# Creation Research Society Quarterly

**Haec credimus:**
**For in six days the Lord made heaven and earth, the sea, and all that in them is, and rested on the seventh. — Exodus 20:11**

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# CREATION RESEARCH SOCIETY



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Jay and Betty Van Andel of The Jay and Betty Van Andel Foundation who provided a major grant to the Society for the building and operating of a research facility in Arizona. See article; page 62.



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# CREATION RESEARCH SOCIETY

**History** The Creation Research Society was first organized in 1963, with Dr. Walter E. Lammerts as first president and editor of a quarterly publication. Initially started as an informal committee of 10 scientists, it has grown rapidly, evidently filling a real need for an association devoted to research and publication in the field of scientific creation, with a current membership of over 600 voting members (with graduate degrees in science) and over 1100 non-voting members. The *Creation Research Society Quarterly* has been gradually enlarged and improved and now is recognized as the outstanding publication in the field.

**Activities** The society is solely a research and publication society. It does not hold meetings or engage in other promotional activities, and has no affiliation with any other scientific or religious organizations. Its members conduct research on problems related to its purposes, and a research fund is maintained to assist in such projects. Contributions to the research fund for these purposes are tax deductible. The Society operates two Experiment Stations, the Grand Canyon Experiment Station in Paulden, Arizona and the Grasslands Experiment Station in Weatherford, Oklahoma.

**Membership** Voting membership is limited to scientists having at least an earned graduate degree in a natural or applied science. Dues are $18.00 ($22.00 foreign) per year and may be sent to Glen W. Wolfrom, Membership Secretary, P.O. Box 14016, Terre Haute, IN 47803. Sustaining membership for those who do not meet the criteria for voting membership, and yet who subscribe to the statement of belief, is available at $18.00 ($22.00 foreign) per year and includes a subscription to the Quarterlies. All others interested in receiving copies of all these publications may do so at the rate of the subscription price for all issues for one year: $21.00 ($25.00 foreign).

**Statement of Belief** Members of the Creation Research Society, which include research scientists representing various fields of successful scientific accomplishment, are committed to full belief in the Biblical record of creation and early history, and thus to a concept of dynamic special creation (as opposed to evolution), both of the universe and the earth with its complexity of living forms. We propose to re-evaluate science from this viewpoint, and since 1964 have published a quarterly of research articles in this field. In 1970 the Society published a textbook, *Biology: A Search for Order in Complexity*, through Zondervan Publishing House, Grand Rapids, Michigan 49506. All members of the Society subscribe to the following statement of belief:

1. The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. To the student of nature this means that the account of origins in Genesis is a factual presentation of simple historical truths.

2. All basic types of living things, including humans, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.

3. The Great Flood described in Genesis, commonly referred to as the Noachian Flood, was a historical event worldwide in its extent and effect.

4. We are an organization of Christian men and women of science who accept Jesus Christ as our Lord and Saviour. The account of the special creation of Adam and Eve as one man and woman and their subsequent fall into sin is the basis for our belief in the necessity of a Savior for all people. Therefore, salvation can come only through accepting Jesus Christ as our Savior.

## Editor's Comments

Many of you may be interested in my letter on the recent publicity over the Big Bang theory (p. 102). It seems that many scientists have adopted media methods in making their pronouncements. Also it is good news that all volumes of the Quarterly have now been reprinted and are available to individuals and institutions. Possibly you may wish to donate all 28 volumes to a university or college library. I suggest that you talk to a member of the library staff to determine if such a gift would be welcome.

This issue of the Quarterly offers a variety of topics from genetics to geology. One article, a response and a letter to the editor, contain a debate over how variation is accomplished or prevented within a creation model. It is an "appendix" to the symposium on variation recently published in the Quarterly. Robert Newman adds a "chapter" to the supposed Charles Darwin conversion story. The detective work published in the Quarterly over the last decade about this topic is intriguing. Michael Oard examines the so-called varve chronology within a young-earth framework.

Several Panorama selections and letters plus a philosophical essay may be of interest to you. Likewise several book reviews are included for your edification. Please let me hear from you concerning the Quarterly.

If Quarterly subscribers would like a copy of the CRS Constitution and Bylaws, they are invited to send a request to the Society Secretary.

Don B. DeYoung

## Erratum

March 1992 *CRSQ* p. 148: footnote, second column, last reference, author's name should be S. T. Wolfe.

## GRANT GIVEN TO CREATION RESEARCH SOCIETY

The Jay and Betty Van Andel Foundation recently made a major grant to the Creation Research Society for the purpose of building, furnishing, and operating a research facility near Chino Valley, Arizona. The purpose of the new research facility will be to perform original field and laboratory research from the perspective of Biblical origins.

The Creation Research Society is an organization of more than 700 scientists who are committed to a Biblical view of origins. The organization, in existence for nearly 30 years, publishes the *Creation Research Society Quarterly* which is the world's foremost scholarly technical publication in creation science.

The site of the new research center will be in the desert grasslands of northern Arizona, close to a number of areas of significant biological and geological importance. The facility will be named The Van Andel Research Center and will house several research laboratories and shops as well as a technical research library and an administrative area. It will be staffed by visiting scientists from throughout North America.

The research will include such topics as reevaluation of the geology and origin of the Grand Canyon, limits in the variation of plant and animal populations, reevaluation of the fossil record, and a complete study of the geological dating procedures. As the research center expands, studies in the origin of the universe as well as in the composition of the ancient atmosphere will be included.

Dr. John R. Meyer, director of the new creation research center, notes that the capabilities of the Creation Research Society have been greatly enhanced by the generous contribution of the The Jay and Betty Van Andel Foundation and that the grant will advance significantly the creation science movement.

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### QUOTE

Secular economy is always discontented. It is based on such hope as is inspired when science has found a process or a tool that promises to win for mankind a fresh advantage from nature. But secularism is not defined merely by the proposal to adopt some specific process or tool: it is defined by a total attitude, which abandons the idea of limitations. Secularism is a wartime economy, and the war is the one which man has declared against nature. It says nothing about God, who vanishes from the picture as soon as men think they see through nature; or perhaps it mentions God, but to the effect that man now becomes the God, and will determine the world according to his will.

Ransom, John ***C.*** 1965. *God Without Thunder* Archon Books, Hamden, CT. p. 117.

# GENETIC INFORMATION AND McCANN'S DUAL FACTOR PARADIGM FOR DEVELOPMENT AND VARIATION*

RICHARD D. LUMSDEN, PAUL C. ANDERS AND JEFFREY R. PETTERA**

**Received 20 November 1991; Revised 24 December 1991**

**Abstract**

*McCann (1991) has developed a model for embryogenesis and other aspects of differentiation that subordinates developmental genetics to a quality he defines as "cellular intelligence." We debate this paradigm in light of currently understood genetic principles and functions, information theory, and the Creationist concept of origins.*

*We contend that "cellular intelligence" is a non-entity, that cells are neither creative nor "intelligent" entities, but are informed entities. The dichotomy between intelligence and information is defined in terms of organizational hierarchy and antecedents.*

*Since information is not spontaneously generated, the information guiding development and differentiation is hereditary, being archetypical in origin and genomic in location. The ultimate source of that genetic information is Creative intelligence.*

*Cytodifferentiation is primarily a function of gene regulation and information transduction, according to a variety of tangible constitutive and inducible mechanisms and cellular components. The latter include homeotic genes, gene promoter, repressor, and enhancer elements, receptors, protein kinases, the cytoskeleton, and the dynamic three-dimensional tertiary structure of DNA itself.*

*The limitations McCann would place on "gene action" respective of phenotypic variation and development are untenable.*

## Intelligence and Information

We have read with interest the *CRSQ* article "Is More Than Gene Action Required to Account for Variation?" by Dr. Lester J. McCann (1991). Answering affirmatively, McCann posits that (p. 151) ". . . any aggregative construction requires an *intelligence* input" and concludes that "*Cellular* intelligence works in a copartnering arrangement with gene action" (emphasis ours). McCann's rationale for his "dual factor paradigm" is his view that genes alone play a decidedly limited role especially in embryogenesis and cytodifferentiation, requiring a superposable factor he identified as "cellular intelligence." We find his thesis seriously flawed.

Throughout his discourse on "cellular intelligence," McCann (1991) is first of all confusing *intelligence*— which he defines, we think aberrantly, as (p. 151) "the ability to select, control and direct energy"— with *information*— the quality which in biological systems limits the number of realized outcomes from the total number of putatively possible events (Lwoff, 1962). Following Lwoff (1962), information respective of probability and outcome would be expressed as follows:

If $I_0 = 0$ (when no information is available), $I_1 \neq 0$ (when information is gained), $P_0$ is the probability for possible outcomes, $P_1 = 1$ (when, as a result of specifying information, a single outcome is selected), then:

$$I = -k \ln P \quad \text{or} \quad \Delta I = -k \ln (P_1/P_0) = I_1 - I_0.$$

Distinguishing information from intelligence is not merely a matter of semantics. It is one of hierarchial organization. In the context of information theory and according to a Creationist model of origins, specifically where a developing organism would be concerned, intelligence would be the *source*, or *cause*, of the information guiding the system. Four additional, correlative principles apply:

(1) Following Schrodinger (1967) and Eccles (1979), neither awareness nor intelligence per se is an emergent property of matter.

(2) Information is neither spontaneously generated nor spontaneously increased (Yockey, 1981).

(3) In biological systems, the processing of information involves its encoding within and by macromolecules in a retrievable form. The archival codifer is DNA. Other informational molecules include the RNA's transcribed from DNA and proteins translated from RNA.

(4) Retrieval then becomes a function of gene regulation and information transduction by a variety of constitutive and inducible mechanisms. These are in themselves genetically specified.

## Energy and Order

Where McCann's (1991) focus on energy would be concerned, the selective, incremental, and coupled utilization of energy in biological systems is prescribed by genetic information, as it is translated into enzymes, their cohorts, and their structural and spacial organization in the cell (for detailed examples, see Nakao and Packer, 1973, and Vogel et al., 1967). Energy then becomes a factor in biological ordering, according to the relationship (at equilibrium):

$$\Delta S \geq \Delta Q/T,$$

where $\Delta S$ is the change in entropy, $\Delta Q$ is the "heat"— or energy—flow into or out of a system, and T is the absolute temperature (see Thaxton et al., 1986).

The significance of entropy lies in its close reciprocal relationship to the degree of order (nonrandomness) characteristic of the system. Thus, following Thaxton et al. (1986):

$$S = k \ln \Omega,$$

*Readers may be interested in the symposium on variation that recently appeared in the Quarterly [CRSQ 27:144-153; 28:18-27, 50-59, 98-108, 146-1551.

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where Ω corresponds to the number of ways the energy and mass in a system may be arranged; k is Boltzman's constant. As a function of the statistical probability,

$$S = k \ln P.$$

We note the correspondence between entropy and information by comparing the two equations:

$$S = k \ln P \text{ and } I = -k \ln P.$$

In general, as the outcome becomes predictable by the informational component, or determinant ($I_1$), the greater the predictability, the lower the entropy. For biological systems only an exceedingly small, often singular, number of arrangements of any given set of components, as compared to the total number of possible arrangements, works.* At that point, organisms are, statistically, highly improbable events. Thus, the existence, development and maintenance of an organism depends on information. For the organism to be a repeatable event, the information guiding its development must be hereditary. Therefore, the ultralow entropy characteristic of embryogenesis and cytodifferentiation is a function of *genetic* information, as we review below. Accordingly, one can predict, with a high degree of confidence, the outcome, under normal conditions, of the development of, e.g., a fertilized frog egg, including the fate of one of its embryo's myoblasts (it will become a muscle cell), the position of its micro- and macroanatomical elements, and so on. Meanwhile, energy, per se, because of genetically informed, hence determined, pathways of metabolism, is being channeled and coupled to predictable events of biosynthesis, etc. While the availability of energy alone will satisfy the thermodynamic equations for endergonic processes, it is insufficient, absent informationally directed transduction, to reduce entropy or maintain a low entropy state respective of biological systems. Indeed, under such circumstances, energy alone becomes a potentially disruptive factor (see Morris, 1984, pp. 207-208). Energy per se does not generate the information on which biological systems are predicated, though energy is, of course, required mechanistically for the synthesis of informational molecules (nucleic acids, proteins, etc.) whose structures (ergo information content) are templated by *pre-existing* information.

Thus, ". . . the ability [of cells] to select, control, and direct energy" (McCann, 1991, p. 151), where that becomes a factor in development, is a manifestation of information which has its origin in Creative intelligence, i.e., that which brought the system into being in the first place. Kaufmann (1991, p. 66) has remarked that "The essence of intelligence is . . . the ability to select and direct processes." However, the context here is that of causation, and the "Logos" to which Kaufmann refers is correctly attributed to the Divine Designer. McCann (1991) would otherwise attribute to cells a remarkable degree of agency. In reality, cells themselves are neither creative nor "intelligent" entities, but are *informed* entities. Where their "selective and directive abilities" are concerned, cells can only execute the options that are already programmed, unless one evokes the evolutionist's hypothetical "progressive (adaptive) mutation." This conjecture has been largely defeated, however, by the mathematical algorithms of Schutzenberger (1967), Yockey (1981), and others. The quandary of "evolutionary genetics" otherwise has been cogently reviewed by Ouweneel (1977).

*Editor's Note: See Williams, E. L. 1971. Resistance of living systems to the second law of thermodynamics. *CRSQ* 8:123 or Williams, E. L. 1981. Resistance of living organisms to the second law of thermodynamics in Williams, E. L. Editor. Thermodynamics and the development of order. Creation Research Society Books. Kansas City, MO, p. 104 for a discussion of the small number of microstates possible for living systems.

**Genetic Information in Development**

McCann (1991, p. 152) contends that ". . . cellular involvement during embryonic development and other vital processes give evidence of being governed by non-genetic influences . . ." which McCann attributes to "cellular intelligence," However, the particular events of embryonic development McCann (1991) reviews are demonstrably governed by genetic information. Note that genetic mechanisms would include those involved in replication of the archival code, those governing its transcription, translation, and *the functions of gene products.* The latter, notably those functioning as receptors and gene regulators, close the apparent gap between cytoplasmic factors, environmental influences, and the role of structural genes per se in growth and development, when it is realized that these epigenetic/environmental principles are operating within a molecular-level cybernetic framework set by direct gene control. Their effects are not autonomous from the genome, but are genetically prescribed. For a particularly cogent discussion of nonhereditary variation and its relationship to genomic processes, see Marsh (1991). Reviews of various cytoplasmic phenomena impinging on development are found in Malacinski (1990). See also Berridge (1985) regarding cell surface receptors, their translation of external signals into internal signals, and some of the consequent molecular aspects of intracellular information flow.

Despite McCann's (1991) inferences to the contrary, by the mid-1960's it was already clear that gene action is continuous throughout embryogenesis (see review by Gross, 1967), and essential to normal development and morphogenesis. While McCann (1991) would reference the observation (Barth, 1964) that experimentally enucleated amphibian eggs (merogones) can, under certain circumstances, be stimulated to cleave and carry out a limited kind of early development, this phenomenon is readily explainable (Gross, 1967) by the presence in these merogones of genetically derived (transcribed) morphogenic RNA, released into the cytoplasm prior to removal of the nucleus (or, as in other experiments, blockage of transcription by actinomycin D). These gene products are conserved and utilized as messengers for the direction of protein synthesis, in particular of proteins involved with cleavage. However, such "embryos ex merogones," on reaching a stage morphologically comparable to a blastula, cease development and eventually disintegrate. In any event, what the data, collectively, indicate is a direct role of gene action in early development, not a lack of it. As Gross (1967) emphasizes (see also Stein, et al., 1991), genes, some being transcribed very early on, act directly and indispensibly throughout the course of normal development.

### A Transition in Developmental Biology

Analagous to First Law-accommodated processing of energy within cells, the principle of transduction applies to their processing and utilization of information. Among the information transducers to which we refer, whose structure ergo function is directly determined by genes, are (besides m-, t-, and r- RNA's and enzymes, per se) DNA binding proteins, receptors, and the myriad elements of the cytoskeleton, all of which play decisive roles in cellular development and differentiation.

It is lamentable that the literature sources McCann (1991) draws upon in developing his thesis are, for the most part, limited to texts published no more recently than the 1960's. This period, it may be recalled, was one of transition for developmental biology, where traditional embryology was only beginning to be integrated with molecular biology and interpreted accordingly. For a particularly incisive discussion of the classic "boundary dispute" between geneticists and embryologists, see Gilbert (1991). Many questions posed then concerning the role of genes in development are no longer enigmas; but see Malacinski (1990) for some possible, at least arguable, current exceptions to the ubiquity of genotype in *all* aspects of development. In any event, the limitations McCann himself (1991) identifies for gene action and the products thereof are specious. While McCann (1991) finds some support from Dubois (1962) for his idea that embryonic development is governed to a substantial degree by nongenetic functions, Dubois' remarks about the "modest tasks" of genes (quoted by McCann, 1991, p. 152) must be considered in the context of the "modest" state of knowledge respective of genes and development at that time—1962! Indeed, there has been considerable progress during the last 20 years toward an understanding of the genetic basis and intermolecular linkages for the developmental processes McCann (1991) discusses. We doubt that Dubois would disagree.

For example, while McCann (1991, p. 152) cites Alston (1967, pp. 189-190) as finding ". . . no explanation of the regulation of cell movement [respective of embryonic morphogenesis] . . . by *presently* known intracellular mechanisms of information transfer" (our emphasis), we daresay that neither Alston nor any other knowlegeable developmental biologist would make that statement today (e.g., for reviews of the protein fibronectin, a gene product, its role in determining embryonic cell migrations, and how it informs the mechanics of the cytoskeleton respective of directed movements, see Alberts et al., 1989, Hynes, 1981, and Ruoslahti, 1988). Where McCann (1991) can find no genetic basis for what he calls (p. 151) the ". . . vital crafting process . . . in which cells . . . position themselves . . . in the process of which embryonic details are fashioned" (positional information?) we reference Stein et al. (1991), who discuss the genetics involved in establishing axial polarity (anterior/posterior, dorsal/ventral) in *Drosophila* embryos. Attributing the events McCann (1991) discusses to "nongenetic influences" requires disregard or ignorance of the clearly defined genetic principles discovered during the last two decades, principles that apply to embryonic cell movements and every other one of the developmental phenomena McCann (1991) cites. These would include the now well known existence and functions of, for example, homeotic genes, developmental control regulators and receptors, cell surface recognition and adhesion principles, etc., topics reviewed by Alberts et al. (1989), Berridge (1985), DeRobertis et al. (1990) Edelman (1984, 1989), Gehring (1985), Holliday (1989), McKnight (1991), Ouweneel (1975, 1977), Ptashne (1989), Rutishauser and Goridis (1986), Stein et al. (1991), and Takeichi (1988), among others.

### Gene Activity

In his statement (McCann, 1991, p. 152) ". . . we have to assume that the genes in terms of function are in the protein-supply business *exclusively"* (emphasis ours), McCann overlooks the *nucleic acid* products of certain genes that do not encode peptide structure but directly regulate gene expression—we reference as one example antisense RNA molecules (Weintraub, 1990); these bind to complementarily structured m-RNA molecules and thereby selectively *inhibit* translation. In the remarkable statement that follows—(p. 152) "(genes) are not involved in initiating constructions"—McCann (1991) would apparently discount the role of catalytic and regulatory proteins (gene products) in development, or fail to see the genetic linkage between such proteins and the process, and limit "genes" to but one category—structural genes—according to the classic, but now inadequate, "one gene, one peptide" notion of gene function. However, it is now known that such genes contain, besides the protein encoding element, regulatory elements, the latter controlling transcription of the encoding sequences (McKnight, 1991), ergo initiating constructions. Moreover, in addition to structural genes, there are also regulatory genes per se that exercise control over whole repertoires of other gene sequences (Beardsley, 1991) activating or repressing them as appropriate—again, initiating constructions! While it is obvious how activating a gene would initiate construction, there are cases as well where "turning off" a gene does likewise. An example would be the production (genetically prescribed) of a juvenile hormone that arrests silkworm metamorphosis (Williams, 1963). When juvenile hormone production is stopped (a genetically prescribed event), there is de-repression of genetic information for construction of the pupa and its transformation to the adult moth.

Paradoxically, the "totipotency" and "fate flexibility" (our characterizations) of early stage embryonic cells, to which McCann (1991) alludes (his references, p. 152, to those "experimentally scattered," those "faced with an unchartable problem," "tailored-to-the-situation responses," etc.), rest on the fact that in these cells the genes responsible for specialized "fate determining" proteins are repressed. Thus, for these "totipotent" (or at least pluripotent) cells, the greatest amount of genetic information is latent. What is expressed, predominantly, in these cells, are the genes from which products dedicated to cellular replication are derived. Later, as specific cell lines and cell types are differentiated, the genetics for replication tend to be down-regulated as genes for the line characteristics are expressed. Thus, replication of "committed" neurons, hematocytes, muscle, connective tissue, and special-

ized epithelial elements, etc. is atypical, except where a population of "stem cells," such as found in bone marrow, the stratum germinativum of the epidermis, crypt cells of the intestinal mucosa, etc., is maintained. The genetic principle manifested in organogenesis is emphasized by the reverse process of regeneration, which involves "de-differentiation" of the "adult" cells, i.e., a genetically triggered reversion to the multiplicative "embryonic" type (Hay, 1966). A similar phenomenon is tumorigenesis.

