesus Christ".[2] Conservative scholars like Scofield have interpreted this text as "man being a trinity".[3] However, we rather go along with Calvin who does not put the concept spirit in this text on an equal footing with the body and soul – from which it is separated by a special conjunction "and" – arguing that this would contradict Paul's entreaty "atqui tunc absurda esset Pauli precatio". Though much remains to be said, we presume that trichotism is a concept of the past and is alien both to biblical and secular anthropology.[4]

The dualistic conception of man, adhered to by Catholics and most Protestants as we saw above, has had a relatively quiet existence until, at the end of the previous century, the view of *materialistic monism* vastly gained territory. In this view, which in one form or another is already found with some Greek philosophers (Thales, Democritos), man is a substantial, organic body and the soul is only to be viewed as a limit of reality, being a product of biological processes in the body. Two outspoken representatives of this view are Karl Vogt and the zoologist, Ernst Haeckel.[5] Vogt's book "Köhlerglaube und Wissenschaft" (Superstition and Science) of 1855 denounces the soul as an independent part of the human being in the strongest terms: "the thoughts have about the same relationship to the brain as the gall has to the gall bladder or the

urine to the kidneys"! Less rude, but even more pressingly, this was stated by Haeckel in "Die Welträthsel" (The Riddle of the World) of 1899: "What is called 'soul' is a natural phenomenon (Naturerscheinung). Thus, psychology is but a branch of physiology. The basis of all mental processes both in man and animal is a protein like carbon complex, called 'psychoplasma'. What we denote as impressions, actions, reflexes, memories, instincts and finally views, emotions, motives, decisions, and ultimately and even what we call consciousness, is nothing but a function of that plasma occurring in living animal organisms (including man), in various differentiated form. . . . subject to the one law of moved and moving matter. 'Psyche' is just the collective concept of these functions. The soul exists (i.e. the start of these functions occurs) at the moment of conception when the embryo is formed; in this way she is inherited".[6] I believe that this quotation illustrates beyond any doubt the meaning of materialistic monism in its most radical form. Some philosopher expressed this in a shorter form: Ohne Phosphor – keine Gedanke! (without phosphorus – no thought!).

The second kind of reaction to dualism is *spiritual monism*. To this view the soul is seen as only essence of human existence, from which matter emanates.

Before leaving this domain, I should remark that the above-mentioned monisms do not exhaust the possible counterparts to dualism. In fact, any theory that seeks a *common* ground for the existence of body and soul is opposed to abstract dualism as we inherited it from the Greeks and the early Church. In this respect I mention also Teilhard de Chardin. Teilhard assumes that psychic and physical processes are sustained by radial and tangential energy respectively. Evolution is for him no barrier to the formation of man, since a soul ("the within") is already present in latent (i.e. dormant) form in the non-organic matter.[7] Such philosophies are basically alien to dualistic views of man.

Definition and Re-evaluation of Concepts

Before proceeding with some more modern ideas, we should agree as to some concepts. One will have noticed that I have not yet referred to the concept "mind", as it is used in scientific or ordinary language. The reader will be disappointed that I shall not do so in the future either. As I see it, the concept of mind – not in the sense of memory, but as *bearer of the mental processes* – is prevailing in the Anglo-Saxon and Romanic literature. This may be nothing but an attempt to escape the confrontation with religion, to whom has been assigned the domain of "soul" (maybe to realise the Tertullian view of the third century A.D. "Anima naturaliter Christiana" – the soul is naturally Christian!). Thus, it can occur that the concept of soul has been removed from the scientific dictionary and shoveled into the hands of pastors and theologians who have gratefully acknowledged the soul in their treasure house of supernatural entities! Meehl, et al, say in this respect: "The Oxford English Dictionary (1933) gives 25 definitions and uses of the word soul, 23 of the word spirit, and 30 of the word body. Out of this surge of meanings, philosophy and more recently science, turned more and more to the analysis of the biological nature of man for more precise answers to the riddle of life. Anthropology became engrossed in the evolutionary ancestors of man to explain his mentality and culture. To the psychologist, engaged in objective and empirical study of behavior, *the concept of soul appeared speculative and the word has all but disappeared from the psychological literature*".[8]

To this easy way out of a possible conflict with religion I object for two main reasons. (1) In the Germanic European languages, soul is a non-sacred concept, has no supernatural connotation, and is used both in ordinary psychology or psychiatry and in theology. Thus, pastoral counseling and psychiatric counseling deal with the same functions in man. Examples from the German language in which "Seele" is soul:

Seelenkrankheit – mental illness
Seelenlehre – psychology
Seelenkundlich – psychological
Seelenleben – mental life
Seelsorge – spiritual (pastoral) care.

Similar parallels are found in Dutch. (2) Theology becomes sterile when it solely deals with concepts foreign to secular science. To put it more sharply: Jesus did not come to redeem a trancendental soul but body as observable by an anatomist, and mind (i.e. soul) as accessible to a psychiatrist. If a man is transformed by the Holy Spirit to a new creature, then this involves nothing more and nothing less than his old creature being body and soul. Thus, to avoid any misunderstanding, *we regard mind* (in the sense of locus of mentality) *identical with soul.*

Before we investigate closer what we could mean by soul, we should dwell for a moment on another concept, common to secular and sacred science, viz. *spirit*. Meehl, et al, define spirit as a "fruit, an outcome of the individual's life and experience". We prefer the pointedness of Karl Barth when he says: Man *is* a soul-body structure, but man *has* spirit.[9] The spirit is not an existential part of man; it is not even a created part! Spirit *is* not just, but *occurs*.[10] Spirit is an action, an activity or a relationship, always in the passive sense of these words (being not the actor, worker or relator). As such we have the spirit of love when we deal lovingly, the spirit of courage when we act courageously, or the spirit of God, if we are in the proper relation to God. This definition, by the way, does not violate the conception that God is Spirit, since (a) God is not a created part; (b) God is also a (supreme) Being; this statement is neutral to the history of mankind, however, until God "occurs" to them, i.e. comes into relationship with them. As the Bible says: "God is a Spirit *and* (here comes the relationship) those that worship Him must worship Him in Spirit and in truth." We leave Barth when he further states the necessity of the spirit for man in order to become a living soul-body. "Das der Mensch Geist ist könnte nur insofern richtig gesagt

werden, als er *durch* den Geist Seele und darum auch Leib, geistige Seele und insofern dann auch geistiger Leib ist".[11] When spirit is seen as a *conditio sine qua non* for the existence of man (and animal life [*loc. cit.*, p.432] we are awfully close to the pitfalls of spiritual monism or of trichotism.

Body and Soul

We now come to the main concepts, body and soul. To avoid being tagged as either materialistic monist or abstract dualist, I venture the dialectic statement: *body and soul are separate distinguishable entities in an ontological sense* (this is in accordance with classical theology) *but are united with each other in inseparable existential connection* (this is in contrast to classical theology).

What is meant by the soul? We could probably fill an issue with listing all definitions given by scholars of repute. I shall pick a simple one, viz. that of Spranger: The soul is the entire psychic life of man. As "Gestalt" psychologist Spranger stresses, the correspondences are between the bodily, morphological traits of man and his inner structure. Without defending this psychological system, the possibility of such a connection may be understood if we emphasize that the concept of soul has no meaning apart from the subject whom it represents. In Barth's anthropology this is empathically stressed: man is not just a soul, but he is *soul of his body* (Seele seines Leibes) and, in a more objective sense, we can only speak of *the soul of a body,* never soul per se. Thus, we close the door to witchcraft phantoms like disembodied souls or, as some put it, disembodied spirits who roam around through the skies or may be around your chimney pot!

The soul of a body is the bearer of all psychic activity. As such it is one's personality, individuality, etc. But we have not said what we mean by psychic activity. Putting it therefore slightly differently, I define the soul as the locus of all stimuli or responses that require an act of our will, emotions, or other conscious involvement. This definition does not preclude subconscious life. To see this, we should examine somewhat closer the location of the psychic activity. No doubt, this is mainly the brain and the nervous system though in ordinary language we assign part of this role to the heart (who loses his brain to a girl or boy? ?). The Bible uses the meaning of heart in the same sense. (Matthew 15:19: For out of the heart come evil thoughts, murder, adultery, etc.) We can take this as an anthropomorphism.

Going now one step further in a materialistic direction we can view the brain, the neuron chains, etc., as a large computer with input data, memory system, filtering system and output responses. We can trust the physiologists when they tell us that this computer is "run" by chemical secretions, tissue depletion, transport of DNA, etc. If now, in addition, we could have this computer run in a self-sustained spontaneous manner, e.g. by connecting a regenerative feedback between output and input, we would have reduced man to the role assigned to him by the materialistic monist. Furthermore, man's behavioral output would then be identical with the statistical ensemble average of all computers, being placed under identical constrained environment, though otherwise arbitrary. Psychology and theology would be reduced to the study of statistics and, lastly but not leastly, "grading on the curve" by university professors would for the first time attain scientific justification!

Being a dualist means postulating the existence of a soul that causes (*regulates*) a non-random output of the computer. We thus have conscious, individual life. Part of the output, however, can be random and we *may* refer to it as spontaneous or unconscious life. Other responses (e.g. instincts) may stem from "stored" data in the brain and could be tentatively called subconscious; i.e. no momentary, direct psychic stimulus is involved. With this picture we do not in the least mean to have given a mechanistic explanation of psychic life. At most, we have illustrated with a model some psychological concepts, on the meaning of which the last word has definitely not been said. We quote from Victor White.[12] "The boundaries of the unconscious, understood as the source of biological purposiveness and undirected mentation (including dreams) have yet to be discovered and are probably undiscoverable. The unconscious is at best a postulate, known (as is God according to Thomas Aquinas) only by its phenomenal effects. He is primarily a negative concept for what is not conscious. . . . Of his own conception of the unconscious Freud, in his last major work, acknowledges that it is not properly a theory at all, but a first attempt at a stock-taking of the facts of our observation. . . . He keeps as close as possible to those facts and does not seek to explain them. For Jung, the unconscious is a 'Grenzbegriff', a 'boundary concept', to describe that, into which, by definition, our consciousness cannot penetrate, but which yet often behaves as if endowed with consciousness, and often intelligence and purposeful volition".

The case against a materialistic monism is, as far as I have been informed, sufficiently proven by modern psychology. Recently, at a gathering in Dr. Elving Anderson's house, Professor McGeeves, visiting psychologist from Australia, stated that nowadays there are such perfected personality tests which can be repeatedly applied to a person in entirely different circumstances, thereby yielding the same definitive picture of a man's self, which we call soul.

Thus, while taking the view that *all* "soulish" activity, including religious thought, faith, etc. stem from physiological processes, we admit to the non-spontaneous nature of many of these processes, which we identify with life in the purest sense, more specifically with conscious individual life as manifest in the soul of a body. A much more complete and thorough philosophical discussion has been given by philosopher H. Feigl in a recent paper.[13] Feigl first describes the currently most acceptable view according to which there

is a correspondence (one to one or one to many) of mental states to neurophysiological process patterns. *Empirical* evidence for such a correspondence is more and more obtained. Feigl then resorts to what he terms an "identity theory", to face the soul-body relationship, i.e., the neurophysiological description and the mental description are two modes of viewing the same events. Feigl finally discards the meaning of psyche "in the traditional sense of a soul that could act upon the brain, let alone be separable from it." Agreeing fully with the last part of the statement (see below) we have argued against the first part of the statement to some extent. Yet, we dislike the phrase of letting the soul be the *agens vitalis* "acting on the brain". This violates our empirical knowledge of physical processes which are not in need of Thomas Aquinas' metaphysical "immovable mover". Therefore, it seems a better model to us to regard the soul as a filtering capacity.[14] Thus viewed, the neurophysiological processes are left alone to the laws of nature and the soul is that part of the system that provides for a non-random, selective output.

This short description hopefully suffices for the first part of our statement that stresses the *distinctness* and *particularity* of body and soul. Simultaneously, however, our appeal to the physiological processes, necessary for the delimitation of concepts, demands the second part of the statement, viz. that body and soul are *united in inseparable existential connection.* We can do no better here than quote from Adolf Portmann when, as a biologist, he comes to the following conclusion: "Whatever kind of soulish or spiritual form we may invent (for man), in the biological view like I present it here and like it has found widespread acceptance, mental or spiritual action is only acknowledged as a property of the living organism, being found only in the specific existence of the life substance, of protoplasm".[15] This view excludes the scientific meaning of soul outside the human body (or for that matter, animal body).[16] Thus, a conflict with the Church's conception of immortality may be at stake. We shall discuss this below.

Birth and Death; Eternal Life

Two final questions must be posed: (a) where does the soul come from and (b) where does it end up? With these problems we return to the realm of theology.

The Catholic viewpoint is that the soul is added unto man from God. (We clearly learned that recently from a wall Text when my wife was in a Catholic hospital to have a baby delivered.) The opposite theological view states that God *finished* his creative acts on the 6th day when Adam was created. Thus, direct creation of a soul, when a baby is born, should be excluded. If we believe with Haeckel that man's soul is formed at conception and thus inherited from his parents, we may have the right statement but still lack an explanation. For, no doubt, the genes that combine in the fertilized egg cell carry all physiological traits and psychological *predispositions*, as is also testified by what we call heredity, but it would be short to the dignity of human life to accept that all psychic activity were teleologically prearranged in the embryogenic state. Thus, we fail a complete answer. Theologically, it seems to us that Barth is right when he enunciates as a main theorem:[17] Man exists, as soul of his body, in that he is *founded, constituted and preserved by God.* This does not necessarily mean that God sends a soul at birth. But it does say that we must confess life as stemming from God. In this respect it seems to me that, *if* an era will dawn in which organic evolution will be completely proven, the Christian scholar will not reckon with a process that occurs outside the interference of God, who shall remain to be professed as Creator of Matter *and* Life.

The final point of exploration is left: What happens to the soul after death. Science gives here (rightly) no answer. Portmann has this clearly stated: "I do not stress the meaning of this boundary in order to withdraw from a clear position; when asked as biologist to speak of immortality, . . . I can only emphasize that no natural scientist in the present state of affairs can give a scientific explanation regarding origin and goal of living forms; this is valid no less for flowers and birds as for human life. It is further my conviction that a conclusion concerning these boundary questions of life and existence will rather never (überhaupt nicht) be given by science".[18]

Thus we must return to theology. According to traditional theology, the soul is immortal. For "practical purposes" this may be a mode of viewing eternal life as promised in the Bible. It is sad, however, that proponents of the immortality of the soul do not provide us with a better picture of the contents of this statement. Clearly, the "soul hereafter" is a different being than the soul discussed so far, which cannot exist, i.e. function, outside physiological processes. Certainly our soul is – as we saw above – not the captain who in our life commands the ship (in which he is held captive, however!) in order then, at death, to transcend into higher regions. It should be realized that, *if* in theological terms, an immortal soul is defined for the life hereafter, then we are, mathematically speaking, equating two entirely different functions of entirely different variables!

Thus, for sake of logical simplicity, let us return to the soul as described in this paper. *This* soul is mortal, even if the entire New Testament breathes the coming of eternal, that is non-mortal, life! (cf. Luyten).[19] Or, consider these statements of "empirical theology": Death has been conquered. Still there is death. Satan is dethroned. Still there is sin. Eternal life is made available. Still presently, with body and soul, we are subject to death. We believe that this is also the witness of the Biblical Record. The word immortality occurs only twice in the Bible, viz. at 1 Cor. 15:53: "This mortal nature must put on immortality" and 1 Tim. 6:15 and 16, which speaks of "the King of Kings and the Lord of Lords who *alone* has immortality and dwells in unapproachable light, whom no man

has ever seen or can see". A further (theological) point against the immortality of the soul is the fact that the soul belongs to the *created order*. Finally, we notice that prior to the Fall, man did not eat of the Tree of Life which was in Paradise and which will reappear in the New Jerusalem (Gen. 3:22; Rev. 22:2). Other texts like: "He who believes in Me shall live, even if he were dead" (John 11:25) do not contradict this. Immortality is not a property of man; however, eternal life can be gained through regeneration! Let us for once be a "super-fundamentalist" and absorb the full weight of the text when it states (Rom. 6:23): "For the wages of sin is *death,* but the *free gift of God* is eternal life in Christ Jesus our Lord."

The effectuation of eternal life is promised us through *resurrection*. This is not less than the alleged immortality of the soul, it is more. It means that both body and soul will be recreated. That the new life is not a mere continuation of the old life is clearly described in 1 Cor. 15, one of the most neglected chapters of the Bible. We read: "But someone will ask, How are the dead raised? With what kind of body do they come? You foolish man! What you sow does not come to life unless it dies. And what you sow is not the body which is to be, but a bare kernel, perhaps of wheat or some other grain. But God gives it a body as he has chosen and each kind of seed its own body" (vs. 35-38) (this means that the body will be a body of an individual soul). And further: "Just as we have borne the image of the man of dust, we shall also bear the image of the man of heaven. I tell you this brethren: flesh and blood cannot inherit the kingdom of God, nor does the perishable inherit the imperishable. For this perishable nature must put on the imperishable and this mortal nature must put on immortality. When the perishable puts on the imperishable and the mortal puts on immortality, then shall come to pass the saying that is written: Death is swallowed up in victory". (vs. 49, 50, 52-54 RSV).