Only a fraction of the amount of DNA in plant and animal cells is ever required, in terms of essential gene products, for building the organism (see Alberts et al., 1989, pp. 485-486). This "extra" quantity of DNA is not accounted for just by polyploidy or gene duplication otherwise. Some consider much of it the "junk" that might be expected from the stochastic process of evolution (see specific references below). However, we note that the informational content of DNA includes more than its encoding sequences (for RNA's and proteins) per se. There is a nucleotide sequence-specified, tertiary structural quality that affects recognition and reactivity respective of various mechanisms for gene regulation, significant of which are those of an allosteric nature (Felsenfeld, 1985). This, we believe, is the primary significance of the large amount of DNA present in a given organism's genome that is not transcribed/translated into gene products. Allegations to the contrary notwithstanding (Orgel and Crick, 1980; and see discussion by Augros and Stanciu, 1987, pp. 180-182, and Britten and Davidson, 1971), we do not believe that this DNA is merely an evolutionary vestige. While some of it is represented by pseudogenes (see Alberts et al., 1989, p. 602)—putatively genes rendered inoperable by mutation—the greatest amount is neither superfluous nor useless otherwise, but functional, we believe (and see Felsenfeld, 1985) to the dynamic tertiary structure of the genome, which in turn is significant to its genetic regulation. Indeed, even "pseudogenes" may have functions of their own, if distinct from those of their sibling counterpart, or "conventional" structural genes (McCarrey and Riggs, 1986). Then there is the phenomenon of introns—noncoding intragene nucleotide sequences—which may underlie a mechanism for diversifying the protein products of a single gene (Anderson, 1991; Andreadis et al., 1987). McCann (1991) does not address this subject (of non-encoding DNA), but it is germane to how DNA (ergo the genome) is involved in "initiating constructions."

### Proteins and Developmental Regulation

Even where structural genes per se are concerned, McCann (1991) grievously restricts the initiative role of proteins in development by stating (p. 152):

> . . . there would seem to be no way the mere availability of inanimate, gene-produced proteins can assure the carefully timed furnishing of the proper kinds of directed energy and thereby bring about a specific energy-demanding process of assembly.

But the protein kinases (Rosen and Krebs, 1981) do just that; these enzymes (ergo "gene produced proteins") employ ATP (directed energy?) to phosphorylate other proteins and thereby regulate their biological activity. Among the roles of protein kinases, and the protein phosphatases which catalyze the reverse reaction, in development and differentiation are the assembly/disassembly of cytoskeletal ultrastructure (Hunter, 1984; Murphy et al., 1983; Rappaport et al., 1975; Rosen and Krebs, 1981), timing and execution of the cell cycle (Murray and Kirschner, 1991), epidermal growth factor-mediated cell proliferation (Hunter, 1984) and, respective of pathobiological development, oncogene-inflicted neoplasia (Hunter, 1984). For an appreciation of the myriad functions otherwise of protein kinases in metabolism, biosynthesis, regulation of gene expression, etc., see Rosen and Krebs (1981). These enzymes are themselves regulated through receptor (protein)-mediated fluxes of "second messengers" (cyclic nucleotides, $Ca^{++}$) acting on regulatory proteins (e.g., the inhibitory subunit of the CAMP-dependent protein kinases, the calmodulin group of proteins respective of the $Ca^{++}$ dependent protein kinases) and the cyclin group of proteins (Berridge, 1985; Murray and Kirschner, 1991; Marx, 1991; Rosen and Krebs, 1981).

Then there is the phenomenon of post-translational enzymatically mediated modification of nascent peptide structure that includes (additional to the aforementioned phosphorylation of proteins) selective proteolysis, hydroxylation and glycosylation, respective of activation, self-assembly mechanisms and the like. As an example, we cite the steps involved in the construction of collagen fibers (Burgeson, 1988; Olsen, 1981). These biochemical processing functions further evidence the significance of protein availability to processes of macro-assembly and have a genetic basis in that gene products (proteins) are acting on or being acted upon by other gene products (proteins), events that are directed, energetic, and temporal.

Moreover, gene expression itself (i.e., transcription and all that follows therefrom) is controlled to a great extent by proteins that bind to DNA as gene activators/repressors (McKnight, 1991; Ptashne, 1989), or enzymatically modify DNA structure/gene activity per the DNA/cytosine methylases/demethylases (Holliday, 1989) ergo contributing to the ". . . timed (etc.) . . . process of assembly" (McCann, 1991, p. 152).

### Environmental Influences

McCann's (1991) reference to the seasonal, adaptively significant dimorphism of *Nemoria arizonaria* caterpillars is misapplied to his thesis of non-genetic direction of development, when it is considered that the features described (Green, 1989) can be accounted for by, albeit environmentally-impacted, selective events of genomic translation. The relative concentration of tannin in the diet of the spring vis-a-vis summer caterpillars appears to be the environmental trigger to phenotypes that remarkably mimic the oak catkins or twigs, respectively, on which they crawl; the indicated mechanism is that receptors responsive to tannin levels influence the levels of circulating hormones which in turn mediate genetic regulation during development (Green, 1989). This then is but another example (see Marsh, 1991) of the interplay between environment and genotype underlying phenotypic variation and the bidirectional circuitry of information transduction.

The *Nemoria* phenomenon, and others McCann (1991) points to—the differentiation of queen and

worker bees, and insect metamorphosis generally—involve genetic regulatory mechanisms that Jacob and Monod (1961) originally elucidated for prokaryotes, later applied to eukaryotes (Jacob and Monod, 1963; and see review by Ptashne, 1989), to wit: regulatory protein-mediated selective expression of genes promulgates the phenotypic response triggered by differential feeding, or diet, humidity, light, temperature, etc. This includes, for example, the elaboration of "adaptive" enzymes and morphogenic peptide structures. That gene regulatory mechanisms in response to exogenous as well as endogenous mediators (Williams, 1963) may differ in their details for eukaryotes (vs. bacteria) does not diminish the significance of such regulation and its locus for development and differentiation generally, and it is now clear that a variety of inductive mechanisms, acting at the gene level, are operable in the development and differentiation of multicellular organisms. Otherwise, noting that the dimorphism exhibited by *Nemoria* caterpillars in their natural environment is consistent generation after generation, McCann's (1991) interpretation of the phenomenon as gene-independent strikes us as unsettlingly Lamarckian. As noted by Marsh (1991, p. 54), "The phenotype . . . of any organism is necessarily the result of the interaction of a genotype . . . with an environment . . ."

### Genetic Programming of Phenotype

Where insect development in general and McCann's (1991) references to it in particular be concerned, it was already clear by the 1960's (Williams, 1963) that the programming of cells respective of metamorphic differentiation has to do with sequential gene action—as Williams (1963, p. 258) stated: ". . . the 'taping' of the individual cells for a subsequent 'playback' . . . a process that . . . predicts with utmost precision the chemical engineering of larva, pupa and adult." Further knowledge of the genetic determination of insect embryogenesis was the discovery of homeotic genes (reviewed by Gehring, 1985, and Ouweneel, 1975), which also play the decisive role in "masterminding" pattern formation for many other kinds of animals (Gehring, 1985; DeRobertis et al., 1990), as well as fungi and plants (Rennie, 1991). As important as homeotic genes are in development, however, we note parenthetically that an argument for their role in evolution, after Goldschmidt (1952), has been defeated in the insightful review of Ouweneel (1975).

McCann (1991) finds it enigmatic that the vascular elements of plants (xylem and phloem) are sorted out from a population of genetically identical cells (cambium). But it has been known for some time how this and plant histogenesis generally is accomplished—through differential expression of genes in the common genome, involving in part selective responses to a variety of growth factors (reviewed by Clowes and Juniper, 1968). Indeed, McClintock (1956; 1961), by identifying the principle of genetic regulatory circuitry in plants (maize), brilliantly anticipated the model independently derived for microorganisms in the Jacob and Monod (1961) review.

Therefore, as early as 1963, Grobstein could remark that (p. 3) ". . . the dilemma of differentiation, . . . *man-made rather than cell-made,* has never been as sharp or as fearsome as sometimes . . . portrayed" (emphasis ours). Today, it is not at all bemusing that while the somatic cells of an organism contain the same genome that this genome is differentially expressed among these cells at the same as well as different stages of development; that is, identical genotypes can generate different phenotypes. This is precisely what genetic control mechanisms and their bearing on cytodifferentiation are all about; and genes specify these control elements.

According to McCann (1991, p. 151), ". . . cells by their own effectiveness position themselves in strategic patterns in the process of which embryonic details are fashioned." He subsequently refers (p. 152) to a "painstaking self-positioning on the part of the embryo cells" and (p. 152) "Purposeful deftness on the part of embryo cells." McCann's anthropomorphic inference is that these cells are somehow electively managing their own affairs apart from the otherwise integrated genetic determinants of the process for embryonic pattern formation—but see, e.g., DeRobertis et al. (1990), Edelman (1984, 1989), Rutishauser and Goridis (1986), Stein et al. (1991), and Takeichi (1988) for evidence to the contrary. At this point, McCann (1991) errs glaringly in viewing the development of a cell (zygote) and its progeny into an anatomically definitive organism as an isolated event of agency. In particular, the ability of cells to respond to extracellular signals respective of embryonic processes, the genome to cytoplasmic feedback, clearly has a genetically informed basis. This, in part, is what proteins (gene products) serving as receptors (information transducers) and, frequently, informational ligands, are all about (Berridge, 1985; Edelman, 1989; Stein et al., 1991). It is to be emphasized that while the outcome of these functions is selective, it is by no means elective.

### Intelligent Origin

In our opinion, a model for development and differentiation that requires the presence and active participation of unique yet arcane forces not explainable in terms of developmental genetics is today no more productive, at least scientifically, than the archaic concept of vitalism. While many details for any given system remain to be elucidated, the operative principles are no longer enigmatic. Genes beget phenes. This is not to reduce the phenomenon of embryogenesis to a wholly materialistic or mechanistic conception. Genetically scripted embryogenesis is a marvelous example of pre-existing design, purpose and specification, wholly consistent with a creationist model. McCann's (1991) paradigm is not only inaccurately derived, it is superfluous to the anti-Evolution, pro-Creation argument.

We would agree with the thrust of McCann's (1991) observation that stasis, vs. evolutionary change, is favored (though not necessarily compelled) by the fact that random changes in genetic information tend to be unproductive (as for "neutral" mutations) or counterproductive (as for lethal or debilitating mutations). It is not, however, a perturbation of an "*intelligence* - centered" parameter (McCann, 1991, p. 153, our emphasis) that would be required to bring about change, either constructive or destructive. *Cellular* intelligence, in any event, is a non-entity. Organic intelligence is an *organismic* parameter, and one, cogently

argued by Augros and Stanciu (1987), limited, according to its best definition, to human organisms. [Augros and Stanciu (1987, Chap. 3) differentiate other aspects of behavior and consciousness from intelligence, per se; see also Morris, 1984, p. 369 and pp. 405-413].

What is reflected at the cellular level of the developmental differentiative process is a hierarchy of information, the ultimate source of which is an *external* intelligence, the same that prescribed the kinds and properties of life in the first place. It is, in fact, a "living intelligence" (see McCann, 1991, p. 153), but one we would identify, first and last, in the context of Revelation 1:8. McCann would unnecessarily place the burden of intelligence on the cell, where we (and see Kaufmann, 1991) would attribute it otherwise to the Creator and His formative endeavors—specifically in designing and placing information and the mechanisms for information transfer and reception within the cells of the organisms He made. Having at that point been assembled and energized in the archetypes, the process is now sustained through conservation (Morris, 1984, pp. 89-92). Now that the cellular *information* is in place, represented by the totality of an organism's genome, and transmitted from one generation to the next by reproduction of kind, development becomes a matter of executing a sequence of commands through a multifaceted network of information transducing pathways, which ultimately direct and determine the appropriate cellular responses. Cells are not in the business of autonomously making decisions concerning what they should be when they grow to maturity! Indeed, to paraphrase Lwoff (1962) when there is a capricious departure from the preordained order, the observed result is pathology.

We respectfully disagree with McCann (1991, p. 153) that "*there remains the question* of how the modality for the intelligent governance of living systems could have been acquired" (our emphasis). There is no question. We reference Genesis 1:1-31, and Exodus 20:11.

## Conclusion

Variation of phenotype, which includes the morphogenic differentiation of cells during embryonic development, remains altogether explicable in terms of genetic information, as that is viewed in its *totality,* and information transduction. It is the latter principle, in particular, that integrates the genomic "code" per se with extragenomic influences, where applicable, on development. The genome is both initiative and reactive. The limitations McCann (1991) would place on "gene action" respective of differentiation and phenotypic variation are specious. We note that "gene action" would include the "action" of gene products; as their structures are prescribed by genetic information, so, ultimately, are their functions and interrelationships. The superintendent quality of "cellular intelligence" he proposes is neither demonstrable, necessary, nor justified as an explanation of cytodifferentiation and the developmental process. While McCann (1991, p. 151) would decry the genetic explanation as "well-worn orthodoxy," it remains well-developed and based on empirical evaluation.

Since information is not generated spontaneously, the source of genetic information — implanted in the archetypes at the time of their fiat creation and now maintained through conservation and heredity — is Creative intelligence. Cells per se are not "intelligent" entities but are *informed* entities, marvelously made in the process.

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## DR. McCANN'S RESPONSE

Beginning in a very broad way, evidence of living systems performing meaningful work is apparent in the many constructions we see around us. Not all of these are of human origin. Non-human products include such items as bird nests, snail shells, spider webbings, and the larval encasements of caddis flies.

No kinds of aggregative constructions are found on those celestial bodies that we have inspected thus far. It indicates that any work-demanding assembly process is always associated with the presence of life. This observation correlates with the ability of living systems to control and direct energy, without which constructions are impossible.

However, we have a troublesome problem here relative to living systems themselves. Lumsden, Anders and Pattera, and mechanists generally, contend that living systems in their assembly patterns are different. These authors believe that living systems are put together by a non-living source, the genes. This is where Lumsden et al. and McCann most sharply differ. McCann maintains that the construction of any non-living assembly and any living system itself *both* require the involvement of *living* agencies having the ability to beget *work* of a constructive nature.

If genes could qualify as such an agency it would be fine. However, genes give every evidence of being inanimate and incapable of autonomous performance. The inert and insentient nature of genes is suggested by the way in which the nucleus reacts when removed from a cell. The nucleus, with its genes, promptly withers. The remaining cell, however, persists. Moreover, with nuclear genes absent such cells are capable of ordered divisions.

Along this same line, the human red blood cell aborts its nucleus prior to entering the blood stream where, minus its genes, it functions as a metabolizing, process-controlling, living unit. All of this suggests that genes are no more than dependent devices that need the presence of a living directorship.

If genes do not serve as the control center of the cell, what is it that does? McCann maintains that cellular activities are ultimately under the control of a living agency which he calls "cellular intelligence." This idea is vigorously rejected by Lumsden et al. Presumably it is because such a view conflicts with a materialistic and mechanistic view of cellular activities which they feel ought to prevail.

Call this controlling agency "cellular intelligence" or any other suitable expression. The intelligence connection seems appropriate, however, for if and when philosophers provide an overall definition of intelligence, surely it will include as one of its main ingredients the ability of intelligence to control and direct energy.

A view of the cell as being a kind of robotic engine made up of a meshwork of regularized, mechanistic arrangements in which a computer-like nucleus initiates and coordinates actions (even after the nucleus is no longer there) falls short. It is a concept that provides no means for solving the kinds of non-chartable demands which we know living systems are able to handle. And too, it introduces uncertainty relative to any latitude in individual decision-making when applied broadly.

Hampering inquiry, it seems manifest, is any insistence that to be acceptable a concept must have materialistic and mechanistic embodiments.

This is the reason, no doubt, why none other than Niels Bohr himself from his matchless experience with physical forces had this advice: If Biology wished to move to a higher level of understanding it would have to employ new concepts and new approaches that did not require mechanistic and reductionist interpretations

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# THE DARWIN CONVERSION STORY: AN UPDATE

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**Abstract**

*Since the discussions of Rusch (1975), Rusch and Klotz (1988) and Herbert (1990), new information on the Darwin conversion story has come to light. The earliest version of the story has been located in the Watchman-Examiner and some further biographical information on a possible candidate for Lady Hope is presented.*

## Introduction

Probably no other individual in modern times has had a greater influence in turning people away from the biblical account of creation, the scriptural view of mankind, and the authority of the Bible than Charles Darwin. His *Origin of Species* (1859) and *Descent of Man* (1871) were seen by many of his contemporaries as giving scientific credibility to the idea that all life developed by purely naturalistic processes. As a result Darwin provided considerable impetus for several atheistic ideologies which have dominated our troubled twentieth century.

In view of this, most people are surprised to hear that Charles Darwin allegedly became a believer in Christ near the end of his life. This story—in which we should rejoice, if true—has circulated in numerous tracts and magazine articles since 1915 (Rusch, 1975; Rusch and Klotz, 1988; and Herbert, 1990). It narrates an interview with Darwin, in the fall of the last year of his life, by a "consecrated English, woman" identified only as "Lady Hope." According to her account, she was allowed to visit with Darwin, and found him reading the New Testament epistle to the Hebrews, which he called "the Royal Book." When she asked him about Creation, he became very distressed and said that people had taken his unformed ideas and made a religion out of them. Darwin then invited her to speak to some of his servants, tenants and neighbors in his garden summerhouse on "Christ Jesus, and His salvation," and promised that he would sing along with them from his open bedroom window.

As Rusch (1975), Rusch and Klotz (1988), Herbert (1990) and others have pointed out, this account does not square well with other information we have about Darwin. His correspondence in the winter and spring following this alleged incident give no indication that Darwin's agnosticism had changed or that his belief in evolution had lessened. When Darwin's daughter, Henrietta Litchfield, heard this story, she denied that Lady Hope had visited Darwin, that Darwin's estate had a summerhouse, or that the "servants or villagers ever sang hymns to him." She claimed the story was invented in America (Rusch and Klotz, 1988, pp. 20-21, quoting from *The Christian*, 23 Feb. 1922).

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Some confusion exists in the various tracts as to whether this story was first reported by Lady Hope in Northfield, England or Northfield, Massachusetts. The date of her report is given as August 15, 1915. Rusch's attempt to find this report in the issues of the *Watchman-Examiner* available to him in the midwest was unsuccessful (Rusch and Klotz, 1988, p. 3).

## Some New Findings

Intrigued by this story and spending my summers in the Washington, D.C. area, I decided to try to locate the article in the Library of Congress with its extensive resources. Assuming the *Watchman-Examiner* was some sort of periodical and using the date of August 15, 1915 as a starting point, the search was successful. The *Watchman-Examiner* was a national Baptist newspaper issued weekly from Boston and New York since 1819, with some variation in name over its history. The Library of Congress has nearly a complete run of the paper. The article turned up on the first issue following the above date (Hope, 1915) and is reprinted for your convenience:

This article was preceded by a four-page report on the 1915 Northfield Conference, a summer Bible conference held on the grounds of the Northfield Seminary, a girls' school in Northfield, Massachusetts founded years before by Dwight L. Moody. The conference that year ran from July 30 to August 15, and Lady Hope gave this testimony at one of the morning prayer services, the date not specified. The particular issue of this paper was stamped as received by the Library of Congress on August 19, so the account was in print no more than a few days or weeks after she gave it orally. Thus, so far as we know, the story was first circulated in the United States some 33 years after Darwin's death. Since this is also long after Darwin's wife Emma died in 1896, the suggestion that she started the story is unfounded.

Who was this Lady Hope? The *Watchman-Examiner* gives us no more information than has circulated in the tracts. As reported by Rusch and Klotz (1988) and Herbert (1990), a former editor of *Burke's Peerage*, L. G. Pine, was asked this question also. He could come up with only one "Lady Hope" who would have been grown in 1881 and still alive in 1915, a woman he names Elizabeth Reid Stapleton-Cotton, mentioned in

# DARWIN AND CHRISTIANITY

BY LADY HOPE.

It was on one of those glorious autumn afternoons, that we sometimes enjoy in England, when I was asked to go in and sit with the well known professor, Charles Darwin. He was almost bedridden for some months before he died. I used to feel when I saw him that his fine presence would make a grand picture for our Royal Academy; but never did I think so more strongly than on this particular occasion.

He was sitting up in bed, wearing a soft embroidered dressing gown, of rather a rich purple shade.

Propped up by pillows, he was gazing out on a far-stretching scene of woods and cornfields, which glowed in the light of one of those marvelous sunsets which are the beauty of Kent and Surrey. His noble forehead and fine features seemed to be lit up with pleasure as I entered the room.

He waved his hand toward the window as he pointed out the scene beyond, while in the other hand he held an open Bible, which he was always studying.