Though the doctrine of resurrection as replacing that of immortality of the soul will have no effect on the final state of eternal bliss, as we see it in eschatology, the problems seem to arise when we consider the statehood of man "in between the times", i.e. after death and prior to the resurrection. It seems to many that the consequences of the above views would be to assume that after death the reborn man, together with the unregenerate, will be in no man's land, forlorn for God and men. Together with the witches and disembodied spirits mentioned before, the glorified church is then also disappearing from the scene. This incorrect and to many offensive view has been very lucidly rejected by the theologian Cullmann, while adhering at the same time to the resurrection vs. immortality standpoint.[20] Cullman does neither believe in an immortal soul, nor in a resurrection directly after an individual's death – which is in contradiction with the N. T. which describes resurrection as a universal event[21] – but restores the idea of an "inbetween state" (i.e. between death and resurrection). This state is not a purgatory in Cullmann's opinion (neither in ours) but the existence of such a state cannot be denied, see particularly II Cor. 5:1-10 and Rev. 6:9-11). Though little is known of this state, some things *are* known:

(1) It is a transcendental state of being in Christ and with Christ (I Cor. 5:8: "We are of good courage, and we would rather be away from the body and at home with the Lord." Phil. 1:23: "My desire is to depart and to *be with Christ,* for that is far better"). This does not mean we have returned to the Greek doctrine of immortality of the soul, for let us notice secondly:

(2) It is a state of *nakedness*. Paul describes he would like to be *over*clothed, i.e. live until the event of the resurrection without passing through death, but he fears to be *un*clothed when his "earthly tent" is destroyed. Thus, in human, existential terms, this state involves destruction, or as Paul expresses it frequently, men are sleeping. Yet, in fairer perspective, this state also is comprized in Christ's redemptive work: "Thou shalt not abandon my soul to (in) Hades!" (Acts 2:27).

(3) It is a state of expectation. (Rev. 6:11 "They were each given a white robe and told to rest a little longer until the number of their fellow servants and their brethren should be complete". Romans 8:19: "For the creation waits with eager longing for the revealing of the Sons of God".)

(4) This state is made possible not by the immortality of man (i.e. it is not a consequence of a characteristic possessed by man's soul) but man is enabled to *acquire* this state by the *Holy Spirit* who is referred to as the "guarantee" (ἀρραβών) (II Cor. 5:5: "He who has prepared us for this very thing is God who has given us the Spirit as a guarantee"). Cullmann puts it further very pointedly when he states: *"The Holy Spirit is a gift which cannot be lost through death."*

We have herewith given an introduction for a possible confrontation between science and faith with regard to the problem of body and soul and related concepts. Undoubtedly, many of the ideas set forth here are criticizable and will be criticized! Further, as the latter part of this review indicates, not all theological concepts will be rational to science since in theology sometimes reason must abdicate to yield to the (seemingly) irrational teaching of the Bible as Brunner puts it somewhere. Luther said already: Jeder Konsequenz führt zum Teufel! (being completely consistent leads to the devil!). However, it is our conviction that if science takes a sincere interest in the Christian faith, and further if theology listens closer to the Bible (not reading in what is not to be found there), then simultaneously a closer harmony with the secular (that is not: less godly!) sciences may be achieved.

REFERENCES

1. Trichotism was adhered to both by some philosophers (e.g. Philo) as by several church fathers. In a weak form it is observed by Augustine. Sometimes the name dichotism is used for dualism.
2. All quotations are from the Revised Standard Version.

(continued on p. 11)

SOME COMMENTS ON THE SOUL AS DEVELOPED IN ORTHODOX CHRISTIANITY

GEORGE J. JENNINGS*

Most anthropologists agree with other social scientists and contemporary students of human nature in identifying the soul as philosophical speculation by early man and they now reject it as an integral essence of man. This conclusion is contrary to traditional thought by Christian theologians who held to the essence and immortality of the soul according to their Biblical interpretations — interpretations which were greatly influenced by classical Greek thought. Hence the soul concept accepted in orthodox Christian circles is largely the definitive efforts of theologians who were swayed by extra-Biblical sources in reaching their conclusions. Social scientists, including psychologists, refuse to pursue investigation of the soul since its assumed nature is not amenable to scientific techniques of study. The plea of this paper is to encourage investigation of a concept not confined to Christianity but which has prevailed through space and time among mankind. It is the writer's conviction that the soul is an immortal and integral aspect of man, and that there are possibilities for studying the soul as part of contemporary research to understand human nature and behavior.

Sir Edward Tylor, the founder of modern anthropology, gave currency to the term "animism" in his book, *Religion in Primitive Culture* (p. 10). In his thinking, animism is the belief in souls with attendant associated ideas of a future state or afterlife, of ruling deities, and of subordinate spirits. This view is fundamental to what Tylor considered the minimum definition of religion, namely, "the belief in Spiritual Beings" (p. 8). In developing his theory, he concluded that ancient man was faced by questions relating to two groups of phenomena in the experience of mankind. The first group may be summed up in the question: What is the essence that is absent from a dead body or what is missing when the physical body apparently remains intact. The second group of phenomena is summed up in the question: How is it that in such experiences as dreams, hallucinations and visions that some essence of man is unrestricted in relationships to other selves in both time and space. Despite the fact that the body remains in an evident location as attested to by observing family members or friends, some part of man overcomes space and time limitations to relate to persons removed from the physical scene, or even to persons long since deceased.

Tylor suggested that early man employed philosophical answers in response to these questions. Primitive man accounted for these phenomena by proposing a dualism for man. Man was viewed as a being characterized by two possessions, a physical life and a phantom or shadowy essence. In the normal or commonplace experiences of man, these two are united but when they are separated, the consequence is death, dreams, or visions. The soul therefore is the apparitional essence of man who postulated its existence as an answer to physical and psychological phenomena.

Tylor's speculations have been challenged by social scientists and theologians, but in a critique of the theory, the anthropologist, Robert Lowie, who was strongly influenced by the ideas of William James (*The Varieties of Religious Experience*), speaks for a large company when he concludes that Tylor's views are more satisfactory than various other theories. Needless to say, Tylor's conclusions are diametrically opposed to the traditional Christian interpretation of the soul, particularly in respect to origin. This brief review of Tylor's theory has been included because it reflects something of modern psychological thought. Anthropologists for the most part find the Aristotelian naturalism about the soul in considerable agreement with their scientific notions which see man as a *psychophysical* organism in adaptation to an environment. Such age-old controversies as to whether man is trichotomous or dichotomous are not only *passé* but irrelevant in views which consider man a unitary organism with a questionable destiny beyond this world. To a considerable

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degree, anthropologists agree with modern psychology which rules out the soul and substitutes terms unencumbered by traditional theologies and metaphysics. To most anthropologists, the soul may be identified as one of a number of designations depending on their particular brand of psychological theory. Included in such a list are the self, or the person, or the id, or the psycho-physical, or even a mere SR — that is, stimulus-response.

Anthropologists seldom devote themselves to an analysis of the soul concept other than to note and describe the belief in, and nature of, souls as held by most, if not all, cultures. There are certain exceptions to this absence of treatment. Thus Margaret Mead, in her article, "The Immortality of Man" (in Simon Doniger (ed.), *The Nature of Man,* pp. 201-208) views soul as a speculation derived from man's search for immortality. She points out that a soul concept is necessary when immortality is linked with the beliefs of a survival after death, a continuance of life in some other sphere or plane, and a persistence of personal identity. The larger portion of her text in this brief paper follows anthropological tradition in illustrating these beliefs as held in various cultures. Her conclusion is that "As we widen our sense of man's potentialities through our widening knowledge of the cosmos, the question of the immortality of man may be expected to widen also and to take on new forms" (p. 208).

Ashley Montagu also has considered the soul idea in his small work, *Immortality.* To him the soul is not an essence apart from the body, or that man by nature is not a dualism. Rather the whole body is nothing but a nervous system which means that the whole body in its intrinsic nature is the soul (p. 26). The persistence of the soul is not the continuance of an essence of man in an afterlife in another world. The soul, in his thinking, is the cultural achievements of a biological organism that persists in memory or records of a people's traditions or history. To emphasize this reasoning, Montague writes:

> Do men, then, at death vanish into husks and the formless ruin of oblivion? Physically, yes. Culturally, no. We know that what men have done during their lives, the good *and* the evil, lives on after them, to influence other human beings in consonance with the power of their ideas and their deeds (p.27).

As an anthropologist with orthodox and evangelical convictions, I am of quite an opposite persuasion. To me the soul is an integral aspect of man which persists after death in an abode of divine preparation, and which will be reunited to the body at the occurrence of the body's resurrection. In maintaining this position, I would be less than honest if I did not admit my personal problem in resolving the trichotomous-dichotomous enigma. However, more about that later in this paper. With the awareness that the doctrine of the soul has been dynamic and controversial during the Christian era, I will attempt in the remainder of this essay to delineate a common core of interpretation that approximates the conservative tradition.

Christian thinkers for the most part seem to have held that the soul is the "self" or personality of a human being. Traditionally it has been considered the essential principle of human nature and the basis of conscious, continuous, and individual existence. These long-held conceptions evidently have their roots in Jewish thoughts of the Old Testament, or should I say Hebrew thought; and these roots also reach into Synoptic, Pauline, and Johannine expressions of the New Testament, and into Patristic and Mediaeval conclusions as well.

The early Hebrews in Old Testament accounts emphasized a unity in human nature rather than a dualism. Robinson, in his *Religious Ideas of the Old Testament,* suggests that, to the Hebrews, man's nature is a product of two factors: the "breath-soul", which is the principle of life, and the physical organism which this vitalizes. To separate these two factors meant a cessation of being. This early view undoubtedly represents an incomplete understanding of human nature, but it must be emphasized that the ancient Hebrews recognized that the "breath-soul" relates man to God. Some scholars have attempted to postulate a belief in the trichotomous nature of man to early Old Testament writings. This effort rests upon the employment of the Hebrew terms for soul (*nephesh*), and spirit (*ruach*).

To support this notion, biblical scholars cite various texts. For example the King James version of Genesis 2:7 reads: "And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul." It is interesting, and perhaps significant, that the Revised Standard Version sometimes uses such words as "being" or "life" rather than "soul" in the translation of *nephesh.* An example of the occurrence of *ruach,* or spirit, is Genesis 41:8 where, in reference to Pharaoh's emotional disturbance following a dream experience, the King James text reads "that his spirit was troubled." Concordances provide many other references illustrating the occurrence of soul and spirit. Ferm, in his *Encyclopedia of Religion,* asserts that the trichotomous nature of man is held by later Old Testament writers. He concludes that these authors believed that the spirit is the surviving aspect, while the soul as the vital principle making for mental life perishes with the body at death. This interpretation is possibly the projection of later ideas back into Hebrew culture. Its principal weakness may be observed in the interchangeable use of the terms "soul" and "spirit" by the Hebrew writers.

Three general types of psychological usage appear in New Testament texts which offer insights into ideas of human nature, and the soul in particular, as held by writers of that period. It seems reasonable to classify the Synoptic, Pauline, and Johannine sources as three distinguishable types. In these three contextual settings, the terms most frequently used to characterize human personality are *psuchē* or soul, *pneuma* or spirit, *kardia* or heart, and *sarx* or flesh.

The concepts of human nature in the Synoptic writings approximate most closely the Old Testament idea. *Psuchē* (or soul) often denotes physical life, emotional states, and, in contrast to the Hebrew counterpart, *nephesh,* refers to persistence of being after death. *Pneuma* (or spirit) refers most commonly to the Holy Spirit, but on occasion it signifies demonic influences, the life principle, or the psychical side of life. When in reference to the psychical quality, the idea is on a higher level than that suggested by *psuchē*. *Kardia* (or heart) is the Synoptic reference term for personality and character but it also indicates emotional, intellectual, and volitional attributes. The physical aspect of human nature is conveyed by the term *sarx* (or flesh) which emphasizes qualities of weakness and limitation in contrast to supernatural power.

The Pauline writings represent considerable originality in the conception of human nature. Paul seldom uses *psuchē* but in those rare instances of employment, his notion seems to be "desire" and perhaps the emotional quality of consciousness. His choice of the adjectival form, *psuchikos* (translated "natural"), reveals that *psuchē* is considered merely the animating essence of the body and the basis of emotionality. *Pneuma* (translated "spirit") predominates in Paul's psychological vocabulary. By its utilization, he signifies supernatural influences as in those cases where man is under the sway of God's Spirit, although he does at times employ the term in reference to a normal element in human nature. *Kardia* (or heart) to the Apostle denotes the covert life as the locus of emotional, intellectual, and volitional psychoses. *Sarx* (or flesh) implies physical or intellectual weakness, and, in some instances, possesses ethical reference to the connection of "flesh" and sin.

In John's Gospel and the Epistles, *psuchē* means essentially the same as in the Synoptic writings, however, on one occasion, it designates the elevated inner life. *Pneuma* usually refers to supernatural influences but John never relates it to demons. Other referent uses are rare; in one case the term signifies the principle of life, two times it speaks of the psychic state of anger, and there is one reference to trouble. John conforms to the Synoptic authors in his use of *kardia.* An interesting contrast appears in the Beloved Disciple's employment of *sarx*. Undoubtedly his fondness for antithesis causes him to polarize *sarx* and *pneuma* as opposites.

In surveying New Testament ideas, one sees emerging the belief that the essential personality, whether termed *psuchē* or *pneuma,* survives physical death. However there evidently is little justification to divorce the personality from the body to the extent that this idea is postulated later by both trichotomists and dichotomists; at least this seems a valid conclusion resting upon Old and New Testament thought. A soul and spirit, or if you prefer, a soul-spirit, may be temporarily disembodied, but complete personality ultimately involves the union of the body with these essences, now and in the future as traditionally maintained in Christian eschatology.

It may be observed also that the New Testament authors give little attention to certain problems inevitably connected with the soul concept. The method of the soul's origin, the relation of the soul's activity to divine freedom and grace, the degree of moral attainment required for membership in the Church, and the mediation of spiritual energies to the soul by institutions or truths respectively, are questions not considered directly by New Testament writers. With the gradual development of the Church, these problems emerged to create profound effects on theological thought.

The influence of Greek thought is apparent when Christianity emerged from a Judaistic context into the Roman world with its Greek cultural traditions. The concept of the soul was modified as a consequence in the Patristic and Mediaeval periods. The early Church thinkers usually were scholars acquainted with Greek philosophy. They reacted in their apologetic and constructive works to this influence with an effort to make Christian concepts intelligible through the established terms and notions of Greek psychology. Siebeck may be cited as one who explicitly states the difference in the soul concept as held by the Greeks in contrast to that of early Christianity. He writes:

> For the Greeks, the soul is a product of the world, and the rational soul primarily exists to know the world as it is, and actively shape it; the soul was consequently the means to an end or ends assigned to it by the world. To the Christian, on the contrary, the world is a means for the end of salvation, which springs from the independent and characteristic nature of the soul; for him, accordingly, the soul is not a product of the world, but a creation of the transcendent God, conceived after the analogy of spirit (*Geschictie der Psychologie,* II, 359).

The syncretism of Christian and Greek thought enabled the scholars to provide a more scientific analysis of Christian consciousness, but unfortunately some religious values inherent in Hebrew and Christian views on the soul were obscured. The greater emphasis upon dualism with the development of a distinction between soul and body tended to minimize the Hebrew emphasis upon unity. On the other hand the doctrine of the resurrection of the body was retained and to a certain extent compensated for the extreme dualism.

Tertullian and Origen may be cited as leading exponents of Christian thought concerning the soul and both were under the Greek influence. The school called Traducianism was born in the views of Tertullian (160-220 A.D.). He accepted the Hebrew doctrine that the soul of Adam derived from divine inbreathing, but he incorporated Stoic ideas in his declaration that the human soul is corporeal in that it is obtained by the child from its parent together with a body (Traducianism). This conclusion was accompanied by the dichotomous idea wherein the soul, with *nous,* or mind, as its supreme function, is sharply distinguished from the body. In ascribing to the soul form and even tangibility, Tertullian states:

> The soul, then, we define to be sprung from the breath of God, immortal, possessing body, having form, simple in its substance, intelligent in its own nature, developing its powers in various ways, free in its determinations, subject to growth

by opportunity, in its faculties mutable, rational, supreme, endued with an instinct of presentiment, evolved out of one (original) (*De Anima*, 22).

Origen (185-254 A.D.) was also swayed by Greek teachings in his belief that the soul is incorporeal and eternal. When he regarded the soul as pre-existent to the present life, he incorporated a Platonic notion into Christianity. Likwise, Platonic influence led him to propose a trichotomy for man by so interpreting the "body, soul, and spirit" reference in I Thessalonians 5:23. There is not time to pursue the development of this problem but a single comment may be made. It is that even a casual survey of Christian theological literature which seeks to explore the nature of man impresses the reader that the dichotomy-trichotomy controversy has persisted in Church history. Supporters of both views seem unaware of, or at least seldom make reference to, Greek influence upon early Christian scholars as Tertullian and Origen. Needless to say, both dichotomous and trichotomous advocates hold that their position is the one possessing Biblical substantiation. My personal view is that of the trichotomy simply because my association has been with those belonging to that school.

One other Patristic theory on the origin of the soul became widely accepted by the time of Jerome (347-420 A.D.). This view suggested creationism whereby God continues to create souls for bodies born by human generation. Tertullian's Traducianism and Origen's eternal, pre-existent souls theory continued to be held by some Christians, but the creationism theory became dominant from the days of Jerome; and it is the view most commonly accepted by contemporary Christians who identify with the conservative position.

It is impractical to attempt in an abbreviated treatment an exhaustive citation of all Patristic and Mediaeval thinkers who offered modified concepts of the soul, but some mention must be made to Augustine and Aquinas. Augustine (354-430 A.D.), under the sway of Neo-Platonism, seems to have been the first to realize and suggest that man's inner life is *sui generis*, with its own intrinsic claims to introspective study. He concluded that the mind is constituted of memory, intellect, and will; thus it is the locus of the soul. In comparing the qualities of the mind, he asserted that the will predominates over the intellect. Augustine associated the primacy of the mind with his conviction that freedom of choice is realized through divine grace. The soul therefore is the determining aspect of man in appropriating moral status which in turn has eschatological implications.

Scholasticism's foremost representative is Aquinas (1224-1275 A.D.) who combined Augustinian anthropology with Aristotelian views on the soul. From Aristotle, Aquinas derived the notion that the soul is related to the body as form is to matter. The body is consequently the instrument of the soul just as matter is merely potency to be realized in a form. The soul is inextricably linked to the body; it is lifeless without it. In pursuing this chain of thought, Aquinas believed that the most developed form of soul is the mind. The end result of such thinking was a position of religious dualism. In his elaborate system, man becomes a nexus between the realms of form and matter — the microcosm which unites both of them. Aquinas insisted upon the inestimable worth of the soul, but regretfully he fails to do justice to the soul's content.

One must bear in mind that these ancient and mediaeval views retain considerable strength in orthodox Christian circles today. Yet modern views about the soul reflect also Renaissance and Reformation thought. There developed a new emphasis upon the religious significance of the soul and there emerged greater subjectivity in treatment. The soul now is seen as capable of feeling and apprehension of God's Holy Spirit. Accompanying this newly formed interpretation is the belief in two experiences related to the soul. The first is a pronounced sense of morality. The second is the glow of Christian certainty in a divine relationship. Perhaps the most significant feature in contemporary theology among conservative Christians is the conviction that the religious experience provides a new man in the heart and a buoyancy in the emotional content of the soul.

Since attaining scientific status, psychology tends to confine its attention to human behavior as phenomena of consciousness with decreasing interest in the soul. For the most part, psychologists remit all theories of an alleged substratum or "soul" to the theologians and philosophers. Anthropology, in seeking scientific status in its study of culture, concurs in declining the task to study the soul. Perhaps the words of Paul Moody, a professor of natural history and zoology, may be borrowed to make this position explicit.

> We have accorded preeminence to the human mind but have said nothing about the human soul. The reason for the omission lies in the fact that the soul is outside the province of science. Science deals with phenomena which can be detected, studied, and measured by use of scientific instruments. The soul is not amenable to this approach. It cannot be seen, or weighed, or analyzed chemically; nor can it be studied — as yet, at least — by the methods of the psychologist. Thus discussion of the soul would be out of place in a book of science. This may not always be true, but for the present we must look to religion and philosophy for knowledge of the soul (*Introduction to Evolution*, 202).

This is not to say that anthropology disregards the soul concepts held by the societies it studies. To neglect the belief in souls would be to ignore a major cosmological segment so significant in the culture of most peoples. As a matter of fact, the comparative study of religions by anthropologists has introduced to Christians non-Western ideas of the soul. I am of the opinion that totemism, fetishism, or metaphysical ideas of the soul held by Hinduism or Buddhism can serve to bring into sharper focus the soul concept by a contrast with the Christian idea of soul. The Greek influence upon Biblical studies has prevailed too long at the expense of other possible sources. There is a need to re-examine the Hebrew-Christian concepts of the soul in the cultural context of Biblical thought. It seems apparent to me that such investigation may be attended by at least three problems. There is a challenge in the findings of contemporary psychology wherein it makes imperative for the conservative Chris-

tian to examine first the soul's reality, second, its relation to the body, and third, its relation to God. A comment about each of these problems may be an adequate means to conclude this paper.

As to the soul's reality, it seems that the orthodox Christian tradition can be maintained only in the belief that the soul exists and that it is a spiritual entity with distinctive activities and qualities. Among its qualities according to my conclusion are unique individuality, the freedom of real initiative, and non-material content. As the locus of human personality, the soul is more than the self of self-consciousness at any moment. At the risk of jeopardizing a trichotomist position, I think that the soul relates the individual not only to other selves but to God as well.

The second problem suggested is the soul's relation to the body. Fundamental to this consideration is the necessary cognizance that the body is integral to human nature. There is no intended equivocation here. I am not concluding that the soul depends on the body for its ultimate being, or that it dies in the physical dissolution of death. Rather the attempt is to emphasize that the connection between soul and body is not artificial, temporary, and alien. Historically, Christians saw life beyond death according to the Hebrew views on resurrection rather than the Greek doctrine of immortality. Traditional Christian thought rests on the theistic notion that soul and body are the creative efforts of God, that they have been brought into existence together, and that, on different levels, they comprise one entity of personality. Lest this statement be misinterpreted, may I assert that this in no way implies that the belief in the soul surviving after physical death is to be abandoned. To adopt Pauline phraseology, we may put it thus:

> So we are always of good courage; we know that while we are at home in the body we are away from the Lord, for we walk by faith, not by sight. We are of good courage, and we would rather be away from the body and at home with the Lord (II Corinthians 5:6-8, R.S.V.).

Finally there is the problem of the soul's relation to God. Perhaps it is unnecessary to assert that in accepting the reality of this relationship, Christian thought rejects any form of monistic absorption that characterizes Hindu and other cosmological schemes. Biblical evidence sustains the tenet that the individuality of the soul remains intact while in intimate association with its Creator and Redeemer. In relation to this, the doctrine of the Holy Spirit is necessarily involved and important for the experience of salvation is essentially "God in us" with the ultimate goal that the soul is hid with Christ in God.

It is quite evident that the implications of these comments in reference to soul reality and relationships to other selves and to God are not explored in this paper. Possibly the suggestions offered will be of heuristic value to the end that Christian concepts of the soul will be made more lucid by serious investigation. The findings of those engaged in the scientific study of man make it imperative that conservative and evangelical Christians elucidate the concept of the soul.

van Vliet (continued from p. 6)

3. Scofield Reference Bible, Oxford Univ. Press, 1917. (footnote to 1 Thess. 5.)
4. If trichotism or other views are rejected by the Church, this should be done on theological grounds only. It is, of course, a mistake to substitute a scientific framework for the biblical framework. Rather, the biblical messages should be translated into our present day world views. Science as such can never be a basis for a Church creed (after A. van der Ziel).
5. An historic survey of materialistic monism, including the passage of Hoeckel's book quoted here is found in Karl Barth's Kirchliche Dogmatik, Band III/2, Zolikon Zurich, 1948, p. 460-467.
6. He continues: "Sie durchlauft dann mit den anderen Lebenstatigkeiten des Organismus ihre individuelle Entwicklung von Selbstbewusztseinslozen Zustand des Neugeborenen bishin zur senilen der Auflosung des Selbstbewusztseins entgegeneilenden Ruckbildung."
7. Teilhard de Chardin, "The Phenomenon of Man", Harper and Row, New York, 1961.
8. "What Then is Man?" by P. Meehl, R. Klaun, A. Schmieding, K. Breimeier, and S. Schroeder-Slomann, Concordia, St. Louis, 1958; Appendix C: The Dualism Problem.
9. K. Barth, K. D. III/2, p. 414 ff.
10. Ibid., p. 428
11. Ibid., pp. 425, 426/(small print).
12. Victor White, "God and the Unconscious" Meridian Books, Cleveland, 1961.
13. H. Feigl, "Mind Body, not a Pseudo Problem," in "Dimensions of Mind", (Sidney Hook, Ed.), N.Y. Univ. Press. Also, Minnesota Studies in the Philosophy of Science, Vol. II, 1962. ("The Mental and the Physical.")
14. I owe this remark to my colleague, Dr. A. van der Ziel.
15. Adolf Portmann in "Unsterblichkeit", Reinhardt, Basel, 1957, p. 25.
16. Though here we cannot discuss the problem of the soul in animals, it is noted that what we said about the directiveness of life processes in human life holds, be it to a lesser degree, also in the higher forms of animal life. Portmann rightly believes though that life in man – "for any biologist that is not blind" – differs from animal life not just gradually but essentially ("wesensmaszig"). He returns to his already stated point of view when he notices that the specificness of human life, when admitted, can only be such because of the peculiarity of the human protoplasm in which it is constituted.
17. K. Barth, K. D. III/2, p. 420.
18. A. Portmann, Loc. cit., p. 29.
19. Norbert M. Luyten in "Unsterblichkeit", Reinhardt, 1957.
20. O. Cullmann, "Immortalite de l'ame ou Resurrection des morts?" Delachaux et Niestle, Neuchatel – Paris, 1956.
21. Possibly at differentiated times, however for believers and unbelievers, compare John 5:29, Acts 24:15.

Art and Science — How Soon the Fatal Dose?

Collectively we are persuaded that since the advent of science nothing can be done as it was done at any time in the past. We must undertake "studies" of everything, suspend action while awaiting the report of the experts, analyze over and over again the most familiar goals – how to learn, how to read, how to sleep, how to breathe, how to make love – quite as if mankind had remained in total ignorance before researchers were invented. We are rapidly approaching the state of not knowing how to do anything – in common situations or in emergencies – because our diseased self-consciousness is itself approaching general paralysis. . . . Methods, professionalism, and technicalizing dominate all behavior, all responses. –Jacques Barzun, a convocation address delivered at the U. of California, Berkeley, in *The Daily Californian Weekly Magazine* – as published in HIS, January, 1967.

SCIENCE AND THE SPIRITUAL NATURE OF MAN

DAVID O. MOBERG*

There is a pronounced tendency in the behavioral sciences to depreciate or eliminate supernatural and spiritual phenomena by reducing them to "natural" relationships, forces, and processes or by explaining them in naturalistic terms. Yet if man has a spiritual side to his nature and relates himself to a God who is and who reveals Himself to man, it seems reasonable to believe that there are scientifically-observable evidences of man's spiritual nature. The development in the sociology of religion of five "core dimensions of religiosity" is a significant improvement on previous analytical classifications, but it seems to omit the man-God relationship which is at the core of Christian spirituality. It is postulated that there is a sixth aspect of personal religiosity, at least in Christendom, which is tentatively labeled the "spiritual." This is what Sturzo labeled "the true life" in his "sociology of the supernatural." Various theological, philosophical, and existential evidences support the hypothesis that man has a spiritual nature. Scientific evidences of the spiritual component of religiosity can come from self-reports of inner experiences, case studies of believers, the possibly universal grasping of men for some kind of ultimate commitment or concern, and the tests of the validity of religious experience religious groups use in screening members. The Verstehende *research approach is subject to many limitations, and the other evidence is circumstantial, hence not conclusive, although it may be as "solid" as much of the data used in socio-psychological research. As better techniques and instruments of research are developed, the spiritual component of man's nature may become a direct subject of empirical research in the future.*

The emphasis in the sciences upon empirical evidence necessitates a neglect of that which is difficult to observe with the senses as well as a denial on the part of some scientists that unobservable phenomena are real or ontological. In its extreme form in the social sciences this is related to the position called "sociologism" which insists that all of man's behavior is collectively determined by his group associations. Hence even the deepest aspects of man's spirituality are attributed to the direct and indirect influences of the clan, tribe, people, culture, or society upon its members.[1] This approach does not leave room for supernatural beings and forces, although it does allow for *belief* in the supernatural. The supernatural is either reduced to the natural or eliminated.

Some scholars hold that the social sciences qua sciences are just as "natural" as the biological and physical sciences.[2] All sciences use the same basic logical and empirical method, seek natural cause-effect relationships, and are concerned with repetitive rather than unique events of the universe. Man is hence studied from a naturalistic perspective that either leaves all supernatural elements to disciplines like theology, or else, as in the case of logical positivism, denies that there are any supernatural factors at all.

The empiricist of this latter type can be convinced of the "reality" of phenomena only by evidence that is empirically produced through a "natural science" approach. Intuition, sympathetic understanding, and deduction are denounced as inadequate or invalid sources of evidence even in the study of man. To the Christian assertion that man is a spiritual being, such scientists scoffingly attach labels like "speculative metaphysics", "folklore", and "outmoded superstition."

If God is, if He reveals Himself to man, if man has a spiritual side to his personality, if there indeed are supernatural forces in the universe, and if men (or at least some men) have a personal relationship with the Deity, does it not seem reasonable to believe that these spiritual phenomena are accompanied by evidences which are objective and hence can be observed empirically, ergo scientifically?

Scientific Dimensions of Religiosity

The critical analyst of most social science studies which include data on "religion" will find them to have significant weaknesses. Crude "measures" of religion like church membership, attendance at religious services, self-identification as Protestant, Catholic or Jew, acceptance of certain elementary religious beliefs, and the like, have been used to classify people religiously in order to observe the possible effects of religion on

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various aspects of personal and group behavior. Even the most sophisticated of scales used in the study of specific religious phenomena have significant limitations.

Sociologists of religion have been increasingly aware of these difficulties and weaknesses and have taken significant strides toward overcoming them, especially during the past decade. The most significant systematic solution to the problems connected with inconsistent, even conflicting perspectives in research on religion, which is presumed to be one phenomenon, is the five-fold classification of types of religious commitment developed by Charles Y. Glock.[3] Noting the confusion that results from the failure of investigators who study a narrow aspect of religious belief or practice to recognize its broader context of relationships to other expressions or manifestations of religion, he distinguished between five "core dimensions of religiosity" in which he believes the religious commitment of any person in any religion may be manifested:

1. The *ritualistic* dimension is that of religious practices — what people who are religious *do* in the external expression of their religion. It includes church attending, praying, confessing, tithing, fasting, working for the church, and the like.

2. The *ideological* dimension deals with what religious people *believe*. These beliefs are of several kinds (warranting, purposive, and implementing). Unbelief also appears in several forms and is a valid subject for religious research.

3. The *intellectual* dimension is concerned with what people *know* about their religion, church, sacred scriptures, etc.

4. The *experiential* dimension focuses around what people *feel*. Religious emotions, sensations, and perceptions related to God, to ultimate reality, to participation in religious activities, and to personal or group religious experiences belong in this category.

5. The *consequential* dimension pertains to the *effects* of the religious rituals, beliefs, knowledge, and experiences and is hence on a different conceptual level of abstraction. It is the area of "works" in contrast to "faith" in the Christian theological sense.

Glock elaborates each of these, pointing out how various aspects of each dimension are researchable and stressing the interaction of each dimension with all the others. His work is stimulating significant research, for the basic purpose of his analysis was to promote empirical sophistication in religious research. I think, however, that his belief that "within one or another of these dimensions all of the many and diverse manifestations of religiosity prescribed by the different religions of the world can be ordered"[4] is too optimistic.

Indeed, this typology probably falls short for Christianity itself. If the word "all" really applies in this statement, then, since all of the five dimensions are researchable, the totality of the *manifestations* of Christianity, including any and all *observable* spiritual or supernatural elements it contains, is eventually subject to scientific analysis, and science can either "reveal" them or profess to prove their non-existence, except as ideas or myths in the minds of people.

Are These Dimensions Adequate?

If Glock's dimensions are presented as a summary of the totality of the Christian religion, the devout believer in Jesus Christ will feel that something is missing. This "something" will be difficult for him to identify. The theologian might label the missing part as the realm of faith, revelation, illumination, and insight which some have labelled as "the sacred", "the holy", "the supernatural", or "the spiritual."

Various Bible references help to make clear the inadequacy of each of these dimensions from the perspective of satisfying the demands of the Christian ideal.[5]

With regard to religious deeds (the ritualistic dimension), the testimony of Jesus and the Apostles is quite clear about their spiritual inadequacy. For example, Jesus denounced the scribes and Pharisees for their failure to live up to their own teachings and their close attention to the fine details of religious rituals while neglecting the basic principles or spirit that lay behind the legal structure out of which their rituals had evolved (Matthew 15:1-9; 23:1-39; etc.). He emphatically said that those who worship God "must worship him in spirit and in truth" (John 4:24). Works are insufficient for man's salvation (Matthew 7:22-23; Romans 3:1—5:21; Galatians 2:14-21; Ephesians 2:8-9; Titus 3:4-7; etc.). Yet works are important indicators of what is within the "heart" of man, the very essence of the self or personality (Matthew 15:16-20).

It is evident from several passages of the Bible that beliefs (the ideological dimension) are also insufficient for a proper relationship with God. This is clearly expressed in James' famous expression that "faith, if it hath not works, is dead, being alone" (James 2:17), as well as in his statement, "Thou believest that there is one God; thou doest well: the devils also believe, and tremble" (James 2:19). The object of faith (Christ) is as important as the act of faith, believing (Acts 4:12; John 8:24; I Cor. 3:10-11; etc.). True belief in the saving sense of that concept in John's Gospel (1:12, 3:16-18; etc.) involves the total commitment of a person to Jesus Christ. To believe on the Son of God is to commit one's self to Him in the same manner and degree to which a seed is "believed into" or committed to the soil.[6]

The scribes knew a great deal about their religion (the intellectual dimension), yet Jesus called them "blind leaders of the blind" (Matthew 15:14; Luke 6:39) and condemned them along with the hypocritical Pharisees (Matthew 23). The knowledge of man is imperfect, incomplete, and insufficient at its best for salvation (I Corinthians 1:17—2:16; 8:1-2; 13:8-10).

The Apostle Paul was "caught up to the third heaven" and had other mystical or ecstatic experiences (II Corinthians 12:1-12), yet he said that all things are but as dung in contrast to being found in Christ (Philippians 3:8). The experiential dimension of religious feelings falls short.