"What are you reading now?" I asked, as I seated myself by his bedside.

"Hebrews!" he answered—"still Hebrews. 'The Royal Book,' I call it. Isn't it grand?"

Then, placing his finger on certain passages, he commented on them.

I made some allusion to the strong opinions expressed by many persons on the history of the Creation, its grandeur, and then their treatment of the earlier chapters of the Book of Genesis.

He seemed greatly distressed, his fingers twitched nervously, and a look of agony came over his face as he said:

"I was a young man with unformed ideas. I threw out queries, suggestions, wondering all the time over everything; and to my astonishment the ideas took like wildfire. People made a religion of them."

Then he paused, and after a few more sentences on "the holiness of God" and "the grandeur of this Book," looking at the Bible which he was holding tenderly all the time, he suddenly said:

"I have a summer house in the garden, which holds about thirty people. It is over there," pointing through the open window. "I want you very much to speak there. I know you read the Bible in the villages. To-morrow afternoon I should like the servants on the place, some tenants and a few of the neighbors to gather there. Will you speak to them?"

"What shall I speak about?" I asked.

"CHRIST JESUS!" he replied in a clear, emphatic voice, adding in a lower tone, "and his salvation. Is not that the best theme? And then I want you to sing some hymns with them. You lead on your small instrument, do you not?"

The wonderful look of brightness and animation on his face as he said this I shall never forget, for he added:

"If you take the meeting at three o'clock this window will be open, and you will know that I am joining in with the singing."

How I wished that I could have made a picture of the fine old man and his beautiful surroundings on that memorable day!

[At one of the morning prayer services at Northfield Lady Hope, a consecrated English woman, told the remarkable story printed here. It was afterward repeated from the platform by Dr. A. T. Robertson. At our request Lady Hope wrote the story out for THE WATCHMAN-EXAMINER. It will give to the world a new view of Charles Darwin. We should like the story to have the widest publicity. Our exchanges are welcome to the story provided credit is given to THE WATCHMAN-EXAMINER and marked copies are sent to us.—THE EDITOR.]

**Figure 1. Facsimile of original Lady Hope article (Hope, 1915).**

*Burke's Peerage* in the lengthy article on Viscount Combermere. In seeking to verify this reference, I discovered that Pine had mistakenly put her in the Stapleton-Cotton branch of the family, though her ancestors separated off from the line before the "Stapleton" was added. Her proper maiden name should be Elizabeth Reid Cotton.

According to *Burke's Peerage* and *Burke's Landed Gentry,* Miss Cotton was born sometime after 1841 and was married twice. Her first marriage (2 December 1877) was to Admiral of the Fleet Sir James Hope, G.C.B., by which marriage she became Lady Hope. He died less than four years later on 9 June 1881. So in the fall of 1881, when our story is set, Lady Hope would have been less than 40 years old and recently widowed. She later married Thomas Anthony Denny (27 September 1893), son of a successful Irish bacon merchant and founder of T. A. Denny and Co. He, too, was much older than she (born 2 April 1818) and he died 25 December 1909. Apparently there was no issue from either marriage. Pine suggests that she preferred to be known as "Lady Hope" (certainly more prestigious than "Mrs. Denny") right up to her death (8 March 1922), but it is not known where Pine got this information. According to the 1921 edition of *Burke's Peerage,* her address when that edition went to press was Buccleuch House, Richmond, Surrey. Lady Hope's father, General Sir Arthur Thomas Cotton, K.C.S.I., has a brief obituary in *Who Was Who,* dying 25 July 1899.

Perhaps one of our British readers could follow up on this biographical information with the more extensive resources available in the United Kingdom. It would be of considerable interest to see if this Lady Hope was the sort of Christian worker pictured in the Darwin conversion story, with what Christian groups she might have been associated, what her reputation for veracity was, and whether she visited America in 1915. Of course, Elizabeth Reid Cotton might not be the Lady Hope for whom we are searching.

### Alternative Explanations

What can we say of the authenticity of the story itself? Besides the two suggestions that (1) Lady Hope made up the whole account, or that (2) Darwin really became a Christian but his relatives sought to hide this, two other possibilities should be considered. (3) Perhaps Darwin did meet with Lady Hope but she later elaborated what were his much more non-committal statements. (4) Or perhaps Darwin did say all the things reported in the story, but he did so as a cover to avoid being evangelized by Lady Hope—a technique frequently encountered in personal work with unbelievers of the sort of strongly non-confrontational temperament Darwin is known to have had. The Darwin correspondence mentioned above makes alternative (2) unlikely, but there is still more work to be done before we can give a final verdict on this story.

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# VARVES — THE FIRST "ABSOLUTE" CHRONOLOGY
## PART I—Historical Development and the Question of Annual Deposition

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### Abstract

*Varves have been used to set up the first "absolute" chronology, which significantly exceeds the Scriptural time scale from Genesis. Observations of modern glaciers and recent climate simulations show that the ice sheets during the Ice Age melted rapidly, much faster than indicated by varves. A further investigation of varves demonstrates that other mechanisms deposit varve-like couplets in a short time. Therefore, "varves" are not necessarily annual. A method to distinguish between annual depositional sequences and other mechanisms is difficult to apply.*


### Introduction

A varve is generally defined as a sedimentary lamina or sequence of laminae deposited in a body of still water within one year's time (Bates and Jackson, 1984, p. 551). More specifically, a varve is considered two sublayers, each seasonally deposited in a glacially-fed lake. The lower "summer" sublayer usually consists of light-colored silt or sand, and the upper "winter" sublayer consists of dark-colored fine silt or clay, which often contains organic residues.

Varves form in deep lakes or in brackish estuaries in which the salt content is less than in ocean water. The water must be deep enough to protect the sediment from erosion caused by wind-generated waves and currents and from biogenic mixing of the sediments at shallow depths. Varves normally do not form in ocean water. The reason for this is the reactions of salt ions with the silt and clay particles, causing them to coagulate and sink to the bottom, forming a featureless or massive deposit. Figure 1 shows a picture of a typical varved sequence from an ancient pro-glacial lake in Ontario, Canada. A pro-glacial lake is a lake that forms at the edge of a glacier or ice sheet.

Varves are a type of rhythmite. A rhythmite is a repeating unit of sedimentation that does not imply limits of thickness, complexity of bedding, time, or depositional environment (Bates and Jackson, 1984, p. 432). Rhythmites display alternations of two or more rock units, such as siltstone alternating with sandstone. A laminite is similar to a rhythmite, except the lithologies are random. An annual period is the feature distinguishing a varve from a rhythmite.

Establishment geologists have employed "varves" to date the deglaciation of the last ice age of the Pleistocene Period. As the ice sheets receded, pro-glacial lakes or brackish estuaries temporarily formed in many areas, and in these water bodies rhythmites often developed. Supposed varves have also been used to determine the amount of time since the ice sheet melted. Varves have been especially employed in Sweden to develop the Swedish Time Scale, the first "absolute" and "exact" chronology according to Antevs (1922, p. ix). Important varve chronologies have also been generated in Finland, the north central and northeast United States, and southeast Canada.

The varve chronology is considered to be so accurate that it compares favorably with the carbon-14 dating method (Olsson, 1970). A revised Swedish Time Scale suggests that C-14 ages may be less than real time between 10,000 and 12,000 years ago (Stromberg, 1985, p. 104). Varve chronology is used to date geological and archeological events and to calibrate other dating methods. Cato (1987, p. 52) informs us of the importance of a revised varve chronology:

> The consequences of the present connection of varve series to the present are far-reaching not only for the Swedish Geochronological Time Scale but also for all the geological and archeological

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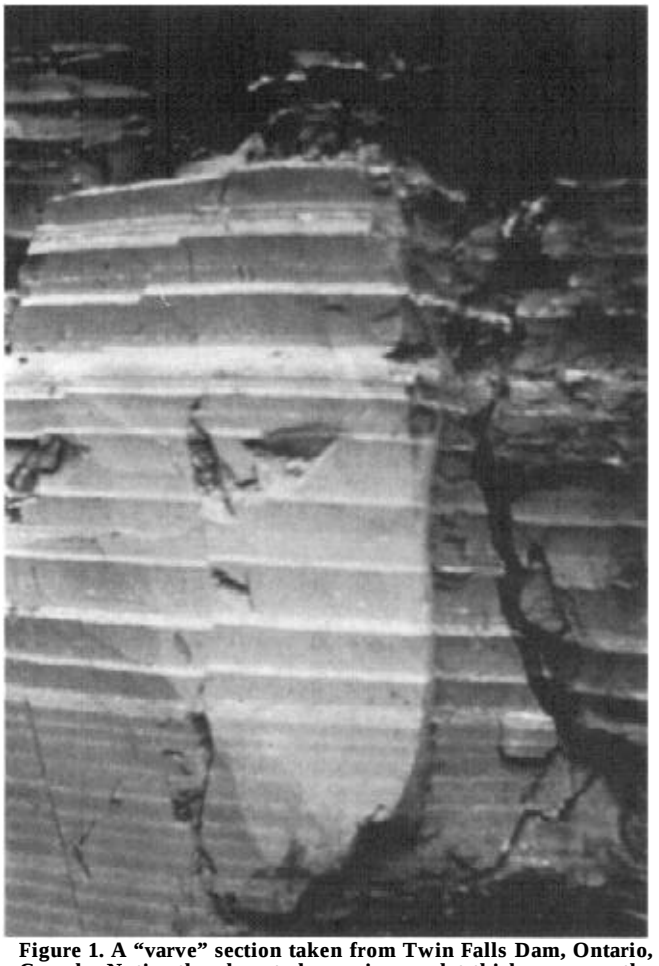

**Figure 1. A "varve" section taken from Twin Falls Dam, Ontario, Canada. Notice the abrupt change in couplet thickness near the bottom of the photograph. Courtesy of the Geological Survey of Canada.**

events, intercalibrations etc. which are temporally or otherwise based on it.

Varve chronology poses a problem to biblical creationists. The derived dates are greater than allowed by the Scriptural time scale from Genesis. The "varves" seem to indicate that an ice sheet melts very slowly over thousands of years. For example, in Sweden the varve chronology indicates that the ice began to retreat from southern Sweden about 13,000 years ago and finally left central Sweden about 9,000 years ago.

In Parts I and II of this paper I will examine varves to see whether they are accurate time recorders. I will focus on the "varves" in Sweden and in the Connecticut River Valley in New England. Part I will show how the varve chronology was constructed and how it has changed with time. New evidence that ice sheets melt much faster than indicated by this chronology will be presented. The presumed annual period of "varves" will be questioned. Several other mechanisms can rapidly deposit varve-like layers. Methods to distinguish true varves from the other varve-like rhythmites are equivocal.

## Historical Development

In 1884 Gerard De Geer, a Swedish geologist, fashioned the first varve correlations around Stockholm, Sweden. He developed his idea by noting the similarity of the varve couplets to tree rings. Stromberg (1983, p. 97) points out: "The regular and continuous distribution of the varves convinced him [De Geer] that they, too, were annual." After measuring the thickness of varve sequences at a number of points, he at first correlated sections only about 100 meters apart. He hesitated to expand the spacing of varve correlations. But 20 years later he took this bold step and correlated his earlier measurements to sections a kilometer away. Within a few more years De Geer and colleagues developed a varve time scale of ice recession along the east coast of southern and central Sweden. The right hand diagram in Figure 2 shows areas in Sweden where the classical (De Geer) and revised chronology was developed. The left hand diagram shows the time frame for the chronologies.

While De Geer and his colleagues completed the deglaciation portion of the "Swedish Time Scale," Ernst Antevs (1922, 1925, 1928) developed a varve chronology in New England and southeast Canada. The North American varve chronology was matched to those in Sweden by a transcontinental correlation (De Geer, 1928). Up until the 1950's, the Swedish Time Scale was the standard chronology for all parts of the world (Schove and Fairbridge, 1983). De Geer (1928) considered his varve chronology continuous and exact, and even applicable internationally. He and his colleagues used the Swedish Time Scale to date other

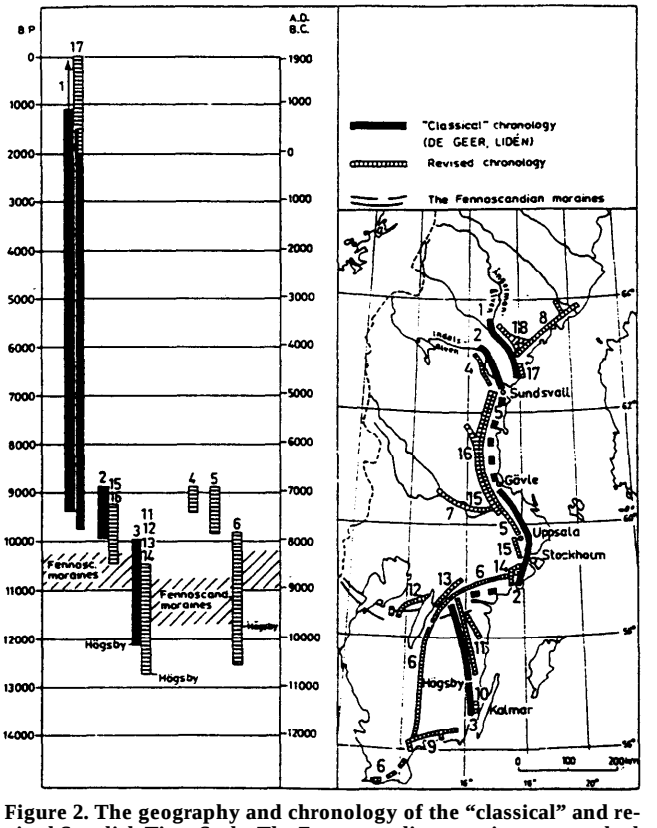


**Figure 2. The geography and chronology of the "classical" and revised Swedish Time Scale. The Fennoscandian moraines are marked on the map as long dashed lines. The numbers refer to the work of different investigators (not listed). Reprinted from "Revision of the lateglacial Swedish varve chronology" by Bo Strömberg from *Boreas* 1985, vol. 14, with permission of Universitetsforlaget AS.**

cyclic sedimentary layers for areas as far away as Iceland, the northwest Himalayas, Chile, India, and Argentina. De Geer progressed from timidly correlating Swedish rhythmites 100 meters apart to brazenly dating events world-wide by correlation to the Swedish Time Scale.

At the same time the deglaciation varve chronology was developed, geologists sought methods to connect the final melting of the ice sheet to the present. De Geer failed to accomplish this task, but Ragnor Lidén succeeded in the early part of the twentieth century. Sweden has been rising isostatically ever since the ice sheet melted, as shown by raised beaches and a currently shrinking Baltic Sea. There has been a corresponding progradation of river deltas and estuaries of major river valleys in central and northern Sweden. Most of the rivers have not deposited rhythmites. However, the Ångermanälven River in central Sweden occupies a former fjord and is apparently the only river that has continuously deposited rhythmites since deglaciation (Cato, 1985, p. 117). Lidén correlated "varve" sections, from where the ice last melted, downstream to the mouth of the Ångermanälven River. He derived a post-Ice Age time scale of about 9,000 years (Cato, 1987).

From 1950 to 1980, the Swedish Time Scale came under criticism and was supplanted by the Carbon-14 dating method, which contradicted some aspects of the varve chronology. During the 1970's, the Carbon-14 method came under scrutiny due to small differences between it and the bristlecone pine chronology from the White Mountains of eastern California. Due to the importance of finding an accurate year-to-year absolute chronology (Fairbridge, 1981; Schove and Fairbridge, 1983), geologists in Sweden have been revising the Swedish Time Scale.

### Method of Varve Correlation

Before embarking further on an analysis of varve chronology, the method of constructing the chronology based on varve correlations will be briefly discussed. A more detailed evaluation will be given in Part II of this paper. Before I studied varves I thought each varve sequence was a long succession of thousands of couplets. By simply counting the couplets in one varve core or section, the time since deglaciation was established. This is not correct. In Sweden, each varve section is very short, most often represented by less than 200 couplets (Olsson, 1970, p. 219). Few layers of varved clay were deposited because the pro-glacial lakes were short lived.

To construct a long chronology the thickness of each couplet in each varve section is measured and plotted on graph paper. A jagged curve results by connecting the points. By curve matching of small varve sections or unusual "varves," the varve sequences are correlated temporally. Figure 3 is a matching of 12 varve sections from southeast Sweden. The longest section is reported at 170 years while the shortest is only 50 years. In each of the 12 sections, the height of the jagged line represents the thickness of the "varves." The time axis is horizontal in increments of 10 years with the youngest to the left, which is the opposite of most plots. The 12 sections are matched and correlated through about 220 years. Figure 3 is one of two suggested correlations, which differ by 85 years.

### Ice Sheets Melt Rapidly

The slow melting rates for ice sheets inferred from varve chronology does not agree with observed data from modern glaciers and the results of newer general circulation models of the atmosphere and ocean. The observed melting rate in the ablation area of many

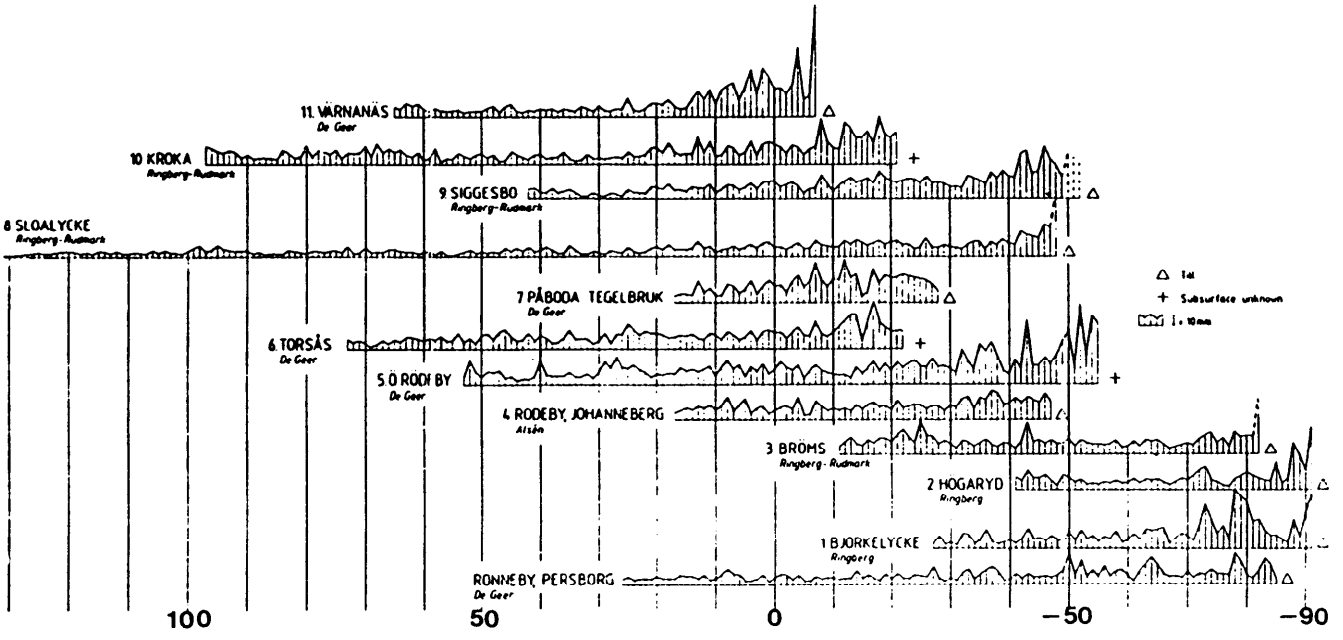


**Figure 3. The correlation of 12 "varve" diagrams from southeast Sweden. Note that time is positive left. This is one of two preferred alternatives, which differ by 85 years. Reprinted from "Varve chronology based upon glacial sediments in the area between Karlskrona and Kalmar, southeastern Sweden" by Bertil Ringberg and Lars Rudmark from *Boreas* 1985, vol. 14, with permission of Universitetsforlaget AS.**

Norwegian, Icelandic, and Alaskan glaciers is about 12 meters of thickness a year (Sugden and John, 1976, p. 39). These glaciers are located in high latitude mountains close to the ocean. Smaller, but still high melting rates occur in the ablation zones of glaciers dominated by a cold continental climate. For instance, Beget (1987, p. 85) has observed that glaciers at 70°N latitude in northeast Canada melt at 5 to 7 m/yr at low elevations and 1.5 to 3 m/yr at elevations greater than 1,000 meters. Such high ablation rates are principally due to strong solar radiation in summer.

Several positive reinforcement mechanisms bring the observed melting rate in the ablation zone of the Jakobshavns Glacier in West Greenland up to an impressive 55 m/yr (Hughes, 1986). These positive feedback mechanisms are stronger absorption of sunlight and heat by crevasses, greater addition of meltwater to the base of the glacier, and calving into water. These effects accelerate melting and would also operate locally during the melting of the Laurentide, Scandinavian, and Cordilleran ice sheets during the post-Flood Ice Age (Oard, 1990a).

At an ablation rate of 10 m/yr, and assuming the huge ice thickness postulated by uniformitarian scientists, the Laurentide, Scandinavian, and Cordilleran ice sheets would melt in several hundred years. These ice sheets were in more favorable areas for melting than present-day glaciers, so the above estimate is conservative.

General circulation models of the atmosphere and ocean are now pointing to the conclusion that if the ice sheets could form at all, they would disappear rapidly (Rind, 1987; Rind, Peteet, and Kukla, 1989). Most previous models have been inadequate for determining the ice sheet melting rate (Rind, Peteet, and Kukla, 1989, p. 12,853). Some of the problems with these models include poor parameterization of complex variables, too high an albedo of melting snow and ice, and much too high annual precipitation (Oard, 1984a, p. 70). The albedo is the amount of solar radiation in tenths reflected from a surface.

Unfortunately, the current models continue to use too high an albedo for melting snow and, therefore, underestimate melting rates. For instance, Rind, Peteet, and Kukla (1989, p. 12,854) use an albedo of 0.5 for melting snow and pure ice. However, the albedo of melting snow drops to 0.4 after two weeks of melting (U.S. Army Corps of Engineers, 1956, Plate 5-2, Figure 4). Ice has an albedo between 0.2 and 0.4 (Paterson, 1981, p. 305). Rind, Peteet, and Kukla (1989) also did not consider the positive reinforcement mechanisms of crevassing, calving into pro-glacial lakes or marine bays, and blowing dust deposited on the ice. Nevertheless, Rind (1987) reports that in his model ice sheets averaging 2,500 meters thick completely melt in 1,000 to 4,000 years. Such a rapid melting rate, according to uniformitarian standards, also raises the question of how can an ice sheet grow this thick if the melting tendency is so powerful?

In an elaboration of Rind's computer simulation, Rind, Peteet, and Kukla (1989) tackle the question of how an ice sheet develops in the first place. They used solar radiation slightly less intense than at present, as postulated by the astronomical theory of the Ice Age (the Milankovitch mechanism). But they discovered, nevertheless. that all the winter snow over areas formerly covered by ice sheets melts during summer. Trying to aid ice sheet growth, the next computer simulation began with an initial 10 meter thick ice sheet over all the land once covered by the ice sheets. They also reduced the sea surface temperature to presumed Ice Age values. Running the simulation with these changes, the 10 meter thick ice sheet, instead of growing melted in 5 years! They conclude that ". . . we do not really understand the cause of the ice ages and the Milankovitch connection" (Rind, Peteet, and Kukla, 1989, p. 12,851).

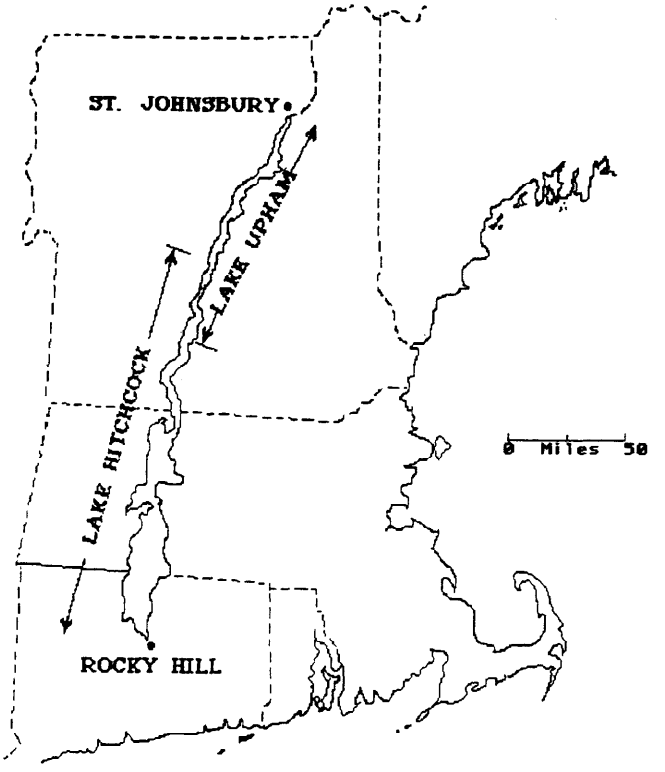


**Figure 4. Map of ancient Lake Hitchcock and Lake Upham in New England. Redrawn from Ashley, 1972 by Dale Niemeyer.**

The above results are consistent with previous evidence that the astronomical theory of the Ice Age is too weak to cause an ice age (Oard, 1984a, b, 1985). An ice age cannot be initiated without a special catastrophic mechanism. The aftermath of the Genesis Flood provides such a mechanism (Oard, 1979, 1987, 1990a, b, c). With a 5-month warm season average for solar and infrared radiation under postulated ice age conditions. the energy balance over a snow cover indicates a post-Flood ice sheet would have melted rapidly. The estimated melting rate is at least 10 m/yr at the periphery and probably more than 5 m/yr in the interior. This rate is consistent with observed data and the new general circulation model results.

The implication of the above research indicates that the ice sheets melted catastrophically. Some glacial geologists are now postulating the rapid formation of drumlins and meltwater scouring features due to catastrophic sheet flooding during deglaciation (Shaw and Kvill, 1984: Shaw and Sharpe, 1987; Shaw, 1988, 1989; Shaw, Kvill, and Rains, 1989; Shaw and Gilbert; 1990: Sharpe and Shaw, 1989).

Tunnel valleys, trough-like depressions in bedrock, are abundant along the periphery of the former Laurentide and Scandinavian ice sheets. In Minnesota west of Lake Superior, tunnel valleys average 10 m deep and about 0.5 km wide, but can be as deep as 70 m and constitute a net-like pattern with a total length of 1000 km (Mooers, 1989). In Denmark and northern Germany, the tunnel valleys are miniature fjords, up to 400 meters deep, filled with fluvial sediments and glacial till (Ehlers, 1981). Since tunnel valleys are associated with deglaciation features, glacial geologists have trouble explaining them. Some geologists have suggested catastrophic erosion by high-velocity subglacial meltwater (Wright, 1973; Boyd, Scott, and Douma, 1988; Gilbert, 1990). Unfortunately, they have trouble finding a source for the water. The catastrophic melting of the post-Flood ice sheets, likely with the aid of cavitation (Holroyd, 1990a, b), can provide a source for the water and a rapid erosional mechanism for tunnel valleys.

Given the observational and simulated model evidence for rapid deglaciation of the Scandinavian and Laurentide ice sheets, plus the new surficial data on likely catastrophic melting, why are the deglaciation rates postulated from varve chronology so low? To answer this question, we need to examine whether "varves" are really annual.

### Are Varves Annual?

De Geer believed that each varve couplet was annual, based on the similarity to tree rings. De Geer's colleagues and students unquestioningly have followed his belief. Anderson and Dean (1988, p. 216) write:

> There was little questioning of the assumption of annual deposition for proglacial lake sediments because seasonally regulated melting and freezing was so obvious, and early investigations . . . were convincing.

But many modern investigators question this assumption, and many others are so concerned about it that they list reasons why they believe the layers are annual. Mackiewicz et al. (1984, p. 114) assert: ". . . the term varve has had a troubled history . . . the term 'varve' has become a catch-all term to describe any interlaminated glacial sediment, and it is confusing and misleading." Quigley (1983, p. 150) corroborates: "A single varve representing 1 year of deposition, consists of a couplet of summer silt and winter clay; this time framework is difficult to demonstrate however."

The time frame is very difficult, if not impossible, to prove because it is historical and not empirical. One troublesome problem is that rhythmites are complex and variable. The rhythmites displayed in Figure 1 are variable; they abruptly change thickness in the lower portion of the photograph. The character of lake rhythmites depends upon the quantity, grain size, and composition of the inflowing sediment, the size and bathymetry of the water body, the wind regime, the thermal and chemical stratification of the lake, the presence of burrowing organisms on the bottom, and other variables (Ludlam, 1979; Smith, Venol, and Kennedy, 1982, p. 206). Unlaminated sediments are sometimes intercalated within rhythmites.

Rhythmites also represent a great variety of depositional environments (Sturm, 1979a, b). Not only do presumed varves or varve-like layers form in pro-glacial lakes, but they also form in many non-glacial lakes (Boyko-Diakonow, 1979; Ludlam, 1979; Saarnisto, 1986; Anderson and Dean, 1988). Many of these non-glacial rhythmites are very thin couplets of diatoms, calcium carbonate, mineral matter, or organic sludge. These rhythmites are beyond the scope of this paper, which shall be confined to clastic rhythmites in which the majority of the sediment is supplied by rivers.

Some recently-formed rhythmites are indeed annual and hence true varves. For instance, a retreating glacier in Norway left behind a pro-glacial lake. The ice was in contact with the lake for 30 years. Cores taken from the bottom sediments revealed that the number of couplets at each location matched the years since the ice left that location. But to complicate matters, one location had twice as many layers as years of deposition (Ostrem, 1975, pp. 116,117). There were a total of 42 couplets. The lower 21 couplets in this one core were assumed to be annual, while the upper 21 couplets were to have been emplaced by slumping, although both sets appear almost identical.

Measurements of the clastic rhythmites in non-glacial lakes indicate that more than one pair of laminae can form each year. For instance, Lambert and Hsü (1979a, b) report that 300 to 360 laminae formed in 160 years in Lake Walensee, Switzerland. The number and thickness of laminae varied with the location, which should make correlation by couplet thickness hazardous. Generally, two layers a year had formed, but at some locations five layers were deposited in one year. This confirmed the long-overlooked findings of a Swiss engineer, W. Stumpf, who earlier this century measured five laminated couplets in one year.

The extra-annual couplets were formed by turbidity currents caused by either melting snow or heavy rain storms. The implications of this research are stated by Lambert and Hsü (1979a, p. 454):

> Our investigations supported de Geer's first contention that sediment-laden flood-waters could generate turbidity underflows to deposit varves, but threw doubt on his second interpretation that varves or varve-like sediment are necessarily annual!

Rhythmites form by either underflows, interflows, or overflows, or by all mechanisms operating at different times. Underflows are more-or-less *continuous* turbidity currents that flow along the bottom. Interflows and overflows spread out from a river or stream at intermediate depths and at the surface, respectively. The level at which the inflowing sediment-water mixture flows depends upon its density compared to the lake density and stratification.

Turbidity currents are more technically defined as sporadic underflows or surge currents. Turbidites, the deposits laid down by turbidity currents, can occasionally mimic varves, especially at far or distal distance from the source of sediment. For instance, turbidites can alternate colors, similar to Pleistocene rhythmites (Kuenen, 1966). Crowell (1957, p. 1005) states: "Sandstone and mud sequences laid down by turbidity currents far removed from a glacial environment may be easily confused with varved sequences . . ." Hambrey and Harland (1981, p. 14) admit that common distal marine turbidites duplicate varve-like rhythmites. Some investigators believe that many sup-

posed varves are in fact multiple turbidity current deposits with no seasonal control:

> It is very unfortunate from a sedimentological viewpoint that engineers describe any rhythmically laminated fine-grained sediment as 'varved.' There is increasing recognition that many sequences previously described as varves are multiple turbidite sequences of graded silt to clay units . . . without any obvious seasonal control on sedimentation. (Quigley, 1983, p. 151).

Silt settles in a matter of days, but clay, depending upon its grain size, can take years to settle in a quiet lake. However, a turbidity current or underflow rapidly transports clay as well as silt and sand to the bottom of the lake (Smith and Ashley, 1985). A cloud of clay particles would be left floating above the deposited silt or sand as the current diminishes. Then the clay will settle on top of the silt or sand in a relatively short time. Smith and Ashley (1985, pp. 198,199) state that the same thickness of silt and clay are expected in turbidity surges:

> As both clay and silt fractions are transported to the site of deposition at the same time, successive surge deposits are likely to have similar proportions of silt and clay. In other words, thick silt layers will have thick clay layers, and thin silt layers will have thin clay layers.

I doubt whether this is an absolute rule, but it indicates that turbidity currents or rapid underflows have no problem depositing clay rapidly above silt or sand.

Lambert and Hsü are not the only investigators to discover more than one annual couplet in a lake. Pickrill and Irwin (1983) analyzed rhythmic sediments from a deep glacial-fed lake in New Zealand. They had to depend on $^{210}$Pb dating to ascertain the annual sedimentation rate, since each couplet looked similar. They found an average of three couplets per year and surmised that the extra two layers were deposited by floods and slumps.

In another instance, Wood (1947) describes three varve-like couplets deposited in a new reservoir. The couplets looked very much like varves and were formed by three peak river inflows caused by light showers. The layers were deposited in just two weeks! The average grain size of these layers was larger than in supposed Pleistocene varves because they were formed by settling in a reservoir only 0.5 mile in length. Ice Age rhythmites predominantly settled out in a larger lake and hence would have a finer average grain size.

Most geologists assume the coarse layer of a "varve" couplet was deposited in summer and the fine layer settled slowly in winter. However, sand or silt layers can be deposited in winter as well, interrupting clay deposition. This will cause many extra years to be counted when every couplet is assumed annual. For example, Pickrill and Irwin (1983, pp. 70-73) discovered that winter couplets form by the slumping of river delta deposits. A delta may become oversteepened due to summer sedimentation and slump during winter. Shaw and Archer (1978) report sand layers sandwiched within presumed winter clay in Ice Age lake sediments from the Okanagan Valley, British Columbia. Coarse layers in presumed winter clay have also been observed in Swedish rhythmites (Shaw, Gilbert, and Archer, 1978, p. 692), and in ancient Lake Hitchcock in New England (Sturm, 1979b, p. 284). Lake Hitchcock is a postulated north-south orientated lake that filled the Connecticut Valley from central Connecticut to northern Vermont after the ice sheet melted in the area. Figure 4 shows the location of this ancient lake, which for the purposes of this paper includes ancient Lake Upham. The total length of the postulated lake is about 400 km.

In modern pro-glacial lakes, discharge from a glacier often continues during winter, although in reduced volume (Gustavson, 1975, p. 252; Smith and Ashley, 1985, p. 198). So, rhythmite deposition may continue well into the cold months. Quigley (1983, p. 152) writes:

> In many cases where large ice lobes or glaciers sit or float in lakes, there is year round delivery of sediments and turbidite activity occurs almost continually resulting in graded laminae that are not true varves.

The reason for continued river discharge is due to bottom melting and draining of water-filled fractures and tunnels in the ice sheet during winter.

Besides continuous river discharge, winter coarse layers are caused by several other mechanisms and are not rare. Potential controls over the occurrence of winter underflows are winter storms, delta failures, and jökulhlaups, which are floods caused by the breaching of an ice-dammed lake. Shaw, Gilbert, and Archer (1978, p. 698) summarize the implication of these winter coarse layers:

> Misinterpretation of these coarse-grained units as summer deposits leads to an over-estimate of the length of time represented by a particular glaciolacustrine sequence. Our review shows such misinterpretation to be common.

Actually, it is not known for certain that the coarse layers described above were formed in winter. They could simply be regular couplets in which the coarse layer is thin. Such layers could have been formed at distal locations in summer, during a dry year, or during a complex deposition of rhythmites. Therefore, couplets that would be interpreted as varves can be laid down rapidly any time of the year.

Scientists have been studying the glaciers of southern Alaska for years. One glacier in particular, the Muir Glacier, has been receding about 410 m/yr up a fjord. This glacier simulates in many ways the melting of the ice sheet at the end of the Ice Age. Investigators have discovered that debris from the base of Muir Glacier and other glaciers in Muir Inlet is continuously fed into the fjord. The debris often forms rhythmites that are similar to varves in glacial lakes (Mackiewicz, et al., 1984, p. 115). The rhythmites are formed mostly by interflows and overflows because of the higher density of the brackish water in the inlet. The sedimentation rate in the fjord varies from 13 m/yr at the terminus of one glacier to about 1 m/yr at ice-distal locations (Mackiewicz, et al., 1984; Cowan, Powell, and Smith, 1988, p. 409). Most of this sediment is finely laminated silt and mud, and many couplets are deposited each year.

The rhythmites in Muir Inlet are formed by combinations of semidiurnal tides, diurnal meltwater discharges, baroclinic waves resulting from water density differences in the estuary, heavy rain storms, and random debris flows (Mackiewicz, et al., 1984; Cowan, Powell, and Smith, 1988). Smith, Phillips, and Powell (1990) discovered that large diurnal meltwater variations, combined with twice-a-day tides (especially the large spring tides) form two rhythmite couplets a day below deltas in Muir Inlet. Each couplet averages half a centimeter thick, and the sequence superficially looks like varves. Seiches, standing wave oscillations in an enclosed water body caused by earthquakes or strong winds, can also cause rhythmites (Ludlam, 1979). Some of these variables would also operate to cause rhythmites in lakes.

In summary, rhythmites that are believed to be varves may be annual, but several mechanisms operate to produce more than one couplet in a year. It is difficult to distinguish between these mechanisms. Consequently, presumed varves from the Ice Age may not be annual. Many couplets may have formed in one year.

**Possible Diagnostic Criteria for Varves**

Because of the various mechanisms depositing rhythmites, geologists have attempted to develop diagnostic criteria that determine the annual cycle. In reference to rhythmites formed by underflows, Smith and Ashley (1985, pp. 197, 198) discuss the problem:

> A pervasive and recurring controversy concerning glacial lake sedimentation is the underlying control of rhythmicity: randomly occurring slump-generated surge currents vs. regularly alternating (seasonal) sedimentary processes . . . The difficult problem is distinguishing varves formed predominantly by quasi-continuous underflow from surge-current deposits, because they share similar characteristics . . . Superficially the two deposits may appear similar.

The authors present three diagnostic criteria that hopefully characterize varves: 1) a sharp break between the coarse sublayer and the overlying fine sublayer; 2) biogenic marks, usually in the fine-grained layer; and 3) the same thickness for the fine-grained layer throughout the lake basin.

The first criterion is not absolute, so cannot be applied with certainty. Flint (1975, p. 125) infers that the break between the coarse sublayer and the overlying fine sublayer in presumed varves from ancient Lake Hitchcock is not always sharp. Ashley (1975, p. 304) contends that sharp breaks occur in more than 75% of the rhythmites in Lake Hitchcock. Therefore, a minor, but significant proportion of the rhythmites display a gradual transition from silt to clay in this particular lake.

Eden (1955) also indicates that Ice Age "varves" are variable. The varves at Steep Rock Lake in Ontario, Canada show a sharp boundary between the coarse sublayer and the overlying clay sublayer. However, the clay itself is not vertically graded, which is unusual if the clay settled out during winter. The only apparent explanation is that the clay settled quickly due to coagulation of the grains by ions in the water, which *does* occur in fresh water lakes. Such clay deposition can occur even in summer on top of underflow or turbidity current deposits. Eden's analysis indicates that many layers exhibiting sharp breaks between sublayers can form in one year.

Antevs (1951) came to a similar conclusion for rhythmites in Steep Rock Lake. He crudely estimated the annual layer as the top of the thickest clay layer. The rhythmites from Steep Rock Lake consisted of many couplets of various sizes, and the presumed annual group often contained many of these couplets, up to 25. Antevs could not distinguish any difference between the supposed winter and summer clay layers.

At a second location in Toronto, Canada, Eden (1955, p. 666) discovered that the coarse sublayer graded gradually into the overlying fine sublayer. So, the proportion of couplets that show sharp boundaries may depend upon the particular lake, and thus upon different variables. Tauber (1970, p. 174) states: "Many transitional forms of gradation exist, and even well-graded varves (diatactic varves) may contain various patterns of microlamination."

To complicate the matter further, thick turbidites that simultaneously deposited multiple layers show a sharp separation between the coarse and fine sublayers. This possibly indicates a type of segregation process of "like attracting like" (Kuenen, 1966). Bridge (1978) attributes this separation process to variable hydrological processes.

The activity of organisms, the second distinguishing criterion, is found on clay layers from ancient Lake Hitchcock. However, most layers do not show any evidence of organisms. Ashley (1972, p. 89) shows a picture of a varve sequence in which irregular contacts may be caused by other mechanisms, and the irregularity was only at the *top* of the clay layer. It seems that if the clay settled throughout the winter, the clay layers would be disturbed throughout. Possibly, such disturbances cannot be seen. And what are we to make of the one out of six clay layers that show disturbances? Would the annual cycle be six couplets? In the Swedish rhythmites, evidence of activity by organisms is rarely observed. Therefore, it is difficult to apply the second criterion, especially to the classical Swedish Time Scale.

The third criterion is an even thickness of clay deposited throughout the entire basin. This criterion is difficult to apply in practice, since rhythmite sections collected from the entire basin for the exact time of deposition are required. I doubt whether this has been accomplished in sufficient detail in any ancient or modern lake. Besides, there are reasons, discussed in Part II, why presumed winter clay deposition should not be uniform over the whole lake basin. In ancient Lake Hitchcock, the clay sublayers, as well as each rhythmite unit, display lateral variability in thickness (Ashley, 1972, 1975). In fact, clay is completely absent on some topographic highs on the lake bottom (Ashley, 1972, p. 26). This is very unusual for true varves, and indicates that deposition of the rhythmites, including the clay layer, was very likely due to turbidity currents or semi-continuous underflows.