Furthermore, in his great chapter on *agape* love, the Apostle Paul emphasized that the best of words and deeds (religious consequences?) are worthless without a sincere and active love (I Cor. 13). Other portions of the Bible make clear that *agape* love is not merely an outward act easily put on but instead flows from the very innermost being, the deepest existential springs of a person's self, in response to the love of God.

So all five of these dimensions of religiousness are inadequate according to the Christian Scriptures. What is the missing factor? Is it a combination or blend of all five together? Perhaps. Yet even then I suspect that something else could be missing, namely, the total man-God relationship which is referred to in such varied concepts as regeneration, being "born again," being "hid with Christ in God," and being "written in the book of life." All of the other dimensions are related to this. For a "healthy" or "sound" relationship with God, traditional Christian values hold that there must be at least a minimum of knowledge (knowing God via Christ and the Scriptures), beliefs (faith in Christ as Savior), feelings (emotions are involved in *all* that men experience and know), ritual (worshipping, praying, etc., in whatever form or manner may be specified by the religious group), and consequences (the "works" without which faith is nonexistent or "dead"). Yet the outer forms of any of these may be present without the transcendent spiritual relationship with God that is at the core of Christian commitment. Measuring each of these dimensions of religiosity and all of their numerous subdimensions is not fully identical with measuring religious faith, ultimate concern, or existential commitment. The scientific study of these dimensions can lead to invalid implications if it fails to recognize its limitations in this area of religious research.

The Spiritual Component of Religiosity

It therefore may be postulated that there is a sixth aspect of personal religiosity, at least in Christendom. This may be labeled the "spiritual" or "supernatural".[7] It involves the man-to-God and God-to-man relationships. It does not exist alongside the other dimensions of the religious life but runs completely through them and colors them all. It is on a different level of abstraction and conceptualization.

This sixth component of religiousness is the very essence of religious life, that which Sturzo labeled "the true life." He said, "The supernatural is not made a separate section of social life, something juxtaposed to the natural, which individuals may accept or reject at will. In studying society in its complex wholeness, in the concrete, it is found to exist within the atmosphere of the supernatural . . ."[8] The natural and the supernatural order meet in man. Even he who denies the supernatural root and branch of the religious life in his search for purely natural explanations of religion is involved with "a sociology of the supernatural" in a negative sense.[9]

To some degree the question of the identification, study, and nature of the spiritual dimension of man may be analogous to the question of what life is. It is something more than merely the sum of the identifiable or observable processes and parts of a biological organism. The whole of man also is more than the sum of his parts; the parts are abstracted artificially from reality for analytical purposes. Just as man is seen as a total person in the Bible and in the best of the social philosophies that undergird the sciences of man, we must try to retain a holistic perspective, keeping the total person in mind and not thinking of him as consisting of discrete, separable parts, like body, soul, spirit, and mind. Yet because man is so finite that the whole is too complex for analysis in most scientific and other work, it is necessary to look at the parts.

Through self-consciousness man's spirit transcends the matter of the world. It is man's mind that imparts a kind of "reality" to space and time. Similarly, is it his mind that imparts "reality" to spiritual phenomena? Is the spiritual aspect of man merely a reification? Are men led to believe in it even if it has no ontological basis? How can one isolate the spiritual component of religion from the other dimensions if it cuts across them all? Since man is a unit, not a collection of parts, his religious behavior also is woven into the fabric of the total person. This problem therefore involves man as an existential being.

There are various belief-systems about how man may attain a life-giving relationship with God. Some of these focus upon the act of faith or the faith-commitment of the person, while others stress the sacramental treasures of a church from which grace is dispensed through institutionalized rites and ceremonies ("sacraments"). The study of the different beliefs about man's relationships with God is a proper area for research in the ideological dimension. But the relationship with God is not fully covered by beliefs about that relationship.

This is akin to other philosophical problems pertinent to man. The social scientist can study man's decision-making process, for example, but he is in a somewhat different position when he must make a crucial decision himself. Man the object and man the subject are not fully identical! *Objective reality* is not directly the same as the *subjective significance* of the person himself. "For what man knoweth the things of a man, save the spirit of man which is in him? Even so the things of God knoweth no man, but the Spirit of God . . . But the natural man receiveth not the things of the Spirit of God: for they are foolishness unto him: neither can he know them, because they are spiritually discerned" (I Cor. 2:11, 14).

Science and Man's Spiritual Nature

What non-biblical and scientifically researchable evidences support the hypothesis that there is a sixth dimension to religiosity? Personal experiences are subjective and can be reduced analytically to the experiential dimension, so they can be accepted only as

secondary and circumstantial evidence, not as conclusive "proof." Yet the testimonies of thousands of believers must be given some weight. People's self-reports are used to study a wide range of social science phenomena, ranging from studies of sexual behavior and participation in social organizations to research on marital happiness and adjustment in old age. Just as the statements of people are used in "attitude" studies and other research to get at beliefs, opinions, self-conceptions, feelings, and other internalized phenomena, reports of self-experiences should be useful in the analysis of the inner experiences of people who have religious commitments. The responses to questions and other overt phenomena which are studied are not the basic subject matter, but they are indicators of it.

We may never reach absolute rational finality about religious beliefs, and feelings, to say nothing of the transcendental man-God relationship. As long as no man has seen God, it is impossible to have reports of direct observations of Him. But this is something other than saying that He is non-existent. If men's reports about other behavior, feelings, beliefs, experiences, and relationships are at least partly reliable, we should be willing also to accept, at least tentatively, their reports about relationships with a God whom they believe to be transcendental. Yet these reports are in the ideological and experiential dimensions more than in that of the transcendental per se.

Many religious groups have "tests" of the validity of a prospective member's spiritual relationships with God. They may ask for a "personal testimony" of his faith and experience, or they may look carefully at his life to discover evidences of the consequences of his religious commitment. Since they have criteria for a presumably "objective" as well as "spiritual" evaluation of the transcendental dimension, it should not be totally beyond the bounds of scientific research. But these also fit into the other five dimensions!

All men seem to grope consciously or unconsciously for some kind of ultimate commitment or all-enfolding concern to which they can give loyalty. Is this grasping only a cultural survival from a primitive stage in the evolution of man? Or is there an ontological basis for it that science eventually will be able to study? If God is, and if He is omnipotent, then influences and processes that seem to be purely "natural" may be infused with "spiritual" values, meanings, influence, and significance. Finite men could either understand these spiritual factors, understand them only in part, or completely fail to comprehend them or even to recognize their possibility.

What at first glance appears to be an "anti-Christian bias" that reduces all evidence of "the spiritual," the sacred, the holy, or the supernatural to natural sociological and psychological processes may not be basically anti-Christian at all. It is necessary in any science to focus upon concepts and phenomena pertinent to that science and to use the methods of science in seeking sequences of events, causal connections, etc. which are "natural." This process becomes truly anti-Christian only when accompanying interpretations of the observed data go beyond the observations by making negativistic inferences or implications about the absence of supernatural elements in human experience, about God as a figment of the collective imagination, and the like. (Stating that these are unobservable is a different matter.)

There can be no conclusive scientific proof of the spiritual nature of man, for other (non-religious) explanations or interpretations of the alleged evidence are possible and always may be viable alternatives. This lack of provability can be a service to the Christian cause. We Christians believe that God is involved in *all* events in the universe, but we may be too quick to label as "miraculous" certain phenomena which are presently or potentially explicable in terms of natural processes related to human interaction, emotions, beliefs, feelings, and experiences. Knowing the ways in which God naturally and normally works among men — even in their "hearts," "souls," or "spirits" — can be of great help to those who serve Him. Unconsciously, if not consciously, we recognize this. For this reason, in spite of all that we as Christians *say* about the supernatural guidance of the Holy Spirit, we pragmatically operate our church programs and Christian associational activities on a primarily natural, behavioral, or sociological level of "planning."

Only with the "eyes of faith" do men recognize that it is God who works in and through them, their organizations, and all scientifically-observable and -unobservable natural social and psychological processes. Yet in conducting research on these Christian organizations and activities to discover the latent disfunctions as well as manifest functions of their structures and activities, the Christian social scientist will keep his "eyes of faith" open, aware that there probably is a sixth aspect of religious life not included in Glock's five dimensions.

To leave church work on its present basis of haphazard planning is unrealistic in our complex society in which research and development is a major department of most other social institutions. It also may be a form of blasphemy — attributing to the Holy Spirit that which occurs when we carelessly let the pressures of worldly circumstances and winds of chance determine church-related conduct. Instead churches ought to capitalize upon the resources, methods, and tools of social science research which are available to help in their planning. Doing so, their leaders and members will be moving in the direction of serving and loving God with all their minds as well as with all their hearts and strength. But to analyze the structures and programs of religious institutions scientifically is not the same as scientifically studying personal religious commitment.

Perhaps man's spiritual nature can be studied scientifically only, if at all, through the *Verstehende* approach of sympathetic understanding and intuitive insight. But this carries with it various dangers. It is easy to accept as "fact" various assumptions which are

not consistent with the empiricism of science. Ideological biases easily enter, and they are just as serious when they come from the irreligious, the "religiously neutral," or the anti-religious as when they come from the religious person. It is easy to assume that evidence based solely upon one's faith ("faith" includes the anti-religious stance of unbelievers) is an empirically observable part of scientific evidence. Yet this *Verstehende* approach is in some way related to biblical concepts of "spirit bearing witness with spirit" (Romans 8:16) and of self-conceptions – the spirit of man perceiving what is within himself (I Cor. 2:12).

Conclusions

It is entirely possible that the spiritual component of religion is transcendental, so far above and beyond objective experience that it cannot be studied scientifically. It may be totally extra-scientific, seen only by the "eyes of faith." Others who see its evidence see not, nor do they understand (Matt. 13:13-17; I Cor. 2:14; II Cor. 4:4; Ephesians 4:18). But even if this is so, the correlates and effects of the man-God relationship may be measurable and hence as proper a subject of scientific study as numerous other phenomena that can be investigated only indirectly.

Even if the spiritual dimension is beyond the realm of scientific research, scholars of religion ought not to lapse into a dangerous philosophy of *sociologism* that reduces the totality of religion to social forces, nor into a *logical positivism* that insists that nothing science cannot study is real, nor into a *naturalism* which arbitrarily holds that everything is totally explicable in terms of "natural," non-supernatural concepts.

But we who believe that man has a "real" spiritual nature must also take care lest we assume a metaphysical tenet of our faith to be a scientific fact before there are adequate *scientific* grounds to support our assumption. Scientific scepticism and scientific humility are needed on both sides of this subject. To "explain" scientifically is not to "explain away," for the phenomena explained remain (if they were there in the first place) unless they were mere reifications, creations of men's imaginations.

". . . no ultimate conception of reality is intellectually self-validating, but always rests in circular fashion upon postulates and convictions which are not self-evident. At the foundation of every total view of the world, there is a point analogous to that of God's revelation for Christians upon which the whole rests. We may call this man's *theological predicament,* to which others are no less subject than are Christians. . . . The theological predicament is common to all men."[10]

This problem is linked with *communication difficulties* as well. Is it possible to "translate" the "language of the spirit" into the language of science?

It is easy to locate statements expressing the opinion that man's transcendental dimension or spiritual nature is not a concern of social scientists, at least in their scientific role. I have written earlier that "Ultimate causation and supernatural significance are outside the realm of social science," but the sentence that follows reminds the reader that "To understand the social processes in conversion is not to demonstrate that no supernatural elements are involved."[11] Dr. Osmund Schreuder of the University of Nijmegen in The Netherlands holds that "Sociology of Religion has as its object religion in its empirical manifestations. God, the supernatural, grace, and so on, have no place in this science. . . ."[12] He warns that religionists and secularists hence must be careful not to make statements about the validity, truth, and value of religion, for "Metempirical objects are in principle not approachable by empirical methods."[13] But although the spiritual component of man is not now an empirical subject for research, it may become so in the future.[14] Meanwhile the following questions are worthy of our attention.

Questions for Thought and Discussion

1. Does science by its very nature inevitably "demythologize" any and all spiritual values, beliefs, and commitments?
2. Is the author's belief in supernatural or spiritual forces, including God, based upon circular reasoning? (Feelings of awe produce a belief in holiness; holiness experiences in turn lead to the belief that there must be some real phenemenon behind the feelings, the feelings of awe then being used to validate the beliefs.)
3. Is the thesis of this paper in some way related to the psychoanalytic conception that the human mind is like an iceberg with the huge mass ("the unconscious" and by analogy "the spiritual") concealed beneath the surface of the water and analyzable only by indirect evidence or techniques?
4. Is the problem raised by this paper totally irrelevant in an age in which most scientists already have rejected "scientism"?
5. Can one scientifically test the hypothesis that man has a spiritual nature? What operational definitions of basic concepts and what research instruments are necessary for such a task?
6. Is there a spiritual dimension in man which is so much a part of his nature that it eventually will be revealed by science or supported by scientific evidence as its generalizations approach the level of "natural law?"
7. It is commonly assumed by religious leaders that every personal and social problem has a spiritual dimension. Can this be tested scientifically, or is it an extra-scientific tenet of Christian faith?
8. What light, if any, does philosophical and theological phenomenology throw on the problems raised in this paper?
9. "Is it a tenable metaphysical supposition to maintain that the apparently random appears so only because we have not yet comprehended the underlying principle, and that God being infinite, the more perfect his master plan, the more chaotic it is bound to appear, positive and negative entropy being both in a sense maximized?" (John W. Thompson, "Polarity and the Measurement of

Values," *Theoria: A Swedish Journal of Philosophy and Psychology*, vol. 30, no. 1, 1964, p. 30.)

10. Is there a spiritual component in all religions? Or is it postulated only in Christianity?

FOOTNOTES

1. The most important theoretical example of this position is Emile Durkheim, *The Elementary Forms of the Religious Life*, trans. by Joseph W. Swain, now in paperback (New York: Collier Books, 1961). Guy E. Swanson, *The Birth of the Gods* (Ann Arbor: University of Michigan Press, 1960) is a recent, sympathetic effort to test some of Durkheim's views.

2. The best exemplar of this approach is George A. Lundberg, especially in *Foundations of Sociology* (New York: The Macmillan Co., 1939), and *Can Science Save Us?* (New York: Longmans, Green and Co., rev. ed. 1961).

3. Charles Y. Glock, "On the Study of Religious Commitment," in *Review of Recent Research Bearing on Religious and Character Formation*, Research Supplement, *Religious Education*, vol. 57, no. 4, July-Aug. 1962, pp. S-98 to S-110.

4. *Ibid.*, p. S-98.

5. This paper should not be interpreted as a negative criticism of Glock's significant work. His purpose was to try to answer the "question of what is required for a comprehensive and operationally useful definition of religion" and to suggest "a research strategy for meeting these requirements." My objective in this paper is different; it is that of trying to determine whether the so-called "spiritual nature" of man can be studied scientifically. Bible passages quoted are from the Authorized (King James) Version.

6. Dr. Francis Wheeler, a Greek scholar, in personal conversations.

7. In earlier versions of this paper I called this the "transcendental" dimension. That word is used in numerous ways, however, and can be misleading. Furthermore, if ever it is possible to study this component of religiosity, it will no longer be transcendent in the sense of being beyond the possibility of empirical observation. The volition or will may be an important aspect of it.

8. Luigi Sturzo, *The True Life: Sociology of the Supernatural*, trans. from Italian by Barbara Barclay Carter. (London: Geoffrey Bles, 1947).

9. *Ibid.*, p. 17, *passim.*

10. Charles S. McCoy, *The Meaning of Theological Reflection* (New York: Faculty Christian Fellowship, Faith-Learning Studies, No. 1, 1964), p. 10.

11. David O. Moberg, *The Church as a Social Institution* (Englewood Cliffs, N.J.: Prentice-Hall; 1962), p. 439.

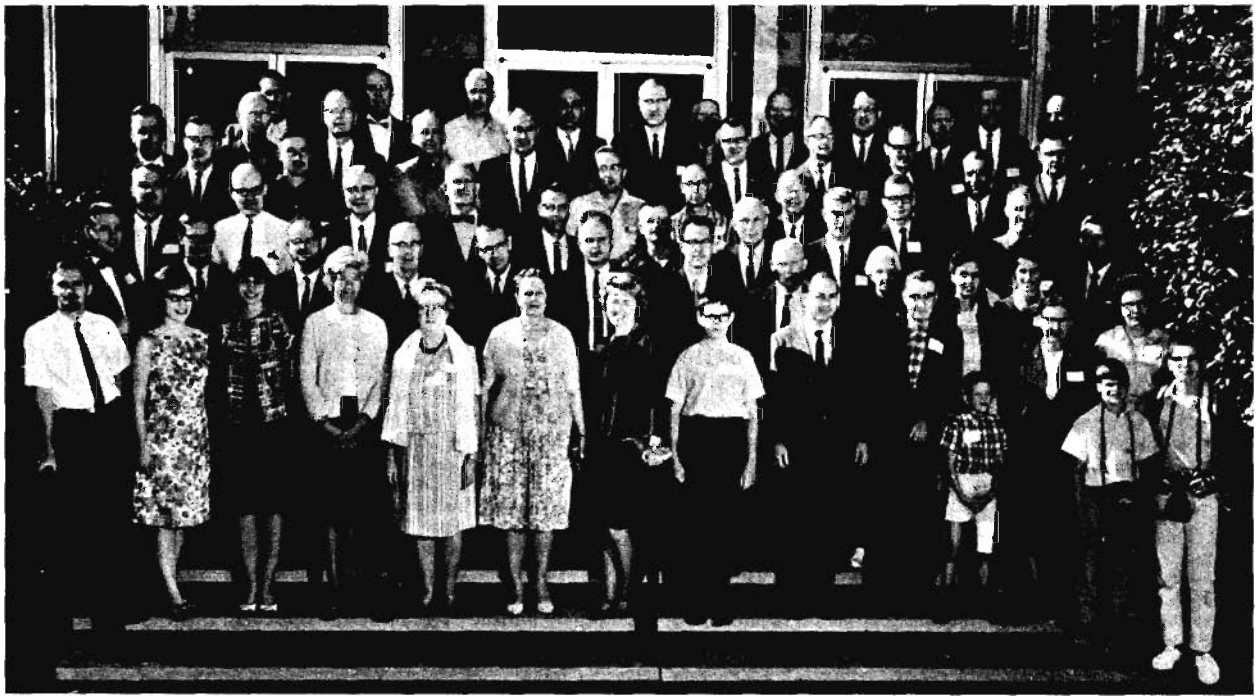
12. Osmund Schreuder, "Church and Sociology," *Social Compass*, vol. 11, no. 5, 1965, p. 11.