No set of diagnostic criteria can absolutely delimit the annual layer in a sequence of rhythmites. Several other processes can duplicate varve-like layers, and many couplets can form in one year. Francis (1975, p. 63) maintains:

> Many glacial rhythmites are not varves and consist of laminated sediments in which the layers are alternately lighter-coloured fine sand or coarse silt and darker fine silt or clay . . .

## Summary

The foregoing sections have endeavored to describe varves and whether they are annual or not. The correlation of these varves is the basis for the first "absolute" chronology, developed in Sweden and called the Swedish Time Scale. This time scale dated the beginning of deglaciation in southern Sweden at 13,000 years ago and ending 9,000 years ago in central Sweden. The chronology was considered so exact that it was used to date other cyclic phenomena from anywhere in the world.

Observational evidence from modern glaciers and the results of climate simulations show that ice sheets melt rapidly—much faster than indicated by uniformitarian models and varve dating. The treatment given here shows that a varve chronology is not scientifically sound. Varves have been assumed to be annual accumulations in pro-glacial lakes, but such deposits form in many types of lakes, and mechanisms have been discovered that deposit varve-like couplets quickly. Several investigators have attempted to devise criteria to distinguish between annual and non-annual rhythmites, but these criteria cannot be applied with certainty.

In Part II, I will examine closely the method of varve correlation. Then the post-Ice Age rhythmites in the Angermanälven River in central Sweden will be analyzed. The paper will conclude with a discussion of the results and the possible contribution to future research.

## Acknowledgments

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## QUOTE

Those who, like Lewis in *The Abolition of Man,* have seen the figure of Dr. Faustus as possessing a profound mythic significance for Western self-understanding have certainly been right. For Faust wanted no thing, no vocation, no possession, merely the unfettered expression of his own will. And from Faust to Bacon the road runs broad and straight, for in a Faustian world the purpose of science is not noetic, is neither wisdom nor knowledge of the natures of things, but that successful production, at any cost and by any means, of those fruits desired by mankind. For not only does man have no nature and fail of existence as a creature or being having self-identity and relatedness, but nature itself loses its very forms. Bacon's *Novum Organum* required as a companion piece Hume's *Treatise of Human Nature,* for the assertion of technological transcendence over man and nature cannot be pursued successfully unless the world has been swept clean of those forms that imply, indeed require, the existence of order and a certain profound respect for the integrity of beings. Thus the metaphysical platform of modernity, pursued from Occam to the English positivists, has had as its central project the extirpation of the Aristotelian-Platonic notion of form or natures or essences and the propagation of the thesis that the individuality of every being is merely subjective and conventional. Thus it is hardly surprising that at the end of this process there exists a populous race who, obedient to the folk Darwinism of their teachers, are willing to believe that no being has a determinate form, but that each may enjoy an indeterminate number of natures, passing down the interminable evolutionary corridor first as one creature then another. And at the end imagination is gripped by the paradox that everything is everything else, nothing itself. Persons as such, rational individuals capable of contracts, loyalties, politics, and faith, cease to exist.

Patrick, James. 1987. Modernity as Gnosis. *Modern Age* 31(3-4):226-227.

# PANORAMA OF SCIENCE

## Cavern and Speleothem Formation—Science and Philosophy

### Introduction

When a person adopts a Flood model of earth history as well as a young earth position, it must be assumed that certain geologic events occurred in rapid succession. For instance, it has been noted that if stalactites and stalagmites developed rapidly, caverns were also formed rapidly in limestone deposited by the Flood (Williams and Herdklotz, 1977). Strahler, in his anti-creationist book, *Science and Earth History*, recognizes this potential problem (pp. 279-281). Like most of his naturalistic colleagues, he is totally ignorant of any research sponsored by the Creation Research Society. He chooses to attack statements in *The Genesis Flood* by Whitcomb and Morris and an *Impact* article by Steve Austin (1980).

### Cavern Formation

Strahler (p. 280) states that cavern formation in limestone could not have occurred until after the Flood waters receded below the land surfaces exposing the limestone. The *assumption* of highly turbid Flood waters was employed to justify this conclusion. It has been shown that during the Flood not all of the water could have been homogeneous and turbid. Smith and Hagberg (1984) demonstrated the need for heterogeneous Flood waters which is more realistic than any postulation of homogeneous, turbid water. When Flood waters receded, it is likely that cavern formation initiated at this stage. Possibly in pockets of Flood water, dead and decaying plant and animal matter could have supplied concentrations of humic acids as well as $CO_2$ in solution. As the exiting waters flowed through jointed, recently-deposited limestone, which would not be as lithified as limestone of today, caves could have been excavated rapidly. Williams and Herdklotz (1977, pp. 193-194) found that acidic water easily can dissolve present-day limestone. Considering the depth of the Flood, much erosion by rapidly-flowing water would have been a factor as cave enlargement processes continued (Williams and Herdklotz, 1977, pp. 197-198). As land surfaces became exposed immediately after the Flood, considerable precipitation in the form of rain or snow (depending upon the latitude) would have provided a continuing supply of $CO_2$-charged water seeping through limestone to form solution cavities. Oard (1990) recently discussed possible post-Flood climatic conditions and specifically countered some of Strahler's claims (pp. 194-195). It is known that the major factor in cave formation is the supply of water available and during floods this mechanism operates most effectively (Williams and Herdklotz, 1977, pp. 197-198; Williams and Herdklotz, 1978, p. 88). Post-Flood precipitation should have been greater than what is experienced today because there were large bodies of water still present on land as well as considerable volcanic activity encouraging precipitation. Thus local flooding and ice age conditions in places would be a distinct possibility to enhance cave formation. Please consult the discussion* of possible post-Flood precipitation conditions kindly provided by Michael Oard (1992).

### Speleothem Formation

Strahler also questioned the creationist supposition of rapid speleothem** formation (p. 281). He failed to mention any creationist laboratory and field studies on the rapid formation of $CaCO_3$ structures (Williams et al., 1976; Williams and Herdklotz, 1977; Williams and Herdklotz, 1978; Williams, House and Herdklotz, 1981). In all of these creationist studies quotes were given from other investigators showing that rapid formation of speleothems is possible if a sufficient water supply is available. Likewise speleothem growth is most efficient during flooding and several conditions were investigated that favor rapid speleothem formation and growth. Strahler (p. 281) appeals to radioactive dating methods (U-234/U-238) and (Th-230/Th-232) as well as paleomagnetism and claims they are ". . . powerful tools for investigating the *absolute* ages of speleothems and the stages in excavation of caverns" (emphasis mine). This bold overstatement ignores warnings by uniformitarian geologists who have performed field work on cave formations (see Williams and Herdklotz, 1978, p. 90) as well as some radiocarbon studies (see Williams and Herdklotz 1977, p. 198) that indicate caution should be exercised in claiming ancient ages for any speleothems regardless of the "method" used. Also the work of Russell Humphreys (1986; 1988) postulating rapid reversals of the earth's magnetic field after the Flood is ignored. Recently Austin (1988, 1992a, 1992b) has shown results on radioactive dating of lavas that would lead anyone to view such "powerful tools" as very tenuous science indeed!

### Philosophy

Unfortunately when Strahler presents his anticreationist arguments, whether it be cavern formation or a refutation of creationist implications of thermodynamics (Williams, 1990, pp. 148-149), he is careful to

*The reason post-Flood precipitation should have been greater at mid or high latitudes is because of the much warmer oceans at those latitudes. Evaporation is seven times greater with a sea surface temperature at 30°C than at 0°C, other variables remaining constant. Also there would be no sea ice to hinder evaporation. Likewise there would be more lakes immediately after the Flood which filled continental basins in areas that are semiarid at present. With much more precipitation, the ground would be wetter causing mere evaporation from land surfaces as well as from pluvial lakes.

However, sunlight is a major factor in continental evaporation and any volcanic dust in the atmosphere would hinder evaporation, resulting in more ground seepage for speleothem formation. This airborne volcanic dust would also have shielded the continents from solar radiation and cooled the continents. This cooling effect causes colder air to flow over the oceans enhancing evaporation near and particularly east of the continents in the Northern Hemisphere. This increased oceanic evaporation would have caused more precipitation. The opposite effect would happen during volcanic lulls. Although evaporation from continents would be reduced during periods of intense post-Flood volcanism, oceanic evaporation would more than compensate for it. Where the precipitation falls depends upon storm tracks. Generally for the continental United States south of the ice sheets, there must have been higher precipitation and reduced evaporation.

**Speleothems—Depositional forms in caves growing from chemical precipitates such as stalactites, stalagmites and helictites. Sometimes called "cave decoration."

select only data that will aid his case. Also he uses the journalistic terminology "mainstream science" when a cautious person probably would say that "my conclusions are based on a model which assumes naturalistic, evolutionary tenets." Calling radioactive dating methods "powerful methods to determine absolute ages" is preposterous when one realizes the hierarchy of assumptions upon which the "powerful methods" are built.

Never does Strahler admit to the reader in the section on cavern and speleothem development that the ages he uses are in the least questionable. It is known! Recently this writer had the pleasure of spending two days in the field with a "mainstream" geologist who claimed that geologists have their most heated arguments over the "ages" of formations. Yet Strahler presents unquestionable "ages."

### Personal Philosophy

Why this attitude mentioned above? In such situations as this, creationists come face to face with individuals who view the reasoning of man and the work that results from this reasoning as the supreme correctness in the universe and you must not trifle with it! Note Strahler's comments as quoted by Rusch (1990).

> But why expend so much effort to stand up for monumental scientific achievements that have long been accepted without question? Surely organic evolution (descent with modification) by natural selection needs no public defenders a century after Darwin, nor should anyone have to get up on the lecture platform to defend the radiometric age of four and one-half billion years for its oldest rocks.

Anyone who questions man's reasoning, particularly on the origin of the physical world, faces an arrogance almost beyond comprehension. Many scientists realize the weak underpinnings of scientific models but the spokesmen of naturalism and their media advocates will not abide anything that questions either the supremacy of man, his reasoning power or his conclusions. I have seen media interviewers, who gladly try to tear Christian and conservative guests to pieces, grovel before a scientist who is an illuminati of evolutionary thought. No one would dare to try to question a living example of the superiority of man's reasoning power. They are in the presence of a high priest of the *one* and *only* knowledge—let all the earth keep silent before him!

Even men who claim to be Christians and adopt a position of theistic evolution are awed by the ultimate product of man's reasoning—evolution. Not even the Revelation that allows them forgiveness of their sin dare stand in opposition to man's reasoning. The subject of origins is closed to the Creator. They know that the evolutionary ancient earth position is true for man (science) has so stated!

I realize I have wandered far from taking issue with an anticreationist on a particular topic. However occasionally I have to see the root of the problem to keep my perspective. It is not crucial who "wins" the origins debate, but that at last, thinking men have an alternate (the creationist viewpoint) to the insanity of our time—arrogant man. No longer need individuals be enslaved by a bankrupt doctrine rooted in the supremacy of Man the Great but they can turn to a concept based on Revelation.

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## The Problem of the Brobdingnag

### Introduction

The physiological problem of the Brobdingnag (named after the giants in Gulliver's Travels) can be summarized as follows: Muscular strength is roughly proportional to cross-sectional area. So is the compressive strength of bones. The gross buckling strength of bones is further reduced with length, as is true with any column. Weight, however, is proportional to volume. Thus were there any giants, they could not have the same bodily proportions as we have. This is also why the legs on *Tyrannosaurus rex* are so large compared to the rest of the body. The reverse of this is why an ant can lift objects larger and heavier than itself.

A similar argument can be made about flight. Lift is roughly proportional to wing area, whereas weight is roughly proportional to volume. This is why people who do not know any better say that theoretically speaking, a bumblebee cannot fly. It is simply not a problem on a small scale. However, an aircraft patterned after a bumblebee would most certainly not be airworthy. What follows are related research projects, possibly of interest to students. They involve possible pressure changes in the atmosphere over time.

### Topic 1:
### Relative Lung Capacity of Extant vs. Extinct Species

It has long puzzled scientists why the largest animals on land and sea in the distant past were reptilian, whereas in the present they are mammals. Reptiles have survived to the present, but why not the large reptiles? One possible explanation is the different breathing apparatus of reptiles and mammals.

A comparison of lung volume to total body volume for extinct and extant reptiles and mammals may show a marked difference. This might be illustrated by drawing a graph of lung volume vs. body volume using different symbols for each of the four groups.

If such a difference is found, one might postulate that there has been some change in the environment that resulted in the extinction of large reptiles, while the small reptiles and large mammals survived. Whatever this change was, it would have to affect land and sea animals alike. A substantial drop in oxygen partial pressure might explain this. Note that hyperbaric scuba mixtures have a very low mole fraction of oxygen.

### Topic 2:
### Mechanical Comparison of Breathing Apparatus

Larger body size requires greater respiration. The mechanical advantage (or disadvantage) of differing structures for moving air would impact the "fitness" of animals in the struggle for life. An analytical model can be developed for the basic mechanical apparatus found in an alligator or a hippopotamus in the same way that one might evaluate some of the early air compressors of the beam and piston or bellows type.

Consider the following statements found in Ency*clopedia Britannica* (1966):

> . . . the internal surface of the lungs in reptiles is simple compared to that reached by mammalian lungs with their enormous number of very fine alveoli . . . this system applies to all modern reptiles (and presumably the extinct ones as well) except turtles . . . because of their hard shell . . . (Inger, 1966, p. 182)

> There are positive pressure lungs, in which air is pushed into the lung while the nostrils are closed, as in frogs . . . Negative pressure lungs are those in which air is pulled in by expansion of a bony thoracic cage, as in man and other animals

> Greater efficiency per unit of diffusing surface exists with birds through improved ventilation. This is achieved by means of two unique anatomical features—a tubular diffusing system (in contrast to the dead-end alveoli of mammals) and a group of air sacs located beyond the lung (Perkins, 1966, p. 220).

### Topic 3:
### Mechanical Comparison of Flying Apparati

The lift of a wing is roughly proportional to area; however, the weight of a flying animal is proportional to volume. Muscular strength is also roughly proportional to cross-sectional area. The only extant flyers are insects, birds, and bats. The birds are by far the largest. Extinct flyers also include reptiles such as the pteranodon and pterodactyl.

A comparison of wing area to total body volume of these groups (such as a graph using different symbols) may reveal a significant difference between extinct and extant flyers. One possible explanation for this difference would be a substantial change in the density of air (due to a change in pressure).

One need only watch films of albatross take-off and landings to wonder how a much larger reptilian flyer could ever manage in the current atmosphere. It does seem farfetched to suggest that such a beast would be helpless unless it could always jump from a cliff and sucessfully land atop another. One encounter with the water or ground would be the end of it.

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## Reprinted CRSQ Volume 9

### Introduction

The *Creation Research Society Quarterly* has been published since 1964 (28 complete volumes). In an effort to make these volumes available many of the missing issues have been reprinted. Brief synopses have been written on volumes 1-8 and have appeared in the previous eight quarterlies. In each synopsis, major articles are reviewed to give a person interested in scientific creationism a general idea of the contents of that volume. Many of the articles are of continuing interest and value.

### Biology

John Klotz (1972, pp. 14-22) in an interesting article on the flora and fauna of the Galapagos Islands concluded that Darwin was probably right regarding the origin of the unusual plants and animals he found on those Islands but wrong in his conclusions that his observations proved evolution. Brauer (1972, pp. 41-44) discussed four particular animals, calling them biological oddities that could not be explained within an evolutionary hypothesis. Included in this treatise were the oilbird of Caripe *(Steatornis caripensis),* the Arctic hare *(Lupus areticus),* the Egyptian vulture *(Neophron percnopterus)* and the chuckwalla lizard. Since so much evolutionary propaganda has been broadcast on the tautology "survival of the fittest" and overplaying of the role of predation (see Smith, 1970; Williams, Howe and Meyer, 1992) William Tinkle (1972 pp. 44-46) asked the question "Is nature cruel?" He offered some evidence to suggest that the natural world is not as cruel as the evolutionists would have us believe.

Howitt (1972, pp. 51-53) presented some ideas on nutrition from a biblical viewpoint: John Moore (1972 pp. 159-171) wrote a very detailed article on chromosomes mutations and phylogeny. Using protein phylogenies, mutation tests, chromosome count in plants and a fossil record test Moore (p. 166) concluded that:

> Based on a careful five-fold examination no empirically demonstrable data can be found which can "fit" the commonly popularly accepted mon-

ophyletic explanation of relationship in diversity among plants and animals.

This paper merits study by interested creationists. A short note on feathers and the unlikelihood of their evolution was presented (Keithley, 1973, p. 203). Wiant (1973, pp. 218-219) suggested that the relation of Southern pine cone spirals to the Fibonacci series indicates creation rather than random evolutionary development.

Several organisms were discussed in individual shorter articles-the quail *(Coturnix)* in relation to Exodus 16 (Keithley, 1972, p. 13); Bacterium *E. coli* vs. evolution (Nicholls, 1972, pp. 23-24); the twig girdler's *(Oncideres cingulata)* behavior as instinctive (Henning, 1972, p. 37), the bladderwort *(Utricularia vulgaris)* as a predator (Keithley, 1972, p. 95); a suggested identification of the brazen serpents in Scripture (Henning, 1972, pp. 123-124); the relation of the Smyrna fig and a wasp *(Blastophaga psenes)* as evidence of creation (Brauer, 1972, pp. 129-131); the daily cycle of growth of the cap thrower fungus as evidence of creation (Howe, 1972, pp. 172-175).

### Kinds

Two articles by Arthur Jones (1972, pp. 53-57; 1972, pp. 114-123) developed a preliminary analysis of the taxonomic extent of the kind *(min)*. The limits of kinds were suggested from a biblical viewpoint. Classifications included beasts, land swarmers, water swarmers, fliers and man in the animal kingdom. Clean and unclean animals also were examined from the Mosaic food list. Anyone interested in a creationist taxonomy should examine these two papers.

### Design Perspective

In an article with the provocative title "Darwinism is Physical and Mathematical Nonsense," H. B. Holroyd (1972, pp. 5-13) indicated the mistakes of Darwin from the viewpoint of design. The improbability of evolutionary betterment is noted. The complexity of living organisms dictates a preferred model of design, not of origin by random changes. Turner (1972, pp. 38-40) stressed teleology (purpose) in the areas of physical and biological sciences. Plant guard cells and stomata and the photosynthetic process were approached from the design perspective and briefly compared to an evolutionary viewpoint (Keithley, 1972, p. 151).

### Anthropology and Genetics

A Biblical-dispersion model was applied to genetic variation between New Guinea communities (Shaw, 1972, pp. 175-180). Using the concept of human migration after the Flood, the following conclusion was offered (p. 180).

> The populations within New Guinea though by no means approaching racial distinctions do provide for observation and recording of the mechanisms at force to produce genetic variation . . . the Migration-Dispersion model fits the data presented. Though more data are needed . . . the Migration-Dispersion model provides a description which fits with the Biblical account and solves a population distribution problem of some complexity.

### Physics, Chemistry and Statistics

White (1972, pp. 32-37) employed probability arguments against chemical evolution. Then he considered the formation of DNA by chance and also noted that the "present is the key to the past" arguments are used for naturalistic schemes from cosmology to the origin of life. Considering the second law of thermodynamics and other physical laws, the origin of the universe and life required an act of the Creator. Chesnut (1972, pp. 64-66) claimed that the concepts of nuclear physics support the creation model.

The planets of the solar system are examined and Erpenstein (1972, pp. 58-63) concluded that the earth was specifically created for man's habitation and that life as we know it could not exist on the other planets. A statistical analysis was performed on the various flood legends and compared to the biblical account (Strickling, 1972, pp. 152-155). The conclusions of this paper are very intriguing.

### Geology

Clifford Burdick (1972, pp. 25-30) wrote a progress report on his well-known palynology work on samples of Precambrian Hakatai shale from the Grand Canyon. This was a repeat of previous work (Burdick, 1966). Angiosperm and gymnosperm pollen were found in this study. A more recent repeated study of the entire Grand Canyon palynology work, including a history of all creationist investigations for 20 years, can be studied in Howe, et al., 1986; Howe, 1986; Lammerts and Howe, 1987; Howe, et al., 1988. Tom Barnes (1972, pp. 47-50; 1973, pp. 222-230) continued his work on demonstrating a young age for the earth's magnetic field. Using the work of Horace Lamb and noting that long ages require a dynamo to maintain the magnetic field, he felt that a young earth model offered the best explanation. Barnes also derived the necessary equations to study the electrical conductivity, current and joule heating on the earth's core. Using these equations with observational data from 1835 through 1965, Barnes concluded that the half-life of the earth's magnetic field was approximately 1400 years indicating a young age for the earth if an unnatural dynamo is not postulated.