13. *Ibid.*

14. David O. Moberg, "The Encounter of Scientific and Religious Values Pertinent to Man's Spiritual Nature," forthcoming.

Starkey (continued from page 26)

15. Tennant, *op. cit.*, p. 86.
16. Hocking, *op. cit.*, p. 64.
17. Richard von Mises, "Causality and Probability," in *Readings in Philosophy of Science*, arr. and ed. by Philip P. Wiener (New York, 1953), pp. 502-503.
18. Harold F. Blum, *Time's Arrow and Evolution*, 2nd ed. (Princeton, N.J., 1955), chap. vi.
19. Tennant, *op. cit.*, p. 87.
20. Otto Struve, Beverly Lynds, and Helen Pillans, *Elementary Astronomy* (New York, 1959), p. 13.
21. *Pascal's Pensees*, ed. and trans. H. F. Stewart (New York, 1950), pp. 19-21.
22. Arthur S. Eddington, *Space Time and Gravitation* (Cambridge, Eng., 1921), p. 98.
23. G. J. Whitrow, *The Structure and Evolution of the Universe*, Harper Torchbooks / Science Library (New York, 1959), pp. 72-74.
24. Arthur S. Eddington, *Fundamental Theory* (Cambridge, Eng., 1949).
25. Paul Couderc, *The Expansion of the Universe*, trans. J. B. Sidgwick (London, 1952), p. 227.
26. Schrödinger, *op. cit.*, pp. 2, 8-17, and 82-84.
27. G. C. McVittie, *General Relativity and Cosmology*, in The International Astrophysics Series, ed. M. A. Ellison and others, Vol. IV (New York, 1956), chap. v.
28. *Leibniz: Selections*, ed. Philip P. Wiener. In The Modern Student's Library (New York, 1951), pp. 91-92 and 347-355.
29. See my "Cosmos, Life, and God," chap. x, second subsection.
30. Tennant, *op. cit.*, p. 80.
31. Leibniz, *op. cit.*, pp. 522-524. *Cf.* also Pierre Teilhard deChardin, *The Phenomenon of Man*. Harper Torchbooks/ The Cloister Library (New York, 1961), chap. ii. "The Within of Things."
32. Genesis 1:2.
33. Contemporary Barthianism, however, has made the required adjustment, but has gone too far inasmuch as it repudiates *all* natural theology.
34. Schrödinger, *op. cit.*, pp. 82-84.
35. J. C. Eccles, *The Neurophysiological Basis of Mind*, the Waynflete Lectures of 1952 (Oxford, 1953), cited in E. L. Mascall, *Christian Theology and Natural Science*, the Bampton Lectures, 1956 (New York, 1956), p. 232; and J. C. Eccles, "Hypotheses Relating to the Brain-Mind Problem," *Nature*, 168:53-57, July 14, 1951.
36. James N. Davidson, *Biochemistry of Nucleic Acids*, 4th ed. (New York, 1960).
37. J. Bernal, "The Scale of Structural Units in Biopoesis," in U.S.S.R., Academy of Sciences, *The Origin of Life on the Earth: Reports on the International Symposium: August*, 1957, *Moscow*, ed. A. Oparin and others (Moscow, [1957]), p. 153.
38. Stephen Zamenhof, "The Chemical Basis of Heredity Determinants," in *Essays in Biochemistry*, ed. S. Graff (New York, 1956), p. 324*n*.
39. George Gaylord Simpson, Colin S. Pittendrigh, and Lewis H. Tiffany, *Life: An Introduction to Biology* (New York, 1957), p. 78. The figure 500 includes only those proteins which have been "isolated and identified." Simpson conjectures, however, that "there must be . . . well over a million different kinds of proteins in the whole world of life." In either case, there is no comparison with Zamenhof's figure of 10^{9000}. As expressed by Sidney Fox, "the number of protein isomers . . . that have appeared during evolution must be an infinitesimal fraction of the total number possible." Sidney W. Fox and Joseph F. Foster, *Introduction to Protein Chemistry* (New York, 1957), pp. 434-435.
40. Arthur Kornberg and others, "Enzymic Synthesis of Deoxyribonucleic Acid," *Biochimica et Biophysica Acta*, 21:197-198, 1956. The syntheses accomplished since this was first written reveal how meticulous are the processes by which the bases or amino acids must be selected and ordered along the chain. The conclusion still stands, *viz.*, that this is a "type of order probably producible only under the direction of a designing mind," in this case that of the biochemist.
41. The calculations of Professor Guye are described by Pierre Lecomte du Nuöy in *Human Destiny* (New York, 1947), pp. 33-35. The original work is C. E. Guye, *Les Frontières de la Physique et de la Biologie* (Geneva, 1936).
42. The point of the illustration is effectively stressed in the paper by Bernal, *op. cit.*, p. 153.
43. *Cf.* Walter M. Elsasser, *The Physical Foundation of Biology* (New York, 1958), pp. 86-87. Elsasser, referring to the belief that negative entropy (or "information") can arise spontaneously by chance, concludes by affirming "the complete irrationality of any such proposition."
44. Our own president, Dr. V. Elving Anderson, lists natural selection among the principles which "are accepted by most ASA members without serious question" ("The Goals of the ASA — A Personal View," *Journal of the American Scientific Affiliation*, 17:35).
45. O. Hoffman-Ostenhof, "Der Ursprung der Enzyme," in the previously cited *Moscow Symposium*, pp. 129-130.
46. *Cf.*, Sydney W. Fox, ed., *The Origins of Prebiological Systems* (New York, 1965), which presents the proceedings of an international symposium held in Florida in 1963.
47. The amount of information is fantastic even when all redundancy is excluded (*cf.* Henry Quastler, ed., *Essays on the Use of Information Theory in Biology*, Urbana, 1952).



Picture Taken at Annual Convention at North Park College, Chicago, August 1966

First Row
Bruce Rowat
Mrs. Gary Collins
Mrs. John Peterson
Mrs. D. Y. Ferguson
Mrs. I. A. Wills
Mrs. F. G. St. Clair
Mrs. Arnold Kriegbaum
Tony Ferguson
Oliver Titrud
William Tinkle
Gordon Ault
Marie H. Berg
Marilyne Backlund

Second Row
Daniel Herrick
Elam Peachey
Harold Hartzler
Irvin A. Wills
Philip Harden
Robert Knudsen
William F. Campbell
John Howitt
Mrs. J. O. Buswell Jr.
Lee Klein
Ruth Ault

Third Row
Maurice Burns
Gary Collins
Martin Wyngaarden
Wilbur B. Wallin
Kenneth V. Olson
Walter R. Hearn
Irving A. Cowperthwaite
George R. Horner
Wayne U. Ault
Edwin A. Olson

Fourth Row
Dale R. Herman
Harry Lubansky
Ivan C. Howard
Arthur A. Smucker
Henry Weaver, Jr.
Clifford D. Anderson
John G. Peterson

Fifth Row
Elmer S. Yoder
George H. Fielding
Robert Fischer
Frank Cassel
Arnold R. Kriegbaum
Wayne Goodwin
George A. Turner
Wayne Frair
Jim Kennedy

Sixth Row
Elroy Robinson
Charles W. Tatter
Charles Hatfield
Wilbur L. Bullock
Robert G. Ziegler
R. E. Hoisington
Dr. Buswell
Donald W. Munro
V. Elving Anderson
F. Alton Everest
Fred St. Clair

Contributing Editor, Dr. Lars I. Granberg, New President at Northwestern College

Dr. Lars I. Granberg, Acting Vice-President for Academic Affairs at Hope College, Holland, Michigan, has accepted the appointment of the board of trustees of Northwestern College, Orange City, Iowa, to become president of that institution. He succeeds Dr. Preston J. Stegenga to become the college's fourth president.

Dr. Granberg, a native of Norway, received his B.S. in anthropology from Wheaton College, Wheaton, Illinois, served in the Armed Forces for over four years during World War II, and obtained his M.A. and Ph.D. in the field of psychology from the University of Chicago. Dr. Granberg joined the Hope College faculty in 1947 and was made chairman of the Department of Psychology in 1952. From 1954 to 1960 he served as Dean of Students and Associate Professor of Pastoral Counseling and Psychology at Fuller Theological Seminary in Pasadena, California. In 1960 he rejoined the Hope College faculty as professor of psychology and staff psychotherapist in charge of student counseling service.

Dr. Granberg is a member of the American Psychological Association and the Christian Association for Psychological Studies, serving on its board of directors. He is a member of the Commission on Psychology and Psychiatry of the American Scientific Affiliation. Dr. Granberg has been a regular contributor of articles to professional and religious publications.

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NECESSITY AND PURPOSIVENESS IN THE COSMIC SETTING AND HISTORY OF LIFE

LAWRENCE H. STARKEY*

The teleological argument for God has been clouded by the indiscriminate reading of purpose into all *biocentric circumstances. To rescue it from this abuse, we must first concede that physical (as opposed to biological) reality is necessary instead of designed and that the Creator has* sought out *nutritive environments (like earth) instead of deliberately fashioning them. Far from being designed, the amino acids were* at hand *at the origin of life, and the biocentric properties of water (hailed as teleological by Henderson) merely reflect the uniqueness of the hydrogen bond, while those of hydrogen in turn reflect a cosmological necessity.*

If the physical realm leaves the teleologist cold, however, the biological realm displays in its history the imprint of a Selective Cosmic Mind — encoding the DNA molecule and, through snowballing processes which span the gap from quantum to molar levels, originating the qualitatively new structural plans described in Schindewolf's palaeontology.

To many a Christian philosopher who cultivates an interest in science, the physical and biological realms provide intriguing documentation of the nature and character of God; *i.e.*, they provide the empirical data from which he reads out a natural theology, as he reads a revealed theology from the Bible. Moreover, just as we need a hermeneutics for the study of the Bible, we also need to develop principles of interpretation for the reading of creation's meaning; for all too often we misread her meaning or claim to find meaning where none exists.

One of the closest common analogies to the problem of reading nature's meaning is that of the archaeologist who reads his history or pre-history in the cultural artifacts — architecture, pottery, art objects, tools — which he finds. But an artifact is, by definition, something fashioned after some pattern in the mind of the maker — a very improbable type of *order* having been imposed upon the raw material. If God is then in any sense a Person, we must watch for *pattern* and *order* in nature as we search for evidences of the Master Artisan, *i.e.*, for His artifacts.

There are many kinds of order, however, as Schrödinger has shown in his little book, *What Is Life?*[1] Even the normal curve has an orderly shape, though it actually depicts utter disorder. Hence natural theology must be discerning in its appeal to order as evidence for God. The attempt to read a theology in such statistical phenomena as the second law of thermodynamics or the virial theorem is therefore a dubious procedure which may yield merely a "God of the Law of Averages," a concept singularly uninspiring, at least to me.

The order gracing some of nature's crystals is more inspiring; yet here, too, the pattern seen is the result of a random process which merely reflects, on a molar scale, the polarity of the individual atoms. If these are Divine artifacts revealing, as has been claimed, the Creator's sensitivity to artistic values, this would be because of His design of the atom rather than of the crystal itself. Yet we shall find reason to doubt the presence of purposiveness even at the atomic level, inasmuch as the elements themselves are the necessary product of random processes occurring, as we believe today, in the centers of ultra-hot stars.[2]

In due time these considerations will be further examined; but meanwhile, let us hasten to add that there is a type of order, I believe, in which we *can* read a natural theology. It is in the nucleic acids of the chromosomes, *i.e.*, in the genes of the DNA molecule, in the aperiodic order of the bases along its chain — an order as different from those of which we have been speaking as a carefully patterned garden is from a chaotic patch of weeds. These are the IBM cards, as it were, which completely program the development of the organism. While the concept of randomness dominated

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our earlier types of order, the DNA molecule displays a type of order dominated by the concepts of "meaning" and "selection." This is why the word "code" comes most naturally to mind when speaking of these aperiodic DNA sequences.[3] And because such sequences are hard to explain except in terms of a mind which orders the bases as an author orders his words, I believe it is here, and perhaps here only, that the concept of Divine ordering finds valid application.

A word of caution is needed, however, even with respect to this type of order: for, in any *individual* organism, these genetic patterns are borrowed and new chromosomes are formed by non-vitalistic, random processes, so that the problem of how these patterns originated is a palaeontological issue, involving those rare occasions thinly dispersed through the long history of organic development when new Baupläne (or structural patterns) suddenly arise.[4] For, apart from these extremely rare transformations, the Biblical dictum "after its kind" prevails in extremely mechanical fashion as the DNA molecule untwines itself and the processes of reduplication transpire. Let us tentatively assume, then, that, apart from God's contact with us through Holy Writ and through His I-Thou encounter with us as persons, the most straightforward instances of His action in the world are those witnessed, as it were, by the palaeontologist as he unearths evidences reflecting the sudden appearance of some brand new biological structure – a new type of tooth pattern, a new geometrical schema for the generation of septa, or the sudden appearance of large new associational areas in the brain.

But how about His action, if any, in the physical world as over against the biological realm? Is His purpose discernible in the types of order arising in the physical universe, which provides the cosmic setting for the drama of life? It is only fair to warn you at the outset that, if a critical hermeneutics of nature is applied at this point, we shall uncover here the limbo of many pet theories of natural theology. We shall seek in vain, for instance, the supposed purposiveness in the great 19th Century concept of "the order of nature," defended in detail as late as 1937 by F. R. Tennant,[5] *i.e.*, in the order displayed in such things as the laws of physics, and the trajectories of the planets. In short, I hope to show that the student of natural theology should work in the biological rather than in the physical sciences.

Before plunging into these problems, however, let us first clarify several useful philosophical terms. Let us distinguish, for example, two types of *purposiveness*:[6] Purposiveness, P_g, is defined as "*goal*-directed activity." In this type of purposiveness no questions are asked about how the mechanism or organism became capable of goal-directed activity; such capabilities may, in fact, have arisen by random processes and have been preserved by natural selection. Purposiveness, P_i, however, is defined as "goal-directed activity governed by the selective action of a mind which *intends* to achieve the goal," thus the i in P_i Clearly, the purposiveness of a personal God is P_i, though that of Wieman's "Divine Creativity" could well be merely P_g.

If there are thus two kinds of purposiveness, there are also two kinds of *necessity*. Necessity, N_m, is that type of *mathematical* necessity in which purely geometrical or formal considerations exclude the possibility of any alternatives. It is conceivable, for example, that a purely geometrical proof could be given that a cosmological model whose space has the curvatures actually observed to occur in the vicinity of dense material masses must *necessarily* be that of a closed, finite, Riemannian universe. I claim only that such a proof is conceivable, not that it has been done. The other type of necessity, N_p, or physical necessity, is that by which no alternatives are possible because the stage is so set that the causes are already in operation which inevitably lead to one and only one result. A certain type of star composed largely of hydrogen provides a case in point, for example, because these stars, wherever and whenever in the universe they are found, always generate in their ultra-hot centers the same stew of elements from helium through iron with which we are familiar in the periodic table.[7] There is apparently some physical necessity in the nature of these stars and in the laws of nuclear physics which decrees that these shall be the only types of material atoms capable of existing in a universe which begins as a cloud of hydrogen gas.

These definitions may be summarized in the form of a table as follows:

TABLE I. DEFINITIONS OF PHILOSOPHICAL TERMS

	PURPOSIVENESS		NECESSITY
P_g	Goal-directed behavior. E.g., teleological mechanisms	N_m	Mathematical or formal necessity. E.g., finite cosmology
P_i	Goal-seeking behavior involving intent. E.g., God's creative activity	N_p	Physical necessity. E.g., origin of the heavier elements

TABLE I

In a manuscript not yet published,[8] I have endeavored to survey the overall cosmic development as known to modern science discriminating carefully between those features manifesting either mathematical or physical necessity and those to which we may reasonably impute purposiveness. In this endeavor I am greatly indebted to Hocking for stipulating three conditions which every situation must fulfill before we may confidently impute purpose, P_i, to it.

> In the first place [he writes], the result must have *some assignable value*. . . . In the second place, there must be some evidence that the process *tends to preserve* what it has produced. . . . But even yet, we would hardly have enough ground to assert purpose unless we could see that *the means* by which the result was brought about were somehow *selected* from many other possible sets of causes, and not merely random combinations of events.[9]

We shall find, in particular, that much teleological thinking collapses under the third criterion — that many alternatives must subsist from which the selection could have been made; for no situation governed by necessity, no matter how goal-directed, P_g, it may be, can be shown to be purposive, P_i, *i.e.*, it cannot be directly attributed to God.

The implication, involved in my survey of the cosmos, that even in God's creation some things may be purposive and some things not may at first seem irreverent and heretical. But creativity as we know it in human affairs always operates within certain necessary limits. Hence, the concept of an artifact combining purpose and necessity is not at all incongruous. The bow of William the Conqueror, for example, was an ordinary physical object, composed of raw materials arising for the most part from the necessities of nature. But "Why," writes Hocking,

> is it just so large? There is no mechanical answer, but purpose explains it at once. It must be stout enough to defy all other arms: it must be not so stout as to defy his own.[10]

The artist, like the craftsman, always operates in a medium, something usually given by nature, which he molds to express his purpose. Yet we do not claim that nature intended, P_i, that the medium would be so used even though it may be very apt, P_g, as in the case of dyes made from the bodies of scale insects. Hence, we do not impugn the glory of God the Supreme Artisan when we suppose that He works in a medium whose properties stem from necessity, N_m, and/or N_p, and not from His design, P_i. Adapting a concept from modern theology, we shall therefore argue that there is a non-teleological Given with which God works[11] — apparently a very refractory medium, since His work has taken so many millions of years.

The key materials in the Artist's medium are, in this case, the amino acids and the nucleotides — the building blocks, respectively, of the proteins and the genetic materials DNA and RNA. Several years ago, Miller presented experimental evidence in which amino acids arose automatically or of necessity, N_p, from electrical discharges in a simulated primitive-earth atmosphere.[12] Recently adenosine triphosphate, life's energy carrier, has been synthesized in a somewhat similar manner by Carl Sagan.[13] Hence, we may consider that these building-block substances were present to God at the origin of life in much the same way that woodlands, water, soils, and herbs are available to a man pioneering in a new land.

Let me stress the fact that the purposiveness of intent, P_i, is not discernible in these building blocks (amino acids and nucleotides), since they fail to satisfy Hocking's third criterion which stipulates, in effect, that the phenomenon must not be necessary. But these are produced by ordinary chemical reactions whose repeatability witnesses to their necessity, N_p. Hence anyone attempting to read Divine design, P_i, in the type of order exhibited in these substances must regress to the simpler gases of the primitive atmosphere — to the water, methane, carbon dioxide, etc., of Miller's experiment — and try to show that these simple molecules are somehow purposive.

Many years ago an impressive attempt to do just this was made by Lawrence Henderson in a highly acclaimed book entitled *The Fitness of the Environment*.[14] Marshaling an encyclopaedic wealth of quantitative data on the properties of simple chemical substances and their fitness to serve as the basis of life, he organizes this data in lists, each representing some property essential to life. Henderson shows that, when evaluated in this way, those compounds (H_2O, CO_2, etc.) actually prominent in physiological processes are invariably found at or near the top of list after list of comparable compounds. He finds that, in one and the same substance, take water for example, an incredible series of maxima (with respect to fitness) are combined. The philosophical theologian, Tennant, assesses this result by writing that

> Unique assemblages of unique properties on so vast a scale being thus essential to the maintenance of life, their forthcomingness makes the inorganic world seem in some respects comparable with an organism.[15]

Table II, for example, adapted from Henderson's chapter on water, shows that (except for two minor exceptions) water is at the top of every list of properties regarded as biologically important. Other properties in which water excels are in its capacity as a solvent, its specific heat, and its unique behavior at the freezing point.

This remarkable coincidence of facts, like a straight run of a dozen or so perfectly lucky throws of the dice, seems so improbable that one tends, with Hocking, to conclude regarding the physical universe that it is "reasonable to call it *biocentric*."[16] This data is hard to assimilate without imputing deliberate design, P_i, to the structure of these compounds, lifeless though they be, and ultimately to some of the elements of the periodic table as well. But the issue is not this simple; for Henderson has only proven fitness (purposiveness, P_g) and not the purposiveness of intent, P_i. In fact, here again Hocking's third criterion is devastating when it asks how improbable is the combination of properties and thus how urgent is the demand for Divine design of the elements. We shall find that the combination is not nearly as improbable as it appeared to be at first.

At this point our hermeneutics of nature demands that probability theory be correctly applied. Probabilities, for example, can only be weighed *in terms of a given population* from which the selection is made.[17] As Hocking's third criterion implies, the population of real alternatives must be large if the probability is to be small. Unfortunately, those who read a purposiveness, P_i, in Henderson's work tacitly assume that the population in question is large, *viz.*, that of all possible mathematical combinations of the relevant physical properties — as though, for example, it were

TABLE II
SUBSTANCES RANKING HIGHEST IN SEVERAL PHYSICAL PROPERTIES
REGARDED AS BIOLOGICALLY IMPORTANT[a]

Substance or Substances 1st[b]	2nd	Dielectric Constant	Surface Tension	Absolute Conductivity	Latent Heat of Fusion	Latent Heat of Evaporation
Mercury	Ammonia		436		108	
Water		81.7	75	0.154	80	536
Sulphuric Oxide	Sulphur				76.7	362
Glycerine	Sodium Nitrate		65		63	
Hydrofluoric Acid						360
Ammonia		(below)	41.8		(above)	295
Formic Acid		57.0	37.1	0.065	57.4	
Methyl Alcohol		32.5	23	0.050		289.2
Acetic Acid	Potassium Nitrate			0.047	47.4	
Ethyl Alcohol		21.7	22	0.042		236.5
Acetone	Hydrocyanic Acid	20.7				211[c]
Ammonia	Acetonitrite	16.0				170.6

[a]Adapted from Lawrence J. Henderson, The Fitness of the Environment (New York, 1913), Chap. iii.
[b]Where two substances are named, numerical data will be found in only two columns, the earliest of which (reading from left to right) pertains to the first substance, etc.
[c]Total heat of vaporization.

TABLE II

equally probable (apart from design) that a high specific heat would be combined with a low dielectric constant or a mediocre capacity as a solvent. These eager teleologists, however, overlook the possibility that the factors involved are not mutually exclusive, *i.e.*, that they could be linked in some way such that, if you choose one property (as a high specific heat), several other properties come along unasked, with the one you specifically chose. Such subtle interdependencies could, in effect, reduce the size of the population to the number of entire *chains* of linked properties instead of the overall number of individual properties. Thus there could be many links, but only a few whole chains.

Henderson was aware of this. But its fatal effect was not brought out until Blum, who devoted a detailed chapter to the up-dating of Henderson's work,[18] showed that strong interdependencies exist between nearly all the properties of water responsible for its fitness. In particular, a unique type of chemical bond, possessed by hydrogen alone, turns out to be the common underlying cause of water's many anomalies. In order to free its molecules, for example, to form steam from water or water from ice, we must break not only the ordinary bonds of molecular attraction, but must sunder these extra bonds as well. Moreover, the other so-called "remarkable" properties are also due to the forming and rupture of hydrogen bonds. The concurrence of all these properties in one substance (water) is thus no longer remarkable at all; and the probability of such "coincidence" is no longer so small as to call for Divine design. For the population in terms of which we now assess probabilities is not that of all the mathematically possible combinations of physical properties, but is, instead, a much smaller one — the population of conceivable types of chemical bonds, types which probably total less than half a dozen.

Tennant's allusion to the "multiplicity of coincident conditions, such as are not reasonably attributable to blind forces or to pure mechanism"[19] now seems singularly inept, since the problem now reduces to the probability or improbability of the occurrence of hydrogen bonds. Henderson's work is therefore, in my opinion, spurious; and the "fitness of the environment" becomes now a fact in the realm of physical necessity, $N_{\bar{p}}$ — a part of the Given available to God before He began His work as the Artisan. Indeed, we shall argue that all inorganic compounds and elements, when traced back far enough, are the necessary products of hydrogen aggregates, and that their properties are emergents from the properties of hydrogen.

This conclusion gains plausibility from the high likelihood that the universe was originally composed completely of hydrogen. "Even at the present time,"

claims Struve, "hydrogen atoms are about 2,000 times as abundant as the atoms of the heavy elements."[20] If, then, the heavy elements were brewed, as we have said, from masses of hydrogen in the centers of hot stars, this implies that all physical phenomena from atoms to stars are, in effect, the disguised manifestations of hydrogen. To be sure, the manifestations may be indirect: This is the case, for example, in a rocket jet which reflects the properties of oxygen and kerosene, while the kerosene reflects those of hydrogen and carbon, and the oxygen and carbon in turn reflect their origin in some primordial hydrogen star.

Let us now pause to review the argument thus far: In a general way we have traced the amino acids, the building blocks of life, back to their constituent elements and then to the single element, hydrogen, and have argued that their properties stem by necessity from those of hydrogen. The view that the building blocks of life (as well as the resulting edifices) are of Divine design, P_i, can now survive — let us stress the point — *only by showing that the properties of hydrogen are contingent* and therefore amenable to Divine design, *i.e.*, that they are *not necessary* in any sense of the word.

I shall urge, on the other hand, that the properties of hydrogen are not contingent, that in fact they *are geometrically necessary*, N_m. I must confess, however, that I come here to the weakest point in the argument; for I am incapable of developing the required proof. At this time, I can only present certain intuitions which have developed through the study of relativity, cosmology, and topology. Notice carefully the subtle turn which the argument now takes: The proof of physical necessity, N_p alone, would logically have involved us in Pascal's endless regress of universes within the atomized atom.[21] Instead, however, the new argument goes only one step further, to the electrons and nucleons of the primordial plasma, and then resorts to a proof of *mathematical* (instead of physical) necessity, N_m — a rationale which more satisfactorily puts the inquiring mind at rest. In short, I shall argue that the properties of the proton and electron issue directly from the geometrical necessities implied in the type of cosmology which satisfies the demands of a joint relativity-quantum theory.

Assuming that matter (*i.e.*, a fundamental particle) can be regarded as a second degree curvature in the space-time continuum,[22] I shall argue, in particular, that the only cosmologies in which such curvatures can arise are those possessing a multiply-connected topology such as that of the moebius strip (in two dimensions) or the Klein bottle (in three) — (see Figures 1 and 2).[23] These surfaces are finite in area and have a reëntrant property such that a snail meandering around the surface could criss-cross both back and front or inside and outside surfaces without encountering a boundary. In four dimensions, this type of connectivity is such that the sharp space curvatures in the vicinity of a particle achieve an angle orthogonal to all three

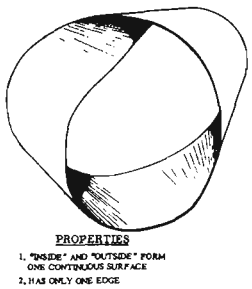

Figure 1. Moebius Strip

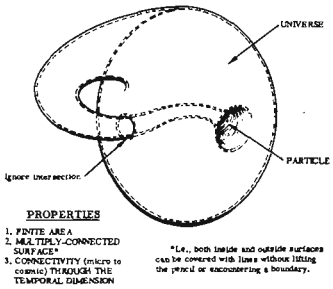

Figure 2. Klein Bottle

dimensions of space and can therefore be geometrically continuous with the outer reaches of the cosmos where the galaxies are receding with the velocity of light. The continuity is through the fourth, *i.e.*, through the temporal dimension; hence the location of the particle is irrelevant. If the electron and nucleon, then, are necessary aspects of a necessary cosmology, it follows that all the properties of matter are necessary.

This is not the time, nor am I the person, to develop such a cosmology in detail. However, this is, in essence, what Eddington was doing when his untimely death left us with no one capable of evaluating his work.[24] Eddington's *Fundamental Theory* was listed by Couderc[25] some years ago as the most highly technical work then in existence on relativity and cosmology. Yet it has also suffered severe criticism. In any case, though Eddington is one of our greatest theoretical physicists, he is deeply convinced that the fundamental laws and constants of nature are deducible *a priori*, *i.e.*, entirely apart from observation — which implies that they are necessary; and he actually supplies such *a priori* deductions in minute, and usually accurate, detail, building on an essentially statistical foundation. Other ranking physicists have also argued that the laws of nature are, in the last analysis, statistical in nature.[26] Hence we have here randomness, again, in contrast to purposiveness. If our reasoning is valid, the theist's dilemma, then, is this: that he can either cling to the dubious theology of a "God of the Gaussian distribution," or he must abandon all theology stemming from appeals to the "order of natural law." In my opinion the former alternative provides such a sterile theology that the argument can be regarded as a *reductio ad absurdum;* hence we must look elsewhere for the type of order which is significant for natural theology.

To summarize the argument thus far, we have traced the physical necessity, N_p, of the physical world, *i.e.*, of any world containing matter, from the amino acids and nucleotides of living matter in regress back to the mathematical necessities, N_m, of statistical theory and of the closed, multiply-connected topology of the Schwarzschild space-time (as it is called);[27] and we found nothing in which the teleologist could gain a foothold for his natural theology. Leibniz' picture of God, at the time of creation, as mentally surveying myriads of *possible worlds*, and considering which

would be the best for Him to create,[28] is misguided if the aforementioned necessities hold; for, at least as regards anything like a *material* world, the choices (as I have shown elsewhere)[29] would appear to be very few. In terms of Hocking's third criterion of purposiveness, then, the statistical population of possible worlds from which such a choice was made would be so small that chance could easily explain the biocentricity of the resulting universe. Hence on this basis, the physical universe, which forms the cosmic setting of life, can only be regarded as accidentally purposive, P_g, and not as intended or designed, P_i.

It would seem, then, that our little earth is "an oasis in a desert of 'chaos,'" as Tennant has put it.[30] To be sure, the oasis has been remarkably maternal in originating and sustaining life. But this maternalism has been overrated. Given a universe of untold billions of stars, almost any type of environment can arise somewhere — even such a cozy spot as the earth. If nature scatters pollen in profusion to assure that a few grains settle upon the appropriate flower, will she not similarly scatter stars and planets to assure that habitable niches would occasionally arise on some protected surface here or there? If there exists then a Divine Selector of worlds, it would seem that His first appearance in the Selector's role would be, not at the beginning of time as Leibniz thought, but at a much later date, after the swirling gases of a universe (originally "without form and void") had condensed into stars and planets. He would appear then, not as a Leibnizian Selector of abstract cosmic world properties, but as the Selector of concrete possible "homesteads," *i.e.*, of specific planets suited to become the scene (or scenes) of the drama of unfolding life.

The picture emerging from this study lends little comfort to idealistic thinkers such as Leibniz who hold that Mind or Spirit lies "within" all matter.[31] As a matter of fact, the view that God pervades the physical world is Baalism and not Yahwehism. It is the pagan fertility cults which believe in a deity who *indwells* nature and is thus responsive to their magic. The Spirit of Elohim (or Yahweh), however, moves UPON THE FACE of the waters, and not within them.[32] Unfortunately, Christian theism, confused by its long alliance with idealism, usually shrinks from yielding this much ground to its ertswhile enemy, deism.[33] But with the rise of the new physics, the time has come to draw back from this excessive reaction against materialism. Let us therefore frankly face up to the primordial deism of Genesis 1:2. We envision, then, in the time immediately following creation, several billion years of nothing but radiation and hydrogen, with no solid matter to provide a stable theatre for the drama of life. Eventually stars form in accordance with certain necessary laws of fluid dynamics. Within these stars first helium is formed and then the heavier elements, eventually to be spewed out to form the planets — perhaps only as a second generation of stars is born. During all this time the Creator found that the medium in which He wished to do His work was too refractory even for His Divine hand. Even after planetary surfaces had formed and their waters had cooled, there would still have been no evident means of implanting order except by violating the laws of physics. If these laws are statistical, however, this would mean, in effect, a rescinding of the law of averages. But we already know that this law does not apply in the case of small numbers. Schrödinger makes a rather obvious point, then, when he shows that, on the level of the molecule (or of small numbers of molecules), the traditional laws of physics are inapplicable.[34]

Here is the opening wedge, then, for a theory by which to transcend our initial deism. Since the physicist has now set us free to assume, if we wish, that order can be implanted with impunity in single molecules, the problem now reduces to that of conceiving how the gap between the molecular and molar realms can be negotiated — how a pattern implanted in one molecule can be reflected on the level of physiological processes. A theology depicting the Creator as One who tenderly implants a pattern in the recesses of reality is more inspiring, at least to me, than one in which He presents a gross show of raw power. And if this implies that His action in matter is confined to those processes, if any, by which a small influence on the micro level can snowball across the gap into the molar world, we must calmly assimilate this truth. Such extremely high-gain processes do exist at present, as, for example, those occurring within the brain. As Eccles has shown, the brain is so structured that the discharge of a single neuron can involve many hundreds of thousands to several million other neurons within a fiftieth of a second.[35]

But there were, of course, no brains in existence in primaeval times. What kind of snowballing processes might there have been, then, to which the Divine Artisan could resort as the planetary surface cooled? It is easy to answer this question in retrospect. For we know now that the Artisan employed the amino acids and/or the nucleotides, some of which, as Miller's experiment has shown, must have been at hand. As is well known, the nucleotides, when polymerized into long chains, form nucleic acids, some of which, in the form of RNA or DNA, are able to synthesize proteins.[36] This they do repeatedly, *i.e.*, a single nucleic acid chain can synthesize thousands of identical protein molecules — the chain comprising, as it were, a template off which the proteins slough themselves one after another. Here is a snow-balling process by which a pattern imposed upon one lone molecule can be reduplicated in thousands of analogously patterned protein molecules — in short, this process can generate relatively large aggregates so that the resulting protein can exist in a concentration adequate for it to function as an enzyme within the fluids of the cell.