In an article on the age of the Mississippi River, the author (Allen, 1972, pp. 96-114) concluded from available evidence that the river was no more than 5000 years old. This fascinating well-written treatise should be studied by creationists. Reginald Daly (1973, pp. 210-217) discussed the cause of the ice age. Note some of his comments (p. 210):

> It is shown that there has been only one ice age and that the theories of multiple ice ages are misinterpretations based for the most part on index fossils. Carbon-14 dating and the recession of Niagara Falls are used to demonstrate that the ice age is an extremely recent event. Evidence is presented to show that the ice age was caused by, and that it followed the universal flood.

The uniformitarian and catastrophic models of earth history were compared by Powell (1973, pp. 230-237). He conjectured that many geologists adopt a uniformitarian explanation in spite of the field evidence to the contrary.

### Carbon-14 Dating

A mathematical model was developed to include all C-14 age data into a creation-Flood model by Hefferlin (1972, pp. 68-71). White (1972, pp. 155-158) examined existing radiocarbon age data and concluded that reasonably good agreement exists between the dates and historically verified chronology for 5,000 years B. P. Generally C-14 dates greater than 6,000 years are suspect.

### Philosophy

Mennega (1972, pp. 30-31) made suggestions as to how a Christian biologist should view the scientific method. The relationship of assumptions to the scientific method was explored by Schoepflin (1972, pp. 125-129). He suggested that scientists should reveal their philosophical assumptions when they publish their work, particularly when they involve conclusions on origins. Moore (1973, pp. 220-221) noted that Darwinian evolutionary concepts cause fragmentation rather than unification within the developing collection of medical scientific knowledge.

### General

Also included in this interesting volume of *CRSQ* are many shorter notes on different topics as well as several book reviews and letters to the editor. It is amazing how rapidly the creation model was being developed. Creationists should study past creationist efforts so that they can understand the formation of the creation model of science.

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## REMEMBER TO SUPPORT THE LABORATORY PROJECT

### QUOTE

"All of this intricate architecture [of orchids] to the finest of details is thought to be the result, *and has to be,* of evolutionary processes and natural selection fine-tuned to pollination," he says. "But there is no way I can show in this orchid a significant pattern of natural selection for certain flower morphologies." I think today, [Darwin] would be enjoying the dilemma. I look to Darwin for guidance. But a hundred years later, I find myself in the same stew, the same problem that he was deliberating and that he was unsuccessful in bringing to a conclusion.

McDonald, Kim A. 1991. Biologist discovers that survival of common orchid challenges Darwin's natural-selection theory. *The Chronicle of Higher Education.* 37(48):A8.

## Chemical Composition of a Millipede Cuticle-Progress Report

Williams, Howe and White (1991, p. 15) performed an energy dispersive x-ray (EDX) analysis on the cuticle of a recently-deceased millipede *(O. ornatus).* This cuticle retained the brown color of a live specimen. However as the cuticle of a dead millipede is exposed to weathering in the Chihuahuan desert over a period of time, it is bleached to a white color.

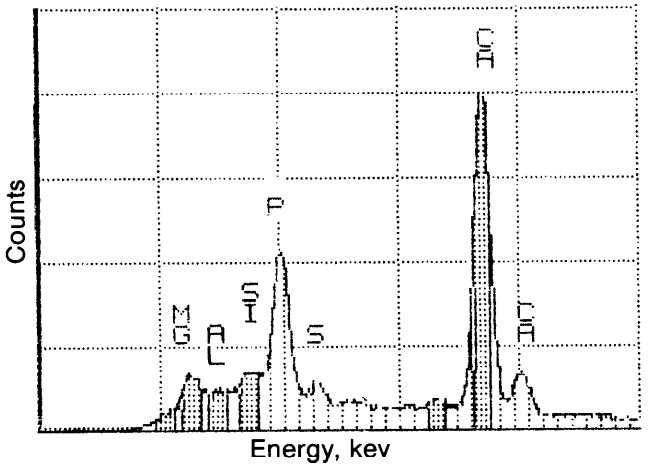


**Figure 1. EDX analysis of brown millipede cuticle. Mg-magnesium, Al-aluminum, Si-silicon, P-phosphorus, S-sulfur, Ca-calcium. Oxygen is not detected by this technique. Same as Figure 17 of Williams, Howe and White 1991.**

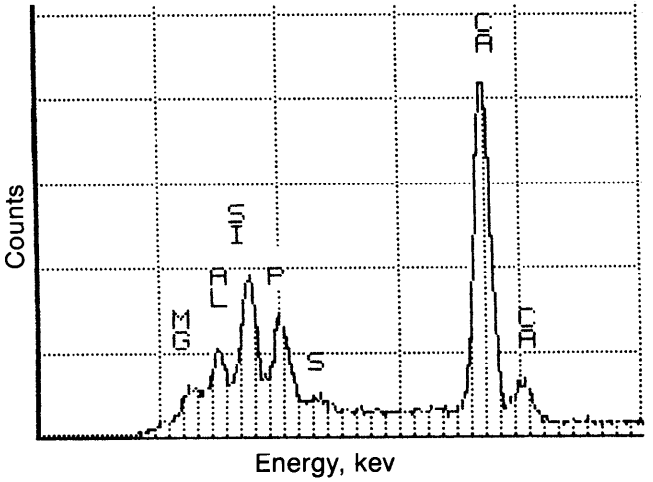


**Figure 2. EDX analysis of weathered white millipede cuticle. For a discussion of energy dispersive x-ray analysis, see Anon., 1989.**

More EDX analyses were performed on brown and white cuticles to determine if a chemical composition change could be detected as a result of the weathering process. An EDX spectra of a brown cuticle from the above reference is shown in Figure 1. An EDX spectra of a weathered white cuticle is given in Figure 2. The silicon content appears to be greater in the weathered white cuticle than in the brown one. The cuticles that were analyzed were located on or near bentonitic clay and tuff deposits which are high in silica ($SiO_2$) content. Possibly silica is being absorbed into the cuticles during rains when they are submerged in standing water that quickly accumulates on desert pavement. Further investigation of this possibility is necessary.

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## Spiders As Engineers

One of the amazing engineering feats performed by living organisms is the construction of webs by many types of spiders. An earlier note (Williams, 1988) in the Quarterly was devoted to this topic. Spiders construct their webs without any experience or instruction. Would it be proper to suggest that this web-building ability is innate or that certain spiders were given this trait by a Designer? Note two types of webs in Figures 1 and 2.

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**Figure 1. Photograph of an orb web (Autumn, 1991).**

**Figure 2. Photograph of a web that resembles a complicated "tent" (Autumn, 1991).**

## PHILOSOPHICAL ESSAY

# MAGNIFICENT MIRACLE: THE VIRGIN CONCEPTION OF JESUS CHRIST*

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**Abstract**

*This study is an attempt to understand from a cytogenetic perspective the physical aspects of the means God might have used to accomplish the miracle of the virgin conception of Jesus Christ. It distinguishes three separate but related factors pertinent to the physical aspects of this miracle: (1) Man's fall and inheritance of original sin, (2) The second-law-of-thermodynamics curse of death and (3) The precise gametogenic definition of the seed of the woman. Although this study postulates a physical component to our sin nature and its inheritance, it does not propose, or even imply, that our sin nature is purely genetic or merely physical. From these considerations, a possible cytogenetic mechanism is described whereby the physical aspects of the virgin birth of Jesus Christ could have contributed to His being both fully God and fully man, sinless, yet able to die as the perfect Sacrifice to save us from our sins.*

### Introduction

When God has been pleased to preserve the mystery of His great miracles (Deuteronomy 29:29) by not revealing the details of the means by which He accomplished them, scientific speculation is a fair preoccupation of His children reverently attempting to think His thoughts after Him. Such is the case with the virgin conception of Jesus Christ. Several explanations have been suggested over the years by theologians and natural scientists in the Roman Catholic and Protestant Churches as to how our Savior was born fully God, yet fully man, sinless, yet a member of our sinful human race, incorruptible, yet able to die as the perfect Sacrifice for our sins. A few of these explanations are briefly compared in the Appendix.

### System Poison

This paper is simply another proposal to explain the physical aspects of this miracle, based on what is known presently in the sciences of genetics, cytology and embryology as they pertain to the relatively recent

*Editor's note: This article is controversial in that it explores a possible physical mechanism for the virgin birth of Christ. At the same time, Dr. Anderson provides a valuable summary of thoughts on this much-discussed topic.

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speculation that "Adam's partaking of the forbidden fruit not only poisoned his own body but affected his seed also, and through his seed was transmitted to the human race our mortal condition" (Custance, 1980, p. 118). The idea that the forbidden fruit might have had a mortalizing poison in it prompted the thought that, instead, such a poison, or some other process in God's Providence, could have been genetically mutagenic, specifically capable of producing an inheritable physical component to the sin nature with which all of us human beings are born; while physical death, the consummation of entropy, was simply a part of God's second-law-of-thermodynamics curse on all of creation for Adam's, and hence our, sins (Genesis 3:17 in light of Romans 8:18-23). The imputation of sin so that it is inherent in each human soul at conception (Psalm 51:5) becomes more understandable if one considers the possibility of an associated genetic transmission of some physical component of sin.

Incidentally, this possibility has a bearing on the theological considerations of Creationism vs Traducianism. Protestant discussions of the controversy over whether each human soul is a new creation or formed by natural generation center on the question of the "inheritance" of sin (Berkouwer, 1962, p. 283) and relate it to Christ's own justification and sanctification (Shedd, 1874-1890, pp. 81-83). Louis Berkhof (1939, 1941, p. 238) noted that certain Scholastics, who were not Traducianists, tried to explain inherent sin as being "passed on through the body, which in turn contaminates the soul as soon as it comes in contact with it." Although the present paper partially agrees with the first part of that statement, it does not agree that original sin is exclusively transmitted by physical reproduction so as to contaminate an otherwise righteous soul on contact. It clarifies the dangers of taking that position, and it is acceptable to either the Creationist or Traducianist concept of the origin of the human soul.

**Theology**

Without digressing into the argument over whether man is holistic, dichotomous or trichotomous, it is clear in Scripture that man was created with two major parts to his person: the tangible or physical part (body) and intangible or spiritual part (soul/spirit, subject to being divided asunder by the word of God according to Hebrews 4:12). Scripture also teaches that Adam's fall was total, such that his initial sin produced or became a sin nature (also known as original or inherent sin) in both these parts, physical as well as spiritual. Since Adam was both the natural and federal head of the human race (Hodge, 1871, pp. 196-198 and Boyce, 1887, pp. 220-221), our fall in Adam was also total so that we, too, have a physical as well as spiritual component to our inherent sin.

This teaching was clearly articulated by the predominantly Presbyterian Divines who prepared the Westminster Confession of Faith in 1643-1647 and the Baptist theologians who prepared the Philadelphia Confession of Faith in 1689. Chapter VI, paragraph 2 of the former states: "By this sin they fell from their original righteousness and communion with God, and so became dead in sin, and *wholly defiled in all the faculties and parts of soul and body."* (emphasis added) Chapter VI, paragraph 2 of the latter states:

> Our first parents by this sin fell from their original righteousness and communion with God, and we in them, whereby death came upon all: all becoming dead in sin and *wholly defiled in all the faculties and parts of soul and body* (emphasis added).

In the preceding century, John Calvin (1554, p. 95), commenting on Genesis 1:26, pointed out that sin has infected us both spiritually and physically. He describes man in the image of God, perfect before and deformed after the fall, as follows:

> Thus the chief seat of the Divine image was in his mind and heart, where it was eminent: yet was there no part of him in which some scintillations of it did not shine forth. For there was an attempering in the several parts of the soul, which corresponded with their various offices. In the mind perfect intelligence flourished and reigned, uprightness attended as its companion, and all the senses were prepared and molded for due obedience to reason; *and in the body there was a suitable correspondence with this internal order.* But now, although some obscure lineaments of that image are found remaining in us; yet are they so vitiated and maimed, that they may truly be said to be destroyed. For besides the deformity which everywhere appears unsightly, this evil also is added, *that no part is free from the infection of sin.* (emphasis added)

Elsewhere he defines original sin as follows:

> Original sin, then, may be defined as hereditary corruption and depravity of our nature, extending to all the parts of the soul, which first makes us obnoxious to the wrath of God, and then produces in us works which in Scripture are termed works of the flesh (Calvin, 1559, p. 217).

This definition may fall short of recognizing a physical component of sin, but, only two pages later, he also states the following:

> Here I only wish briefly to observe, that the whole man, from the crown of the head to the sole of the foot, is so deluged, as it were, that no part remains exempt from sin, and, therefore, everything which proceeds from him is imputed as sin (Calvin, 1559, p. 219).

This position agrees with that of Luther and Augustine that human nature has been both physically and morally corrupted (Hodge, 1879, pp. 97, 101).

The apostle Paul bemoans this deplorable condition in himself in Romans 7. Especially in verses 14, 17, 18, 20, 23 and 25 he points out that sin is also carnal, of the flesh, a law in his members, thus categorizing it as having a physical as well as spiritual component motivationally expressed. Granting that flesh in these passages can refer to the old sin nature in our intangible beings, it is, nevertheless, more consistent with the context of verse 23 for it to refer to a sin nature in our tangible bodies. According to Strong (1890), the word translated as members here comes from the Greek word μελοζ *(melos)* which means a limb as part of the body. Thus, verse 23 implies that the law of sin is in the tangible body:

> But I see another law in my members (i.e., parts of my body), warring against the law of my mind (i.e., a facet of my soul/spirit), and bringing me into captivity to the law of sin which is in my members (i.e., parts of my body).

Because the soul/spirit, which includes the mind, is so intimately related to the body, sin must affect our whole being. Paul's frustration with this physical as well as spiritual component of his sin nature helps us to understand the conflict that rages between the new and the old natures within ourselves. Although Christians have been spiritually regenerated, they will not be delivered from a sin nature until their bodies are also redeemed in glory (Romans 8:23).

**Transmission of Sin Nature**

This doctrine of original or inherent sin infecting us both physically and spiritually does not, however, demonstrate the manner in which it has been passed down from Adam and Eve throughout all generations of mankind. Three possibilities come to mind: (1) The sin nature is transmitted purely spiritually by imputation and secondarily infects the body; (2) The sin nature is transmitted purely physically by genetic inheritance and secondarily infects the soul/spirit; (3) The sin nature is transmitted both intangibly through the soul/spirit by imputation from Adam as our federal head and tangibly through the physical cells by genetic inheritance from Adam as our natural head. All three possibilities provide credible exegeses of Psalm 51:5, "Behold, I was shapen in iniquity, and in sin did my mother conceive me."

The first possibility is, perhaps, the most widely held view of Christian theologians and scientists alike who have written that the sin nature is not to be found in genes or chromosomes, but that it flows from one generation to another only by way of moral and spiritual transmission, not a material sequence (Gromacki, 1974, p. 118; Lester, 1980, p. 40). On the other hand, A. H. Strong (1950, p. 596), also a Christian theologian, has stated:

> In recognizing the guilt of race-sin, we are to bear in mind: . . . that the doctrine of original sin is only the ethical interpretation of biological facts—the facts of heredity and of universal congenital ills, which demand an ethical ground and explanation; . . .

This view would support either the second or third of the above noted possibilities.

However, the second possibility is unacceptable because it promotes the Manichean belief of the third to seventh centuries that, between the spiritual and material worlds, it is the natural world which is sinful, contrary to the orthodox doctrine that material substance in itself is neither good nor evil (Payne, 1991, p. 7). This error, derived from Zoroastrian mythology and ancient Greek thought, was believed by various heretical Gnostic sects (Johnson, 1991, p. 117) and led to the ascetic tendency of the early church (Hodge, 1879, p. 47).

The third possibility that inherent sin is transmitted both spiritually and physically readily supports the aforementioned position of Augustine, Luther and Calvin as to the totality of the infection of original sin in the soul/spirit and body of each human being. A physical as well as spiritual transmission of inherent sin, therefore, reinforces the case against the heresy of Pelagianism which denies original sin altogether with the assertion that, in respect to his moral nature, every man is born in precisely the same condition in which Adam was created (Hodge, 1879, p. 97). It also explains the above noted observation of A. H. Strong without risking the Gnostic heresies promoted by the second possibility. Furthermore, it provides, along with the following cytogenetic study, a reasonable apologetic in witnessing to intellects who question the scientific validity of Christian doctrine. One such intellect is Sir Gavin DeBeer, former Director of the British Natural History Museum, a renowned authority on embryology and one of the most dogmatic of all the neo-Darwinists (Johnson, 1991, p. 172). The fact that the things of the Spirit of God were foolishness to this natural man (1 Corinthians 2:14) is evident by his espression of the following observation:

> One wonders if Pauline theologians realize that the doctrine of original sin involves the inheritance of an acquired character, for only genes can be inherited and, by the nature of the case, neither Adam nor Eve when they first appeared on the scene possessed the character they are alleged to have transmitted to all their descendants (DeBeer, 1962, p. 268).

For this observation, the ability to explain the totality of Adam's fall and, hence, of original sin and its inheritance in us makes it possible to "be ready always to give an answer to every man that asketh you a reason of the hope that is in you with meekness and fear (1 Peter 3:15).

For these reasons this paper accepts the third possibility as being most satisfactory. Guided by this concept of the physical as well as spiritual presence and transmission of original sin, I consider the only part of our person that natural science can examine: our tangible being. A study of the accompanying figures will examine: (1) The sinless, immortal nature of Adam's and Eve's physical bodies as originally created; (2) Two physical consequences of the fall of Adam and Eve: (a) acquisition of the physical component of inherent sin and (b) subjection to physical death as part of God's second-law-of-thermodynamics curse on all creation; (3) The passage of the physical component of inherent sin throughout all human generations by virtue of the continuity of the germ plasm; (4) The gametogenic mechanism which provides a precise, scientific definition not only of the seed of the woman but also of the seed of the man; (5) The cytogenetic mechanism God could have designed to accomplish the miracle of Jesus Christ's virgin conception, that virgin conception so necessary for His power to save us from sin and death.

From the scientific viewpoint Eve's construction (Figure 1) is in keeping with genetic concepts of XY-XX chromosomal sex differentiation, and from the scriptural viewpoint it is in accord with the Hebrew word used, בָּנָה (banah) rather than בָּרָא (bara'), meaning that she was built from Adam's rib rather than created anew. It is also worth noting here that

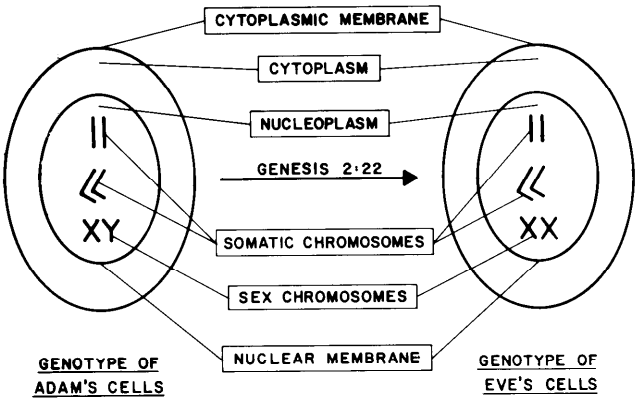


**Figure 1. The Construction of Eve from Adam's Rib**

**No new genetic material need have been created in building Eve's female genotype (XX) from Adam's genotype (XY); only elimination of Adam's Y chromosome would have been necessary. Somatic chromosomes are diagramed to represent the total diploid number (44) arranged as 22 homologous pairs divided into 2 groups. One group (| |) would be comprised of an undefined number (N) of pairs from 1 to 22; the other group (<<) would be comprised of the remaining number (22-N) of pairs from 21 to 0. Representing the pre-fall state, these diagrams illustrate neither sin nor degeneration.**

Eve did not come from Adam's seed (the cytoplasmic stages of his reproductive cells, i.e., germ plasm) but from his side (a part of his body cells, i.e., somatoplasm) so that flesh developing from her seed as described later in the paper is not even remotely traceable to his seed.

Figure 2 illustrates possible physical changes that would explain two consequences of Adam's fall, i.e., inherent, original sin and bodily degeneration unto death, from a scientific perspective. These changes include: (1) Genetic mutation to produce an inheritable physical component of our sin nature, and (2) Introduction of the entropy principle of the second law of thermodynamics to produce physical degeneration and death, beginning the reduction of our physiological function toward its present 10-25% efficiency (Guyton, 1969, p. 389), symbolized by the addition of "M" for mitochondria and "G" for Golgi apparatus as but two examples of the many, known, functioning, cytoplasmic organelles. These changes agree with Scripture as written in Genesis 2:17 and 3:17, Psalms 51:5, 102:25-27, 103:13-16, Ecclesiastes 1:2 and 14, 2:11, 11:8, and 12:8, Romans 5:12, 7:14-25 and 8: 18-23 and 1 Corinthians 15:21 and 22 to list a few verses which refer to the existence of these two factors (sin in the flesh and vexing, dying physical degeneration), miraculously introduced at the fall of Adam and Eve and to be miraculously removed at the time of physical redemption when the sons of God will be manifest (Romans 8:19, 23).