At this point, however, Leibniz's concept of possible world-properties gives way to that of possible proteins; and our natural theology begins at last to find solid rootage. For while on the one hand, we have seen that world properties and the properties of elements

and compounds arise by necessity from mathematical and physical considerations, there is, on the other hand, no significant constraint upon the order in which the bases can occur in a nucleic acid or in which the amino acids can occur within a protein. Hence, if every permutation of amino-acid ordering is considered to constitute a different protein (and it is known in the case of insulin, for example, that the order must be almost perfect for it to perform its biological function), then the number of possible proteins is absolutely astronomical. Some conception of this almost infinite number can be obtained from Zamenhof's statement regarding the varieties of parent DNA (whose molecules extend to lengths of 1,000 A or more[37]):

> Assuming the molecular weight of DNA to be of the order of 5×10^6 [writes Zamenhof],[38] the number of possible combinations of sequence of different nucleotides for the DNA molecules of just one composition is of the order of 10^{9000}.

But the biologically functional proteins known to Biochemistry number only about 500.[39] Presumably many other possible proteins could have been biologically functional but were bypassed in the processes of biological descent. As compared with the almost infinite number of possible proteins, however, it seems that functional proteins must comprise an extremely small percentage of the total. Hocking's third criterion of purposiveness, P_i, is finally fulfilled; for here at last we have a phenomenon (functional proteins) which is highly purposive, P_g, but which also belongs to a very large statistical population of alternatives of the same order of likelihood. The effort to attribute the rise of proteins to the random jostling of atoms appears, then, to be the vain gesture of a declining materialism.

To be sure, the claim has been made that protein-synthesizing nucleic acids have already been artificially produced in the laboratory. This is only partly true. Nucleic acids having randomly ordered bases have been produced; but these cannot synthesize proteins. On the other hand, the nucleic acids which *can* synthesize proteins are not completely artificial, since the ordering of the bases can be accomplished in the laboratory only by priming the solution with one, or a few, molecules of *Nature's* DNA to supply the coded template.[40] (See note for comment on recent syntheses.)

Let me stress that this requirement is no small thing; for, in effect, the primer supplies a code upon which Nature's Programmer has been at work for many millions of years. The difference is similar to that between the computer which is fed a pack of randomly punched cards and that which is fed a deck of carefully programmed instructions. In short, *order* has been added — not the order of the law of averages nor that of the laws of nature nor of a periodic crystal, but the order of an aperiodic sequence selected in accordance with the canons of meaningful purposiveness. It is the type of order probably producible only under the direction of a designing mind.

At this point, one usually resorts to a computation which displays, in fantastic figures, the improbability of the rise of a protein molecule by the random jostling of atoms. A classic effort in this direction is that of the brilliant Swiss physicist Charles-Eugène Guye, who considered a molecule of dissymmetry 0.9, composed of 2,000 atoms of only two kinds.[41] Though these assumptions are very conservative (egg albumin, for example, has 34,500 atoms of several different kinds), the probability that a molecule of such dissymmetry could arise by pure chance turns out to be 2×10^{-321}.

There is a fatal defect, however, in the conceptual model employed by Guye, since he failed to consider the effects of natural selection. The radical difference produced by these effects can be appreciated when the random jostling of atoms is seen as analogous to the drawing of balls in the following illustration.[42] Let us take a large bag of balls — containing hundreds of balls, in fact — each imprinted with a letter of the alphabet. We draw out balls at random, two at a time, three, four, five at a time, etc. The rule of procedure at this stage is that, if at a given drawing the letters on the balls cannot be arranged to spell a word, the balls are thrown away (or shuffled back into the bag); but if they do spell a word, that word is written in full on one of the balls and this ball is put into a separate bag by itself. More drawings are made and the same procedure followed. Soon by chance another word will be formed, the word will be written in full on one of the balls, and that ball too will be thrown into the special bag. After a modest amount of time, the special bag will contain a considerable assemblage of real words. We then turn to this bag and draw out balls in groups of two, three, four, etc., and apply the rule that, in order to be saved for a third bag, the balls of a given drawing must be capable of arrangement into a syntactically acceptable relationship — such as "to town," "going well," "made two boats," etc. Combinations such as "town point," "well plus," "made a boats," etc., would be rejected. By now you can surely guess that the next step will be to put the former phrases on the balls which are to go into a fourth bag and that these balls will be sorted on the basis that meaningful clauses should be retained. This procedure, if continued to a fifth or sixth bag or more will within a reasonable time yield complete meaningful sentences and, indeed, will yield the sonnet which the proverbial battalion of monkeys typing aimlessly and endlessly was alleged to produce [43] — or rather, it will yield its own quaint verse, hardly a Shakespearean sonnet. Clearly, the probability of generating a verse in this fashion is high as compared with the extremely low probability of generating one by the haphazard jostling of single letters. If the primordial jostling of nucleotides or amino acids occurred, then, in accordance with this model (rather than according to that of Guye), the chance rise of functional proteins could hardly be regarded as improbable.

In proposing this new model, materialism makes one of its strongest appeals. In effect, she has extended the principle of natural selection backward to apply

to the evolution of large organic molecules prior to the origin of life. If I am right, then, in supposing that the current eclipse of natural theology is due more to the impact of natural selection on the scholarly mind than to any other influence, what, then, is the impact of this new extension of the principle?

I believe that the discriminating mind, which avoids unyielding extremes, finds here its opportunity. For the enemy of natural theology may turn out to be not natural selection as such,[44] but its application on levels where its efficacy is questionable. As Hoffman-Ostenhof argues, for example, there is some reason to doubt whether natural selection could have acted before the origin of reproduction,[45] since a lone molecule happening to arise, though it may exhibit a biologically functional pattern, could not exercise that function except *en masse*. But it cannot exist *en masse*, since its rise in the first place was such a rare event. Moreover, life, like the functioning of a moon rocket, requires the concurrent action of multitudes of systems and subsystems (enzymic systems, in the case of living organisms) in order to have any degree of success at all; and even the simplest forms of life must already be so extremely complex that the difference between them and the highest forms is, in this respect, relatively trivial.

If I can do nothing in the present paper but identify the crucial questions, it will have been worth while. Let me stress, then, the question emerging from the illustration of the lettered balls, *viz.*: what natural processes, if any, can we envision which could exercise such a selective action as the segregation of combinations forming words, phrases, etc.? *i.e.*, is there in nature a principle of *Zweckmässigkeit ohne Zweck*, P_g, which gathers and preserves those polynucleotides and proteinoids destined to be incorporated into functional macromolecules and ignores those vastly more numerous ones which show no promise? At this point we should by all rights yield to our own Walt Hearn, who could detail the many explanations for us — telling of the formation of coacervates, adsorption on crystalline surfaces, evolution of increasingly complex enzymic systems, molecular preadaptation, spontaneous rise of proteinoids and microspheres, etc. Time forbids elucidation of these concepts, which in any case are familiar to those of you who have followed the exciting inquiries conducted in recent years on the origin of life.[46]

We welcome these discoveries for the light which they throw upon the medium in which God the Artisan has worked, suggesting (to cite but one case) that proteinoids instead of amino acids may have been His building blocks. But these inquiries leave me cold when they touch on the question of how, within an environment which from the standpoint of information theory provides an input of pure noise, the fantastic amount of information arose which characterizes a living organism.[47] For the difference is as radical as that between a computer and its input deck, or rather between the raw materials of the computer and the information of the deck — since the computer itself, as well as the deck, is the product of ingenious design.

If we were dealing here with a distinction in mere complexity of material systems and physical, or even biological, laws — as, for instance in the distinction between physical and organismic conceptions — an appeal to the God who fills in the gaps not yet filled in by scientific explanation would be precarious. But we are dealing, instead, with a qualitative distinction — that between *physical process* and *information*, between a carrier wave and a message. But by definition messages are ultimately the product of *minds* and not of things, as even the Russians must have learned from examining their R&D software budgets. Hence, the invoking of a Divine Mind to fill this gap is philosophically unreproachable.

In conclusion let us note that the encoded DNA molecule satisfies all three of Hocking's criteria for imputing purposiveness: the code performs the useful function of programming the development of an organism; it preserves itself with remarkable fidelity; and, finally, the biologically functional proteins whose structure it describes are a relatively small class within an extremely large class of possible proteins so that ample scope for selection exists. It is therefore a reasonable act of faith by which a natural theology, discredited in the area of the physical sciences, is revived as the mysteries of the biological realm are explored and the teleology of nature's Artisan is revealed.

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(continued on page 17)

THE CHURCH AND TODAY'S TECHNOLOGY

EDWARD R. DAYTON*

To most men and women in the church the word *science* and the word *church* seem to stand in contradistinction. Without attempting to trace a complete history of what produced this tension, it may be helpful to sketch some of the reasons for it. We suggest that at the heart of the matter was the conservative church's strong reaction to the Darwinian theory first promulgated in the nineteenth century. This theory appeared to align "science" on the opposite side of the fence from the Church. It was science that was trying to undermine the scriptures. It was science that was leading us into a new rationalism where religion was no longer necessary. It was the "scientific approach" which contributed to the development of higher criticism of the Bible and cast grave doubts on anything miraculous, anything outside of what was provable and reproducible in the laboratory. The second contributing factor was the tension between a science seeking to unlock the mysteries of life and a rather simplified view of the Christian life that was inherent in the revival techniques of the last century. This in turn, led to a definition of faith which was apparently based on the conviction that the less that was known about the future, the greater the amount of faith that would be needed to face it. If we had weighed all of the possibilities, if we had used all of our scientific knowledge to anticipate the future, where-in lay faith?

The hang-over from this science versus Christian dialectic is still with us. Most discussions between "science" and "Christianity" seem to center around our ability or inability to find a match between discoveries of science and what we find in the historical portions of the Bible. This dialectic can even be felt at the level of the typical church board meeting. How often it appears that the scientist or the business executive is being asked to check his brains at the door before entering the hallowed sanctuary of the church.

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Again, how often we parade our most eminent scientist across our church platform as an example of the fact that it *is* possible to be a scientist and still be a Christian. The unspoken inference is, of course, that that *does* take faith!

The result of all this is a compartmentalization of our work as scientists and engineers outside of our total Christian life, and though many are making an honest attempt to find a Christian ethic for their operation within their secular calling as scientists, most of us have an uneasy feeling that what we are doing could not be applicable to the task of Christ's Church. In fact, the attitude of the Church toward the seemingly sophisticated and esoteric sciences of 1967 is one that would appear to hold us at arm's length.

A small break-through towards understanding has perhaps come about as a result of the author's decision in 1964 to leave the aero-space industry and attend a theological seminary.

In early 1965, Dr. Ted Engstrom, of World Vision International, and the writer discussed the possible application of the World Vision IBM computer for the task for missions. Subsequent to this conversation a meeting was held with Dr. David Hubbard, President of Fuller Seminary, and Dr. Donald McGavran, Dean of the School of World Mission and Institute of Church Growth at Fuller. In December of the same year a meeting was convened between a group of areospace scientists and executives and mission leaders. The aerospace people were asked, "If your company had a contract to evangelize the world, how would they proceed?"[1] As a direct result of these stimulating and thought-provoking discussions a three month seminar was held at Fuller in which a group of experienced missionaries were led through a planning session, using the PERT (Program Evaluation and Review Technique). From this seminar it became apparent that there are three major areas where current scientific tools can be effectively used in the task of winning men to Christ:

1. *Research and development* in the areas of sociology, anthropology, and modern mission methods.
2. The establishment of a computer based *information and communication* center which would collect, analyze and disseminate information on all aspects of the mission task.
3. The use of sophisticated management tools, particularly in the area of *disciplined planning*.

As a result of these studies, World Vision International and Fuller Theological Seminary are jointly sponsoring the Missions Advanced Research and Communication Center, (MARCC). This center, which is presently located at Fuller Seminary, is seeking to implement solutions to the problems presented by the study seminar.

Information and Communication

Today there does not exist in the Christian world an effective information and communication center. The few bi-yearly publications that try to cover this

1. See "Computerized Evangelism?", *World Vision Magazine*, March 1966.

field are grossly inadequate for the need. A survey of all the North American missionary societies demonstrates that enlightened mission executives rate the need for such a center as extremely great. MARCC seeks to meet this need by establishing an information and communication center based on the World Vision IBM 360, Model 30 computer.

This is the age of electronic data systems. Our ability to handle facts and to draw conclusions from them defies the imagination of the layman. Facts which were useless to us ten years ago are now worthwhile and meaningful because of the speed with which they can be considered and utilized. All over this country and in various parts of the world significant work is being done on information management systems. New library systems are being established; new ways of profiling and cataloging people and companies and products; new ways of displaying information – all these are operating to change our way of life. Industry has been quick to seize these new tools. We find complete manufacturing operations now capable of predicting the impact of a proposed request for quotation. We find information systems providing data to those needing it on a selective basis without their calling for it. We find such operations as the Center for Applied Science and Technology (CAST) at Wayne State University which now has in its electronic memory 240,000 documents and is adding to this 7,000 documents a month.

In this milieu of wide-spread transmittal and gathering of information the Church finds itself years behind the times. This starts at the grass-roots where there is little appreciation of the power of the gathered data. Weekly, monthly, and yearly statistics are lacking in most Christian organizations. There is little clear definition of terms, and there is a tremendous lack of communication between and within missionary societies, as well as in the local church.

This project will lay the groundwork for an Information and Communications Center which hopes to be of service to the entire Church. It will eventually interact with information centers throughout the world. It will be concerned with not only theological, but sociological, anthropological, political, and economic data. Profiles will be made of each country of the world in terms of the missionary endeavor. Information will be stored concerning which missionary societies are operating where and with what results. Information about the background of the people whom we are trying to reach will be stored and analyzed. Such information will be made available to all Christian missionary societies.

Education will be done in the wherewithal of data gathering and data analysis.

A pilot project to test the validity of this concept is now being started. A staff of volunteer programmers and system analysts is being recruited. Information about various individuals serving in the mission task is being catalogued and put in electronic storage. A pilot country will be selected, and a test will be run on the gathering and exchange of information to the missionary societies and the churches working in this country. This project, which will take approximately two and one-half years, will be used as a demonstrator to not only find out errors and make corrections in the system, but also as a means of educating those in other countries as to the possibilities and the power of information systems.

Research and Development

The School of World Mission and Institute of Church Growth now operating at Fuller Seminary is attracting experienced missionaries to do graduate study. It is anticipated that the enrollment in the School will shortly reach the level of 60 missionaries from all denominations. This represents a tremendous source of research information. In order to build upon the good beginning that has been made much additional research and development (pilot study testing) needs to be done. Field studies of Latin America have shown the need for comparable statistics to be gathered and analyzed from all over the world. In addition much study needs to be done about the anthropological and sociological characteristics of the people whom the Church is trying to reach. Such research must be based on good information and communication – hard facts.

Management Technology

A cursory survey of those responsible for the conduct and operation of mission organizations will show that those in charge have minimum management experience and training. There is little appreciation that the definition of measurable goals is the first step in solving any problem. What is needed by most missionary and church organizations is a planning method, a way of thinking about things, a procedure for getting at the real problem. PERT which has been used on all major and most minor government development programs since 1959, is one of the tools which could easily be adopted by missions. If mission leaders can define their goals and then display them in the steps necessary to reach them, a major step toward their fulfillment will have been taken. Such schematic systems as PERT are not only powerful communication tools but, also, extremely self-educating.

The possibilities of using such planning tools as PERT have already been explained to some 40 to 50 mission executives. Their response to date has been quite favorable. It is now planned to hold a number of seminar workshops starting in the winter and continuing in future months. These seminars, which will be similar to AMA Seminars, will bring together experienced aerospace managers and social scientists. These men will explain how these tools work, and what they have been able to accomplish using them, to the mission executives gathering with them in workshop groups. The managers and scientists will then lead the mission executives through a typical planning session, using PERT to plan their own missions programs. As a result of this exercise we believe that a great appreciation will be gained of the power of the tools. The

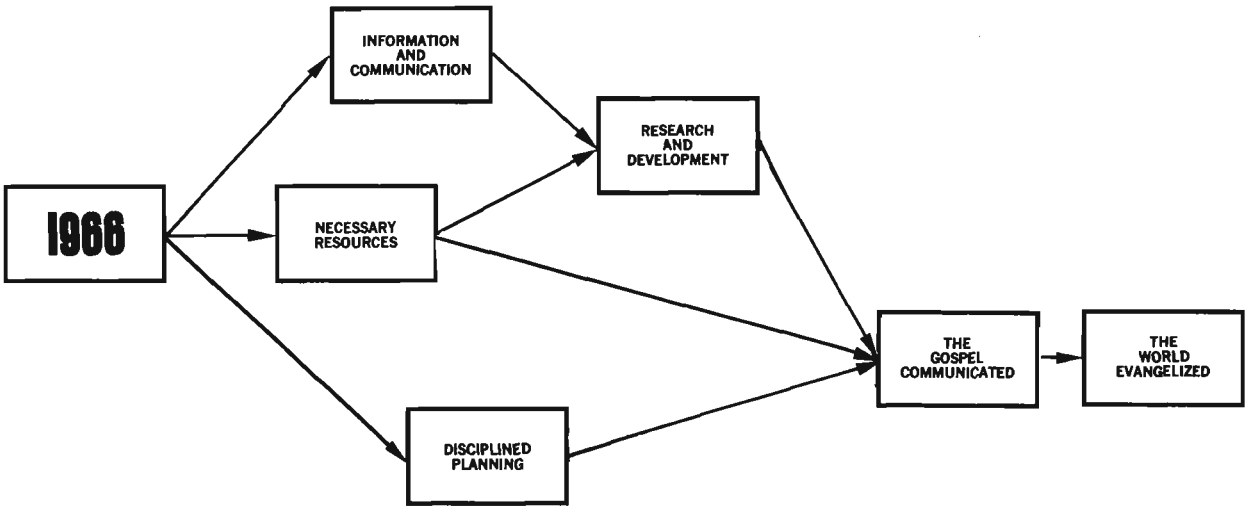
mission executives will then come together to discuss with one another the implications of what they have seen and learned.