Figure 3 was adapted from Custance (1980, p. 213, Fig. 7) to illustrate the scientific concept of the con-

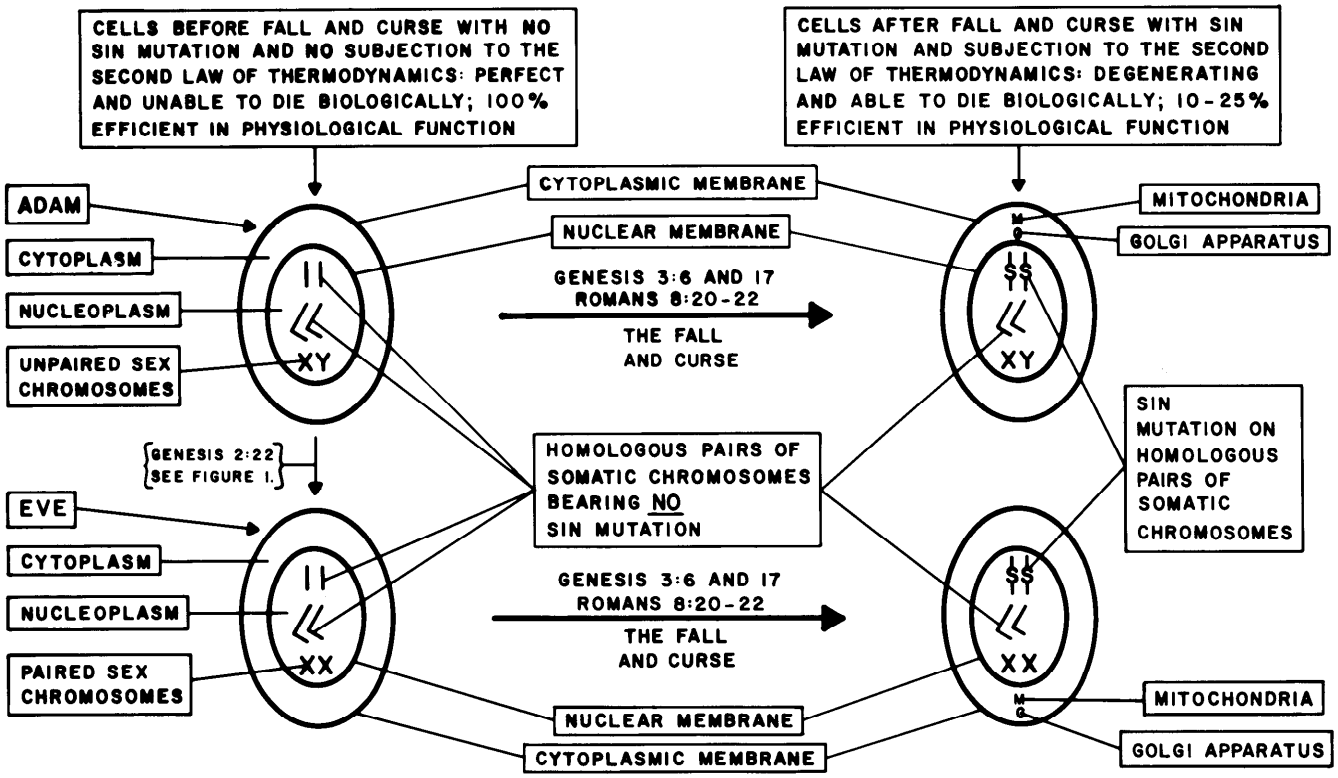


**Figure 2. Acquisition of the Sin Mutation and of the Ability to Die Biologically**

**At the fall, the same homologous pair, or pairs, of chromosomes in all the reproductive cells (germ plasm) of Adam and Eve would have acquired the sin mutation at identical loci in order for it to have been passed on continuously throughout all generations of mankind. One, several, or all the homologous pairs of somatic and/or sex chromosomes could bear this mutation; although only somatic chromosomes are illustrated as bearing it in this figure for purposes of simplicity. Subjection to degeneration and biological death would involve not only the chromosomes but all cell structures. Also, present metabolic processes would have been instituted: previously 100% efficient physiological function would begin degenerating toward the present, only 10-25% efficiency.**

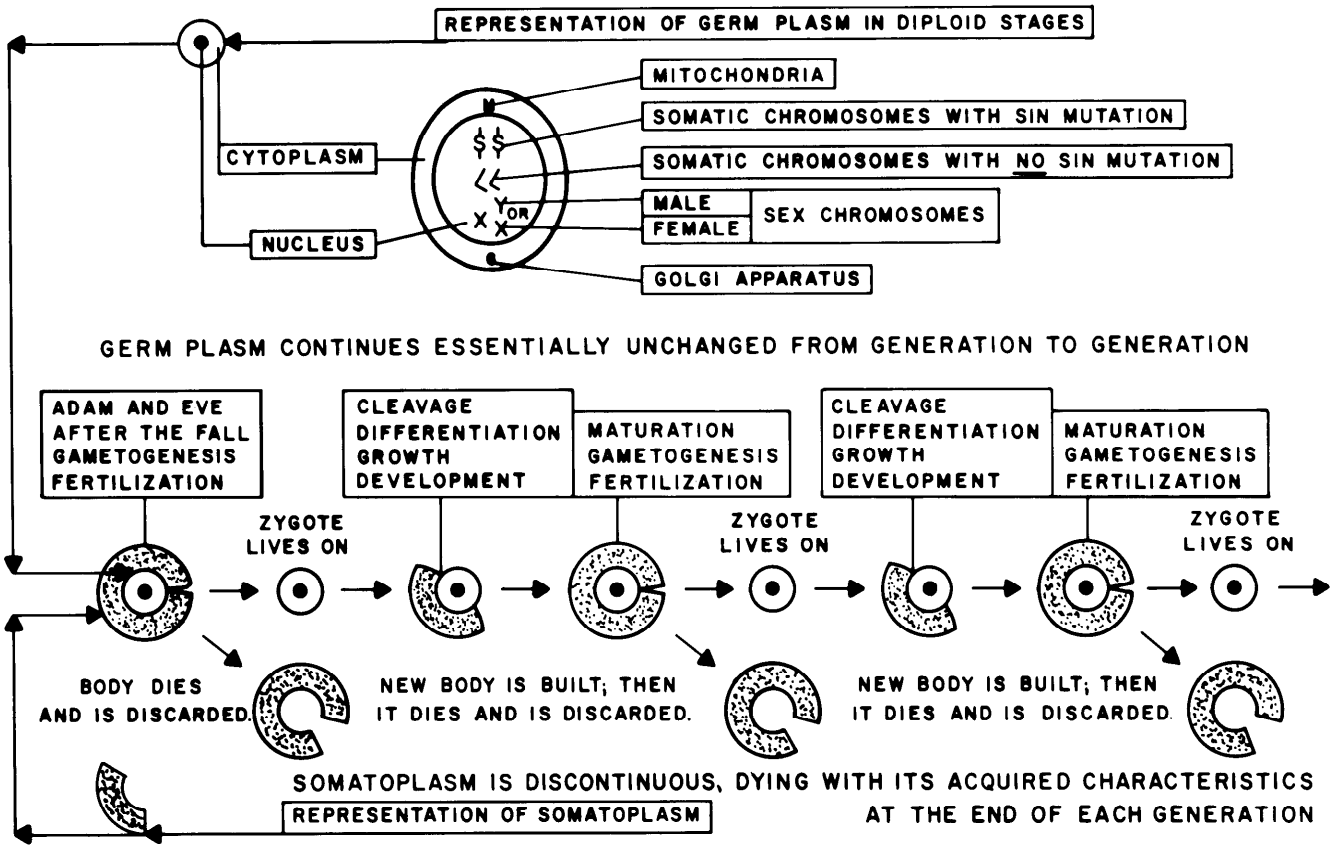


**Figure 3. Continuity of the Germ Plasm**

**Described by August Weismann in 1893, this concept holds that reproductive cells (germ plasm) live on, essentially unchanged from generation to generation (despite continual accumulation of degenerative changes which may be imperceptible with each generation); while the bodies they build (somatoplasm) die at the end of each generation and carry whatever characteristics they acquired in their lifetimes to their graves. The sin mutation, as part of the germ plasm since the fall of Adam and Eve, would thus be passed down throughout all generations of mankind; while the sin-wracked somatoplasm it would produce would die and be discarded with each generation.**

tinuity of the germ plasm as described by August Weismann a century ago and confirmed ever since by experimental evidence. Scripturally, it explains the inheritance of the physical component of sin, traceable throughout all generations back to Adam and Eve, and it demonstrates how Eve "was the mother of all living" in keeping with Genesis 3:20. It therefore makes the term, "her seed," in Genesis 3:15 refer to the physical offspring not only of Eve in the promise of this decree, but also of Mary in the fulfillment of this decree. It also demonstrates that this continuity of the germ plasm must be maintained for that special offspring, Jesus Christ, to qualify as a *bona fide* member of the human race.

### Virgin Birth

Figures 4 and 5 now illustrate the genetic mechanics by which Jesus Christ, the only begotten of the Father (John 1:14b), could have been born as a *bona fide* member of the human race with the ability to die physically yet without any sin whatsoever. They are in accord with scientific data in the fields of genetics and experimental embryology.

Figure 4 clarifies the definition of the term, "seed of the woman," precisely demonstrating that it is human egg cytoplasm, traceable *through females only* all the way back to Eve. (It is interesting to realize that all of us have received our physical flesh only from our mothers; while our fathers have contributed only nuclear materials which influence that flesh.) This illustration conforms to descriptions in embryology textbooks. (Arey, 1965, p. 58 compared with Figures 15, 20, 22, 24, 25 and 26 on pp. 30, 35, 37, 40, 41 and 42 respectively). It also conforms to what Eve would have understood by the term, "her seed," in Genesis 3:15; and it supports the evangelical view that Jesus Christ received His *human nature* directly from Mary while she was prevented from passing on her *sin nature* because of the ministry of the Holy Spirit, as illustrated in Figure 5. This prevention would have been made possible in the physical sense because the gene(s) carrying the physical component of Mary's sin nature would have been contained only in the nucleus of her egg: while the organelles carrying the physical component of her human nature would have been contained separately in the cytoplasm of her egg. Therefore, removing the physical component of her sin nature from the nucleus would remove its effects on the physical component of her human nature in the cytoplasm, i.e., the seed of the woman.

Also, the seed of the man is demonstrated precisely to be the human Y chromosome, traceable *through males only* all the way back to Adam, in keeping with textbooks of genetics and embryology. (Arey, 1965,

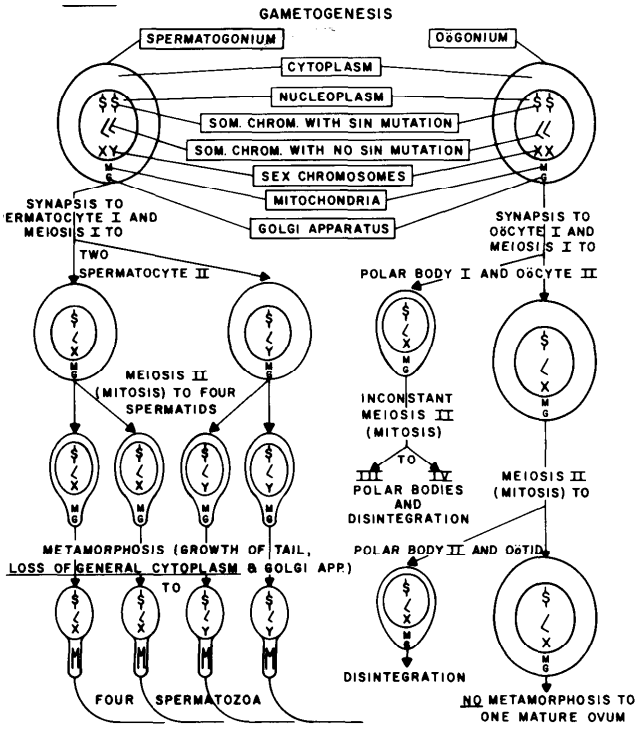


**Figure 4. The Three Distinct Portions of Germ Plasm Resulting from Gametogenesis**

**(1) The seed of the woman is human-egg cytoplasm: since all human spermatozoa contain no general cytoplasm, all human, general cytoplasm, since Eve, has been handed down from her *via* female germ plasm only.**

**(2) The seed of the man is human-Y chromosomes: since all human ova contain no Y chromosome, all human-Y chromosomes have been handed down from Adam *via* male germ plasm only.**

**(3) The seed of both the man and the woman is all the remaining gamete structures: since human spermatozoa and ova both contain cytoplasmic membranes and organelles, nuclear membranes, nucleoplasm, X chromosomes (in 50% of spermatozoa), and somatic chromosomes (both with and without the postulated sin mutation), all these structures have been handed down from Adam and Eve *via* both male and female germ plasm.**

p. 58 compared with Figures 15, 20, 22, 24, 25 and 26 on pp. 30, 35, 37, 40, 41 and 42 respectively). It was this seed of the man that, according to Genesis 3:15, would have been excluded from the body of God's only begotten Son. (It is interesting to realize, also, that no normal woman has the seed of the man, the Y chromosome, in her physical composition; yet all women have the rest of Adam's genetic heredity in them by virtue of all the other chromosomes passed down through the generations from him.)

Here is the point of the great creative miracle involved in the virgin conception of Jesus Christ, as prophesied in Jeremiah 31:22b ". . . for the LORD hath created a new thing in the earth, A woman shall compass a man," as supported by Hebrews 10:5, ". . . but a body hast thou prepared for me:" and as illustrated in Figure 5, which demonstrates the removal of the physical component of the sin nature by God the Holy Spirit and the introduction of God's own, perfectly created Y chromosome in place of Adam's by God the Father.

An exegesis of Jeremiah 31:22b should be helpful here. As noted above, it reads, ". . . for the LORD hath created a new thing in the earth, A woman shall compass a man." The Hebrew word for woman here is נְקֵבָה (neqebah), derived from נָקַב (naqab), meaning to puncture, pierce or strike through with more or less violence. It appears in only one other place in the Old Testament, Leviticus 15:33, where, being used in connection with menstruation, male and female genital discharges and sexual intercourse, it refers to a woman in the sexual, physically female sense. Now, the Hebrew word for man in this passage is גֶּבֶר *(geber)*, meaning a great, strong, prevailing, valiant, mighty man, warrior or hero. He is to be encompassed, i.e., physically surrounded (סָבַב, *cabab* in Hebrew) by a woman in the physically female sense, not simply embraced or surrounded by the arms or thoughts of a woman in a general or spiritual sense. Although this encompassment was to occur at a time future to Jeremiah's prophecy, God had already created (בָּרָא, *bara'* in Hebrew, denoting a miraculous, *ex nihilo* or first-time creation) a new thing (חָדָשׁ, *cadash* in Hebrew) to accomplish this extraordinary event. Many mighty men, e.g., Samson, King David, etc. had already been encompassed by females in the physically female sense, both cytogentically by the maternal egg cytoplasm (i.e., seed of the woman) of their zygotes and gestationally by their mothers' wombs; therefore a very special new thing had to have been created in order for this event to be so remarkable. This new thing might well have been nothing less than God's own perfect Y chromosome, created before Jeremiah's time, for the only begotten Son of God to be born in human flesh of a virgin at a time future to that of Jeremiah, sinless but subject to the death-dealing entropy principal of the second law of thermodynamics, made possible through the miracle of the virgin conception and birth prophesied in Isaiah 7:14b, as confirmed by Matthew 1:22, 23, ". . . Behold a virgin shall conceive, and bear a Son, and shall call His name Immanuel (God with us)." Thus, ". . . the Word was made flesh, and dwelt among us . . ." (John 1:14a), for He ". . . was made in the likeness of men:" (Philippians 2:7c), and "when the fullness of the time was come, God sent forth his Son, made of a woman, made under the law . . ." (Galatians 4:4).

In keeping with this concept, another Christian man of science has written:

> Then how could Jesus have been born without a human father? God could have created a special Y sperm, with twenty-three perfect chromosomes, to fertilize one of Mary's eggs. Since I accept God as the Creator of the universe and each 'kind' of life, I have no difficulty believing that He used this method or some other means beyond His usual law of reproduction to accomplish this biological miracle (Lester, 1980, pp. 27-28).

This is a creative miracle superior to the original creation of Adam, for it enabled Jesus Christ to be identified not only with the original creation of the human race, traced directly from Eve all the way down to Mary, but also with a new creation, the perfect Y chromosome of God, Himself, thus making clear how he could be *both fully God and fully man* at the same time.

Figure 5 is also in keeping with the observation of experimental embryology that an egg's nucleus or por-

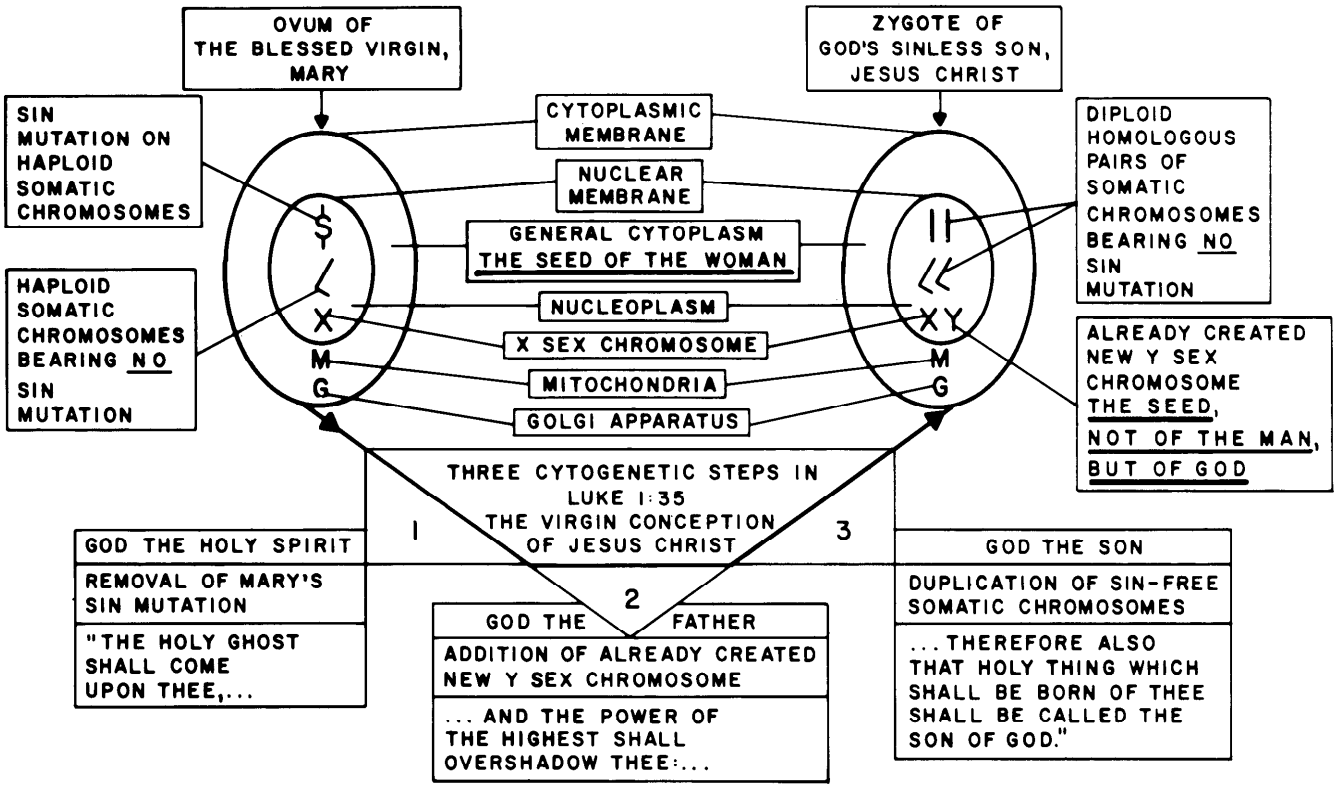


**Figure 5. The Virgin Conception of Jesus Christ**

**The miracle described in Luke 1:35 would involve three steps: (1) Removal of Mary's sin mutation from her egg; (2) Addition of the already created, new, Y-sex chromosome; (3) Duplication of the completely sin-free, somatic chromosomes.**

**Note the resulting genotype identity of Jesus Christ to that in Figures 1 and 3 of unfallen Adam and, thus, the genetic accuracy of the reference to the first Adam and the last Adam in 1 Corinthians 15:45. The characteristic of being subject to biological death, in keeping with the second law of thermodynamics, would have been carried over from Mary's ovum to the zygote of Jesus Christ in order for Him to be fully man as well as fully God.**

tions of its genetic material can be removed and replaced (Arey, 1965, pp. 168, 170) and even with modern proposals of genetic scientists concerning the correction of genetic mutational defects at the chromosomal level. It also agrees with Scripture, demonstrating the beautiful trinitarian nature of the virgin conception of Jesus Christ to be found in Luke 1:35, again in keeping with the character of God as the perfect Designer.