As a result of such meetings we hope to encourage each missionary organization to put a trained, permanent staff member to the task of planning for the mission.

Conclusion

Perhaps one of the greatest benefits which should ensue from this project is a better understanding of how the tools of science can be used to present the claims of Christ's Church to an exploding world population. But at the same time it gives opportunity for the scientist and engineer to use his skills in the overall task of world evangelization and thereby help to break down the science-church barrier. This recognition by both sides that there is no need for tension between *science* and *Christianity* may open new vistas as to the meaning of a seven-day-a-week Christian life for the working professional.

Engineers, scientists and others interested in learning more about the Missions Advanced Research and Communication Center may request information by addressing the Center at: 135 N. Oakland Ave., Pasadena, Calif. 91101.



This is a simplified logic diagram showing the results of the PERT planning study.

If the world is to be *evangelized* the gospel must be *communicated*. This means that we must understand each man within his own culture and his special needs. To gain this cultural understanding we need more *research and development*. This in turn can only be based on much improved *information and communication* and the application of *necessary resources*. Overarching all this is the need for *disciplined planning*.

BOOK REVIEWS

MARLIN KREIDER, *EDITOR*

It is the desire of the editor of this column to publish reviews of books that may be of most interest and usefulness to the readers of this Journal. This should include those books which may have significant influence on man's thought due to the renown of the author or the quality of the publishing media.

In order that the reader may be informed of the publication of such books without delay they will be listed in this column under the subtitle, "Books Suggested for Future Review". This list is meant to be an encouragement for the readers to volunteer reviews of those books that may appeal to them which are in their field of expertise and knowledge. Potential reviewers should contact the editor before preparing the review in order to prevent duplication. In some cases a complimentary copy can be obtained upon request from the publishing company by the editor.

A list of other "Books of Interest" begun in the last issue, will be continued along with a brief description. But in no case does the listing of the book constitute an endorsement or a critical evaluation of the content of the book.

It is hoped that the commission chairmen will feel free to suggest new books as well as to send reviews of potential interest to the Journal readers for inclusion in this column. Finally, letters are encouraged from those who do not agree with a reviewer's evaluation of a book.

Books Suggested for Future Review

GENETICS AND THE FUTURE OF MAN. Edited by J. D. Roslansky. Appleton-Century-Crofts. N.Y. Out in Oct. 1966. Contains a chapter by Ramsley on moral and religious implications of genetic control.

THE PHENOMENON OF LIFE (TOWARD A PHILOSOPHICAL BIOLOGY) by H. Jonas. Harper and Row Pub., N.Y. 1966, 303 pp. Contains chapters on "Life and Death"; "Philosophical Aspects of Darwinism"; "Is God a Mathematician" and "Immortality and the Modern Temper".

ISSUES IN SCIENCE AND RELIGION by I. G. Barbour. Prentice-Hall Inc. Pub., Englewood Cliffs, N.Y. 1966, 470 pp. $5.95.

THE BIBLICAL FLOOD AND THE ICE EPOCH by D. W. Patten, Pacific Meridan Pub. Co., Seattle, Wash., 1966, 336 pp. $7.50.

Books of Interest

COMPOSITION AND CORROBORATION IN CLASSICAL AND BIBLICAL STUDIES by E. Yamauchi. International Library of Philosophy and Theology. Presbyterian and Reformed Pub. Co., Phila., Pa., 1966. 38 pp. $0.75 paper. First presented as a paper at the 20th Annual Convention of the ASA., Aug. 1965 and abstracted in the JASA. 18:11, Mar. 1966.

GREECE AND BABYLON by E. Yamauchi. Baker Book House, Grand Rapids, Mich. To be published soon. The author's brief abstract is as follows: The presence of Greek words in the book of Daniel has predisposed biblical critics to postulate a late date in the Maccabean era (2nd century B.C.) for the composition of that work. This is based on the assumption that Greek contacts with Palestine and with Mesopotamia were not widespread before the conquest of Alexander the Great late in the 4th century B.C. That this is not a tenable assumption is shown by the evidence for such contacts from 3000 to 400 B.C.

THE STRUCTURE OF BEHAVIOR by M. Merleau-Ponty. Beacon Press, Boston, Mass. 1963. $8.50. One of France's most distinguished philosophers comes to grips with the details of recent scientific theories and data in psychology, psychiatry, biology and physiology and shows that many of the most widely accepted concepts of behavior are inadequate. He argues that behavior cannot be understood in terms of conditioned reflexes, that response is determined by the total pattern of the situation and that there is an adaptive nature of response in contrast to an automatic set response suggested by behaviorists. This book should have bearing on the nature and meaning of human existence.

THE MEANING OF THE BODY by J. Sarno. Translated by J. H. Farley from French. Westminster Press, 1966, $5.00. The author, a physicist, philosopher and technician in medicine, attempts to show that the body does not belong solely to the material world nor the soul to the spiritual world. An individual, especially a sick person, must be treated as a total entity (body-mind-spirit). His goal is to show that the idea of incarnation must be restated, but in such a way as to include both transcendence and immediacy — to show that the body is a manifestation, a sign or sacrament, of the spirit.

COMMUNITY PSYCHIATRY AND THE CLERGYMAN by G. E. Westberg and E. Draper. Charles C. Thomas Pub., Springfield, Ill. 1966. "Springing from the evolving field of pastoral counseling and community psychiatry — a vivid description of important experimental teaching projects". Contains exerpts which could supply potentially usable material for study groups, or raise vital questions with respect to interprofessional practice, responsibility and theory.

THE LOGIC OF FAITH, by P. Schmahl. Philosophical Society, 1965. $3.50. The account of the search for religious faith of a well-known medical man.

SCIENTISTS WHO BELIEVE. David C. Cook Pub. Co.. Elgin, Ill. 1963. 63 pp. paperback. Ten interviews with Christian men of science several of whom are members of the ASA including the editor-in-chief of this Journal.

A MEDICAL MANUAL FOR MISSIONARIES by C. S. P. Hamilton. Clonmore and Reynolds, 1965, 27/6. Written for the catholic medical missionary it deals with common surgical and medical emergencies, tropical diseases, emergency midwifery, medical and surgical equipment, diseases of the mouth, nose, ear and throat and diseases of the digestive and intestinal tract.

DARWINIANA

by Asa Gray. Belknap Press of Harvard University Press, Cambridge, Mass., 1963. Reprint, edited by A. Hunter Dupree. xxiii + 327 pp., $5.00 cloth, $1.95 paper.

In November, 1859, a book was published which was to reshape biology and much of western thought, Darwin's *Origin of Species*. Soon after (March 1860), it was reviewed in the *American Journal of Science and Arts* by Professor Asa Gray of Harvard University. This was the first of numerous efforts on Gray's part to defend Darwin against his critics in this country and he soon became Darwin's foremost American defender. This review and twelve other of Gray's articles were collected and published under the title *Darwiniana* in 1876. Gray hoped by republishing his previous contributions, to reemphasize that there is no conflict between the concepts of biological evolution and theistic creation. In the preface he states: "Clearer views than commonly prevail upon the points at issue regarding 'religion and science' are still sufficiently needed to justify these efforts."

Gray is acknowledged as one of the greatest American botanists of the nineteenth century. His *Manual of Botany*, revised by others since his death, is in extensive use today. As regards his view of life, he describes himself as "one who is scientifically, and in his own fashion, a Darwinian, philosophically a convinced theist, and religiously an acceptor of the 'creed commonly called the Nicene,' as the exponent of the Christian faith."

Commonly vilified by others, Darwin is portrayed by Gray as a cautious thinker and as an honest and fair writer. Gray, too, is fair throughout. At times humor enters his writing, for instance, when he trades blows with a theological opponent, Dr. Charles Hodge of Princeton Seminary. But, in contrast to many of his opponents, never is he discourteous. Included in *Darwiniana* is a lively review from *The Nation* of Hodge's book *What is Darwinism?*

While he himself was sympathetic to the Darwinian conception of change in nature, Gray had certain reservations. "Those, if any there be, who regard the deriv-

ative hypothesis as satisfactorily proved, must have loose notions as to what proof is." On the other hand: "those who imagine it can be easily refuted and cast aside, must, we think, have imperfect or very prejudiced conceptions of the facts concerned and of the questions at stake."

Gray maintains that the question at issue really is not creation versus evolution. Rather it is purpose over against fortuity. "Darwinian evolution (whatever may be said of other kinds) is neither theistical nor non-theistical" and it "coincides well with the theistic view of nature."

Included in *Darwiniana* one finds the articles "Insectivorous and Climbing Plants," "The Attitude of Working Naturalists Toward Darwinism," and "Sequoia and its History," each contributing to the discussion of Darwinism and creation. In the last of these, Gray's presidential address for 1872 to the American Association for the Advancement of Science, he develops his revolutionary ideas on the similarity between the North American and North-east Asian floras.

From time to time one notes considerable repetition of ideas. However, this is to be expected in a collection of articles of this sort and in no way detracts from the value of the book. A. Hunter Dupree, Professor of History at the University of California, Berkeley, has provided a useful introduction giving the historical background for the articles. *Darwiniana* is to be recommended as valuable reading, for it occupied an important place in the history of the "Creation-Evolution" controversy.

Reviewed by *Lion F. Gardiner, Predoctoral Fellow, Woods Hole Oceanographic Institution, Woods Hole, Mass.*

GENESIS AND SCIENTIFIC INQUIRY

by Aldert van der Ziel. T. S. Denison and Company, Inc., Minneapolis, Minn., 1965. 209 pp., $4.50. (Also see related article entitled "Science and Beginning" by the same author in JASA 18:15-18, Mar. 1966)

There are many of us in the ASA and indeed in the church at large for whom reconciling Genesis and modern science is still very much a problem. We want fervently to hold the line on an inspired, inerrant Bible and yet we are — too often secretly — convinced that the findings of science in the areas of evolution, paleontology and anthropology are not to be refuted. Many conservatives who have dealt with this problem have suggested views that can best be called temporary, and there is still the quest for a final, overall viewpoint competent both to hold the historic faith and to meet without fear any new finding by science. In "Genesis and Scientific Inquiry" author van der Ziel points the way to what may well be a possible final viewpoint that meets the above criteria. There will be some disagreement as to whether or not the solution is conducive to holding the faith, but the author's thesis is internally consistent and is quite capable of fielding new as well as old scientific results.

The first two chapters of the book are critical, as they give the author's basic approach to reconciling Genesis and science and his ground rules for exegesis of the biblical text. These views are then applied to Genesis 1:1 to 12:9 in chapters 3 to 11. Chapters 12 to 16 present a summary of the methods of science and many of the findings of science in the various fields relating to the Genesis account of creation, and a concluding chapter draws together the most significant contributions of the book.

The key to overcoming problems generated by early Genesis, according to van der Ziel, is to let Genesis speak for itself — a tantalizingly simple formula. In so doing, one must accept the fact that it was written within the framework of thought of the ancient middle east. Neither science nor necessarily reliable history can be expected from the framework, but this is no matter. The writers were not primarily interested in the framework but in recording the "Heilsgeschichte," or account of God's dealings with man in working out His plan of salvation. They saw as their task the need to explain such things as the origin of the sun, moon, stars and the creation of living creatures, especially man. Their explanations, though not scientific in the sense that the question "what happened" can be answered, are nonetheless binding because they convey the proper relationship of the world to God, declaring Him to be its creator and our creator. In fact, the first 12 chapters of Genesis are intensely theological, bringing message after message of God as creator, and as initiator of a relationship of grace with a desperately sinful human race.

The author points out that science gives an entirely different approach to the problem of beginnings, and is really not able to answer questions the Bible deals with but instead must limit its answers to the questions "what is happening now," and "what happened in the past." The result, says van der Ziel, is a more perfect view of reality because the two approaches are complementary. Modern science comes into the theological picture because it is our task to transmit the biblical message within the framework of the modern world. For example, instead of appearing as a threat to the biblical view of creation, evolution emerges as the best answer yet to the "how" of creation, thus clarifying the Christian concept of creation.

To bring out the theological message of the text, the author draws heavily on the results of the German Old Testament scholar Gerhard von Rad. Early Genesis is seen as several literary traditions joined together by an unknown editor, all dating from 950 B.C. and younger. Far from being apologetic for using the results of higher criticism, van der Ziel claims that the method helps to avoid conflicts between science and the biblical message because it distinguishes between the message and the framework.

The author emphasizes repeatedly that the distinction between the theological message and the ancient framework may give the "solution to most of the seeming conflicts between science and the Bible . . ." (p. 199). He labors over the text in calling forth the theological message, careful to give meaning to details

that are often overlooked or misinterpreted. One instance is the account of Eve's creation. It is suggested that the purpose of the story of the rib is to show the God-instituted basis of the strong attraction between the sexes, rather than an attempt at explaining the method whereby God created woman. The flavor of the story is admittedly magical and mythological, but the message transcends the language and the flavor so that it is incorrect to speak of the story as simply a myth. Similarly, Adam is not seen as a historical person but as the representative of the human race and was introduced to bring the message that we are God's creation, that we have a God-given task in our work and a God-given marriage relationship, and that sin is as ancient as the human race.

At the end of each of the chapters dealing with relevant areas of science there is a section entitled "Theological Conclusions." Here many of the controversial issues are joined, as the author examines a number of ideas currently held by many Christians. Especially singled out for criticism are those who are so anxious to defend the integrity of the Bible that they will misrepresent science, e.g., giving the impression that dating methods are quite unreliable and that the evidence does not favor acceptance of the evolutionary theory.

The author is occasionally guilty of oversimplification. This is perhaps inevitable in attempting, as he does, to present literary criticism to the conservative theologian, modern science to the non-scientist, and an interpretation of early Genesis to everyone — all in 194 pages of text. For example, the account of the various literary traditions found in chapter 2 would hardly satisfy an Old Testament scholar, especially concerning the dating of the traditions. And in this regard, the author on p. 17 may well be engaging in wishful thinking when he asserts that "quite conservative Old Testament scholars" commonly accept the view "that the first six books of the Bible are composed of large blocks of different literary traditions."

"Genesis and Scientific Inquiry" is hardly a book that will warm a staunch conservative heart. It isn't intended to be. Largely, because of the present doctrine of inerrancy, conservatives have been very reluctant to come to grips with the crucial issues presented by van der Ziel. As the author says, a new interpretation of the doctrine is needed, one that will allow us to distinguish between the message and the framework. Until this is done, science will continue to appear as a threat to many Christians, especially clergy, because it is obvious that early Genesis and modern science will never be truly harmonized. (To this end, the article "A Perspective on Scriptural Inerrancy" by Richard H. Bube [JASA 15:86-92] is quite relevant.)

Those who are not satisfied with their present viewpoint regarding science and early Genesis may find van der Ziel's presentation a reassuring, live option. On the other hand, they may be greatly disturbed by the apparent sacrifices one must make in order to solve (or, dissolve) the centuries-old problems confronting the Christian church in these areas. In the long run, however, the kind of approach suggested by the author is bound to have a healthy influence on the Christian community. Reducing the tensions in the area of the Bible and science, and removing the onus of mistrust from the heads of the scientists are certainly worthy of much effort. When this effort is clearly made by a believer and given as much thought as is evident in "Genesis and Scientific Inquiry," then we must pay very careful attention to what is said.

Reviewed by *Richard T. Wright, Assistant Professor of Biology, Gordon College, Wenham, Mass.*

THE NATURAL SCIENCES AND THE CHRISTIAN MESSAGE

by Aldert Van der Ziel. T. S. Denison and Company, Inc., Minneapolis, Minnesota, 1960. 249 pp.

This volume is the first of a series called *Lutheran Studies* and is the result of a series of lectures on the natural sciences given for Lutheran pastors. The author, who is Professor of Electrical Engineering at the University of Minnesota, has attempted to "demonstrate that the natural sciences and the Christian message are neither in harmony with each other, nor in conflict, but are radically different."

The first part of the book is devoted to a discussion of the content and the procedures of the physical sciences. Indeed, its format is that of a primer designed to acquaint the uninitiated with some of the basic principles of mechanics, laws of conservation, thermodynamics and statistical mechanics, electromagnetism, relativity, quantum theory, wave mechanics, nuclear physics, age determination, and astronomical measurements. Along with these discussions are philosophical applications and refutations of common misapplications of these scientific principles to religious thought.

The last part of the book contains chapters on science in modern society, creation, and science and theology. Here the author shows evidence of the influence of Karl Barth to whom he refers repeatedly and whose writings he frequently quotes.

In the author's view there is no discrepancy between creation and development through natural causes. The Biblical account is intended to relate God, whom we know by faith, to the world around us which we come to know through science. Our confession of God as creator is a confession that "*in, through* and *despite* natural causes God has given our life sense and meaning and that He is the ground of our existence." The views of science and of theology are complementary, not contradictory, and cannot be correlated.

Those well versed in the physics-related sciences will find the author's approach elementary in the extreme. Those convinced of the literality of scripture will take issue with many of the author's statements and conclusions. As a lucid introduction to many aspects of physical science and as a thought provoking treatment of scientific-theological relationships, however, this book is recommended.

Reviewed by *Stephen W. Calhoon, Jr., Professor of Chemistry, Houghton College, Houghton, N.Y.*

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