Whether God replaced the entire nucleus of Mary's egg or simply corrected all the homologously paired sin mutations therein before inserting His own perfect Y chromosome and duplicating 22 somatic chromosomes to match Mary's is really not important. What is important is the fact that, *through the ministry of the Holy Spirit, the physical component of sin was removed from the nucleus and its effects thus removed from the cytoplasm of Mary's egg* so that the Seed of the woman would be born without sin in His body yet still be subject to physical death and the other aging and injurious conditions of the entropy principal of the second law of thermodynamics: thus, He was able to be "in all points tempted like as we are, yet without sin." (Hebrews 4:15). These conditions enabled Jesus Christ to be the only perfect Sacrifice, without spot or blemish, acceptable to God physically as well as spiritually to atone for our sins as foreshadowed by the blood sacrifices throughout the Old Testament. It must be remembered, however, that His death involved far more than the physical factors to which the discussion of natural science in this paper is limited. His spiritual death when he was forsaken by His Father on the cross of Calvary (Matthew 27:46 and Mark 15:34 as prophesied in Psalm 22:1) was a far greater sacrifice than any of us can totally comprehend.

### Death

This study clearly demonstrates the importance of biblical creation to the gospel of Jesus Christ, for it conforms to the Pauline ascription of the cause of death and corruption to Adam's sin (Romans 5:12, 8:18-23 and 1 Corinthians 15:21, 22 relative to Genesis 2:17 and 3:17-19). Evolution, on the other hand, teaches that death has always been a natural process in operation long before man appeared on the scene, a view that conforms to the Socinian heresy (completing the aforementioned Pelagian denial of original sin) that man was created naturally mortal and would have died had he sinned or not (Hodge, 1879, pp. 96, 106). In an effort to avoid this heresy, theistic evolutionists and progressive creationists have adopted the view that, although physical death and animal predation existed for billions of years throughout the world before Adam's original sin (Bartz, 1991, p. 2), it is only spiritual death (i.e., separation from God) that resulted from Adam's sin. Thus they explain away Romans

5:12 and 1 Corinthians 15:21, 22, while ignoring Romans 8:18-23 and Genesis 3:17. However, the eminent theologian Geerhardus Vos (1948, p. 50) has noted that the Genesis creation account gives no suggestion to the effect that the death of animals occurred before the fall of man.

Such evolutionary wresting of the Scriptures (2 Peter 3:16) undermines the gospel of Jesus Christ and the faith of those who see through the inconsistencies of these weak explanations. If physical death had been a part of the original creation, then God could not have seen everything that He had made by the end of the sixth day and declared it to have been very good as He did in Genesis 1:31. The death sentence that God promised in Genesis 2:17 and carried out in Genesis 3:17 as a consequence of Adam's sin had to refer to physical as well as spiritual death, or else it was unnecessary for Jesus Christ to be the virgin-born, sinless Sacrifice described in the Bible and in this paper as being able to die physically as well as spiritually to deliver us from sin and death and give us everlasting life. Or more simply stated in other words: if physical death were a part of God's original creation rather than a part of the penalty for Adam's sin, then Jesus Christ did not have to suffer and die physically for our salvation—but He did!

Also, the corollary would be true: if our sin nature were *merely* spiritual or transmitted *purely* by imputation, then Jesus Christ would have had to suffer and die only spiritually for our salvation—but He did not! He suffered and died *both* spiritually and physically because sin and death have both the spiritual and physical dimensions we have been studying. Thanks be to God, His Word is sure: in His creation, in His Scripture, and in His incarnation, death and resurrection. Our thanks and praises are His forevermore, and our joyful duty is to proclaim this marvelous gospel of His grace!

## Appendix

The Roman Catholic dogma of the Immaculate Conception declares that Mary was sinless when her mother conceived her so she, herself, would be sinless in order to be able to conceive and bear the sinless Son of God. This assertion is made clear in a quotation from the December 8, 1854 decree of Pope Pius IX, published in the January, 1855, papal bull, *Ineffibilis Deus,* proclaiming:

> . . . that the most Blessed Virgin Mary was preserved from all stain of original sin in the first instant of her Conception (i.e., when she, herself, was conceived within her mother), by a singular grace and privilege of Almighty God, in consideration of the merits of Jesus Christ, Savior of the human race . . . (O'Conner, 1958, p. 312).

Charles Chiniquy (1886, pp. 403-409) describes the controversy surrounding the adoption of the dogma of the Immaculate Conception and some of its consequences, Alexander Hislop (1916, pp. 125-126, 263-269) describes some pre-Christian, mythological origins of this dogma, and Loraine Boettner (1962, pp. 158-162) discusses it from the perspective of the Reformed Faith.

Protestant theologians such as J. Gresham Machen (1930) and Robert G. Gromacki (1974) have written extensive studies of the virgin birth of Jesus Christ. Before them, James Orr (1907, pp. 197-201) affirmed the necessity of a physical as well as spiritual miracle for our Saviour to be totally sinless. However, none of these excellent theological studies examined the biological facts necessary to explain how the physical aspect of that miracle might have been accomplished.

In attempting to clarify how the absence of a human father could have provided for the physical miracle necessary for Jesus' total sinlessness, the medical doctor, M. R. DeHann (1943, pp. 14-15, 24-25, 30-37) suggested the hypothesis that sin is passed down through the generations by way of Adam's blood, adduced to be contributed to each offspring by only the male seed.

Arthur C. Custance (1980, pp. 118-122, 143, 222-225) proposed the possibility that the forbidden fruit, perhaps the grape, contained a poison, perhaps an alcohol, causing death to affect the bodies of both Adam and Eve, and the sperm of Adam but *not* the eggs of Eve, so that all human eggs would be immortal when fertilized, except for the condition that death would be carried into each egg by each fertilizing sperm. He does not clearly distinguish the curse of death from the inheritance of sin. Dr. Custance's book (1980) is a collection of some of his *Doorway Papers,* written over the preceding 40 years, extensively studying the theology and natural science related to the virgin birth of Jesus Christ.

Albert S. Anderson (1972, pp. 1, 2, 6, 7 and 1974, pp. 71-84) presented the formative stages of the hypothesis, offered in this paper. Henry M. Morris proposed the possibility that God directly formed a body for Jesus Christ (1974, p. 59; 1976, pp. 3, 4; 1980, p. 20), "formed neither of the seed of the man nor the egg of the woman, but grown from a unique Seed planted in the woman's body by God Himself" (1975, p. iii).

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# BOOK REVIEWS

*The Encyclopedia of Evolution* by Richard Milner. 1990. Facts on File. New York. 481 pages. $20.00 paperback.

Reviewed by Don B. DeYoung*

Author Milner grew up with Stephen Jay Gould in Queens, New York City. Their junior high pictures are included on the back cover! In a Foreword to the book, Gould thanks Milner for "uniqueness and idiosyncrasy . . . details in the sublime and coordinated sense (p. v-vi)." I must agree; the book contains short, fascinating essays from A (Abang, an orang-utan tool user) to Z (Zoonomia, an evolution book written by Charles Darwin's grandfather).

The book promotes evolution, of course, but it also uncovers some bizarre and uncomplimentary history of this belief system. Here is a sampling of the content of the essays: Henry Ward Beecher, a liberal preacher in the 1870s who popularized theistic evolution, was later discredited by a 1990s-style sex scandal (p. 37). In 1906 a pygmy, Ota Benga, was kept in the monkey house of the Bronx Zoo as a "lower" evolutionary cousin (p. 41). Andrew Carnegie thought that his cutthroat business decisions helped society to evolve (p. 73). Some early "bone hunters," seeking evolutionary evidence, feuded and exchanged gunfire (p. 94). Charles Darwin expressed an abysmal understanding of Scripture: At age 53, he was astonished to learn that the 4004 B.C. creation date printed in his Bible was not a part of original Scripture itself (p. 175)! Horse evolution, "saddled with errors," is now hidden from public view as an outdated embarrassment (p. 222). Alfred Russell Wallace, co-founder of evolutionary theory, was deeply involved with mediums and ghost-spirits (p. 407).

The book contains hundreds of photos and century-old cartoons. They show that many current issues in the creation-evolution debate have been elegantly argued in the distant past. Are you interested in Clever Hans the talking horse (p. 85), a picture of the Cardiff Giant (p. 71), a summary of every Hollywood ape movie, or Mark Twain's encounter with Darwin in 1879? Then you would enjoy this unusual book.

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*Cosmic Catastrophes* by Clark R. Chapman and David Morrison. 1989. Plenum Press. New York. 302 pages. $22.95.

Reviewed by Danny R. Faulkner*

This is a well written, popular level book on the modern acceptance of the role of catastrophes in geology. The development of uniformitarianism in geology over the past 250 years is traced from the time that catastrophism was widely held. As one would expect, the works of James Hutton and Charles Lyell figure very prominently. Once uniformitarianism became established in this century, there was much opposition to any suggestion of catastrophism, as creationists well know.

A great deal of attention is given to the re-emergence of catastrophism in the past few decades, based upon the external factor of meteoroid bombardment. The starting point was the pioneering work of Eugene Shoemaker beginning in the late fifties, in correctly identifying the Arizona meteor crater as having an impact rather than volcanic origin. This has eventually led to the discovery of numerous fossil impact features elsewhere, as well as reconsideration of the 1908 Tunguska event. During this time William Hartmann and others persuasively argued that most of the craters on the moon and on Mars are of impact origin. This view is now held by nearly everyone and has been the paradigm in interpreting the space probe photographic reconnaissance of the surfaces of Mercury and the Jovian moons.

As one would expect, this book then turns toward discussion of the Alvarez hypothesis that the dinosaurs were killed by a meteor impact. Most readers are familiar with the details: a stratospheric dust cloud that reflects enough sunlight to cause temperatures to plunge, much as suggested in the so-called nuclear winter idea popularized by Carl Sagan and others, and the rare earth abundance spike apparently found in a clay layer at the K-T boundary. Other alleged periodic mass extinctions are discussed in the context of possible astronomical periodicities, such as the bob-

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bing up and down of the sun as it orbits the galactic center or the possibility of an as-of-yet undiscovered companion star to the sun.

This talk of colliding worlds should be of encouragement to creationists. However, the author distances himself from what he considers unconventional catastrophisms. One chapter is entitled "Catastrophism Gone Wild: The Case of Immanuel Velikovsky," which requires no elaboration here, except perhaps that Velikovsky's work has been almost totally repudiated by readers of this journal.* It is unfortunate that the following chapter entitled "Other Fringe Catastrophism" is mostly dedicated to special creationists. Henry M. Morris and the Institute for Creation Research (ICR) are particularly criticized because of their leadership in the movement. Critics of creationist authors often seize upon any error, typographical and otherwise, that appears in our writings. It is amusing to read in this chapter that the ICR vice president is Wayne, rather than Duane Gish and that the ICR itself is the "Creation Science Institute" in one place and the "Institute of Creation Research" in another, while it is correctly named elsewhere.

Overall this book gives a good account of neocatastrophism, and it could be profitably used by creationists for a source of new ideas.

*Editor's Note: Readers may be interested in past Quarterly articles and reviews concerning ideas for and against Velikovskyism. Some writers adapt his speculations to their models. Bouw, G. D. 1977. Further critique of Velikovsky's views, *CRSQ* 13:224-225; Chui, C. 1980. Book review of *A Symposium on Creation VI. CRSQ* 16: 228-229; Fischer, J. M. 1989. On Patten's response to Northrup. *CRSQ* 26:29; Hanson, J. N. 1978. Against catastrophic rationalism: gravitational attitude deflections of the Earth's axis. *CRSQ* 15:55-68, 72; Henson, J. L., G. L. Mulfinger, R. Reymond and E. L. Williams. 1968. Book review of *The Biblical Flood and the Ice Epoch. CRSQ* 4:129-132; Hoff, P. H. 1971. Roche's limit and the Patten epic. *CRSQ* 8:62-63; Howe, G. F. 1972. Filmstrip review of *Cataclysm from Space, 2800 BC. CRSQ* 9:82-84; Keister, J. C. 1976. A critique and modification of Velikovsky's catastrophic theory of the solar system. *CRSQ* 13:6-12; MacIver, I. 1973. Report on the Velikovsky symposium. *CRSQ* 10:142-148; Review of A *Symposium on Creation II. CRSQ* 7:171-172; Northrup, B. E. 1988. A comment on Patten's views. *CRSQ* 25:104-106; Patten, D. W. 1966. The ice age phenomena and a possible explanation. *CRSQ* 3(1):63-72; 1987. Mountains-tidal (astronomical flyby) phenomenon. *CRSQ* 24:61-69; 1988. Response to Northrup. *CRSQ* 25:106-108; Steinhauer, L. C. 1971. The relevancy of Roche's limit to the Flood-ice dump theory. *CRSQ* 8:63-65; Strickling, J. E. 1978. Creation, evolution and catastrophism. *CRSQ* 15:12-14; Thompson, III, W. I. 1976. Catastrophic origins for the asteroids and the rings of Saturn. *CRSQ* 13:82-86; Westberg, V. L. 1971. Book review of *Long Day of Joshua. CRSQ* 8:211-212.

*The* Age *of the Earth's Atmosphere:* A *Study of the Helium Flux Through the Atmosphere* by Larry Vardiman. 1990. Institute for Creation Research, El Cajon, CA. 32 pages. $5.95.

Reviewed by Emmett L. Williams*

The amount of helium in the atmosphere of the earth is less than expected using models assuming an age of 4.5 billion years. Dr. Vardiman performs an in-depth preliminary study on this lack of helium in the atmosphere and suggests some young earth models to explain the data.

A table of composition of the atmosphere is given showing 19 substances and the amounts of each. The author notes that of the gases present in the atmosphere ". . . argon, neon, helium, krypton and xenon are of most interest in questions regarding the age of the earth" (p. 3) since these noble gases do not react with other elements. He then limits the scope of this study to helium.

The possible sources of the two isotopes of helium ($^4$He and $^3$He) in the atmosphere are discussed, i.e., primordial helium (although not assumed in the ancient-earth model), leakage of $^3$He through the crust and radioactive decay of certain isotopes of uranium and thorium forming $^4$He within the crust and subsequent leakage into the atmosphere. The possible loss of helium from the atmosphere is considered via a thermal escape model employing a Maxwellian distribution of speeds, escape velocity and hydrostatic concentration of helium atoms. The weaknesses of the thermal escape model are explored. Vardiman explains (p. 24):

> Thus the characteristic residence time for helium is much smaller than the characteristic escape time. In other words, it takes a much longer time for a given quantity of helium to escape from the atmosphere to space than it does to enter the atmosphere through the crust.

Since the helium content of the atmosphere is much lower than predicted in the ancient-earth model, other helium loss mechanisms (polar wind, solar wind sweeping and hot-ion exchange) have been suggested. After a brief discussion of each one, the author claims (p. 25):

> None of the rates for the proposed mechanisms have been accurately quantified, nor have adequate observations even begun to confirm or deny then.

Lastly Vardiman offers a model to show that the atmosphere is young. If most of the helium in the atmosphere is primordial in origin, an age of less than 10,000 years is quite reasonable. The author realizes more work must be accomplished on the subject and he recommends specific possibilities. Let us hope he continues this fruitful endeavor. This book has a place in school and university libraries and on the bookshelves of individual creationists who wish to follow the development of a young-earth model.

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*Creationism: Intellectual Origins, Cultural Context, and Theoretical Diversity*, by Thomas Allen McIver. 1989. Doctoral Dissertation from The University of California. University Microfilms, Ann Arbor. 655 pages. $35.00.

Reviewed by Don B. DeYoung*

This unusual doctoral thesis attempts to summarize the history and meaning of the creation movement. McIver received his anthropology degree in 1989. A year earlier, he wrote a separate review of nearly 2,000 creationist publications (1988). Although a noncreationist himself, McIver makes a commendable effort to write without excessive bias. He concludes that creationism forms a coherent, generally self-consistent and logical system of belief (p. ix). Most thesis committees would have balked at such a statement!

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McIver has done an immense amount of research on creationist literature. Practically every related book ever written, many from a century ago, are nicely summarized. If you have written anything, you are probably in this thesis! Also explained are the particular viewpoints of many present-day creationists, with accurate insight. There is discussion of the beginning of groups such as Students for Origins Research. Creation thinking within Catholic, Jewish, and Islamic circles is also included.

Thanks are owed to Thomas McIver for his efforts to provide an accurate picture of the creation movement. As an "outsider," his limitations and distortions occasionally show. However, his work is 10 levels above the usual unfair critiques of the creation viewpoint.

**Reference**

McIver, T. A. 1988. Anti-Evolution, an annotated bibliography. McFarland. Jefferson, NC. This book was reviewed by Clifford Lillo. 1989. *CRSQ* 26:25-26.

*Analytic Thermodynamics: Origins, Methods, Limits, and Validity* (Advances in Thermodynamics, Volume 5) by E. J. Hoffman. 1991. Taylor and Francis. New York. 287 pages. $89.00.

Reviewed by Emmett L. Williams*

This book is an unusual combination of mathematical thermodynamics and discussions of the limitations of the methods of that discipline. The concepts of thermodynamics are explained and explored in a manner not normally pursued in a standard textbook.

In the first chapter, entitled Overview, the author explains his purpose for writing the book and also discusses thermodynamic terminology. He makes much of tautologies and is frank in his evaluation of the scientific method. Note the following comment:

> For the rest of mathematics, Gödel's (or Goedel's) proof—a milestone or "millstone" in mathematical theory—shows that any system of logic of consequence will lead to inconsistencies, . . . (p. 7).

The next two chapters are devoted to the energy concept. The author explains:

> The concept of energy arises as but another (mathematical) means to represent the results of experiment. It is tautological in nature, . . . (p. 12).

The equations of motion (including relativistic motion) are considered and Hoffman shows that:

> The equations of motion, and their solutions or integrations, and their representations in the energy form, all constitute a tautology. Each is but another mathematical way of representing or reproducing the results of experiment or observations, in this case Kepler's Laws of Planetary Motion, which reproduce the observed motion of the planets. (p. 57).

Again note the penetrating analysis of the author:

> The quarrel here is not that the formulas of thermodynamics are not of great usefulness and do not to a considerable degree approximate experiment but rather that these relationships as derived are treated as if they were irrefutable fact, rather than the inventions, conventions, and contrivances which they are (pp. 57, 58).

If all scientists realized this problem with all "scientific formulas and models and so impressed their students with these facts, possibly the creation/evolution debate would be of an entirely different nature.

The following chapter, heavily mathematical in nature, covers the ideal gas law, Clausius-Clapeyron relation, the Joule-Thompson coefficient and the absolute temperature concept. Chapter 5 is a brief discussion of thermodynamic systems:

> A system generally pertains to a domain or region of space, or to a body or particle, and may be defined as isolated or nonisolated, depending upon whether interchange of any sort or another occurs with the surroundings (p. 124).

Also irreversibility is handled along with dissipative effects in this section.

Equilibrium in mechanical and chemical systems is the subject of the next chapter. In probably the most thermodynamic-like portion of the book chapter 7 concerns pressure-volume work and a discussion of various cycles necessary to understand heat engines. Four chapters involve physical chemistry, particularly reactions in the gasification of coal including catalysis, Gibbs free energy of reactions, heats of formation and competing reactions. Since much has been written recently over the possible development of order and complexity in chaotic systems, Hoffman's concluding comments in chapter 11 place many of the outlandish claims in perspective:

> The essentially chaotic nature of reacting systems, in all their complexity, calls for more heroic and inclusive measures, which are as yet to be determined. The approach will call for serendipity in all things and may be more that of synergism—where the whole is somehow greater that (sic) its parts—as distinguished from reductionism (p. 260).

The epilogue of the book is outstanding. Here the author explores the limitations of thermodynamic methods in particular and the limitations of science (or man's knowledge) in general: "It may be concluded that mathematics itself is suspect, . . ." (p. 263). Hoffman quotes Warren Weaver in which the latter rightfully claims that science has *nothing* absolute about it (p. 263).

Note the following selected excerpts:

> . . . science cannot answer the "ultimate questions" such as "How did life begin? . . ." (p. 263).
>
> It's a problem to tell where science ends and science fiction commences (p. 263).
>
> . . . Oswald Spengler who wrote that the concept of evolution was rooted in economics . . . Christianity would not justify the arbitrament of war, but the philosophy of Darwinism could (p. 264).
>
> The word seems clear, unmistakably, that science is not necessarily unchallengeable in conception nor impartial in practice (p. 264).

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> Science is what man is; he creates it in his passing image (p. 264).

Finally Hoffman, in the next to the last paragraph, mentions the charge of Francis Schaeffer that:

> . . . science, as it is now usually conceived, has no epistemological basis—no base for being sure that what scientists think they observe corresponds to what really exists (p. 265).

This book is refreshing in its approach to thermodynamics and science. If all "scientific" subjects, particularly those that deal with the evolutionary hypothesis, were approached with this attitude and candor, the worldview of many people would likely be entirely different and the arrogance of man would be grossly deflated. Since there are no problems at the end of each chapter, it would be difficult to use the book as a text. However it would make excellent supplementary reading by students and teachers of various scientific subjects. Hopefully it will be found on the bookshelves in college and university libraries. Hoffman is to be congratulated on writing such a needed volume.

*Defending the Declaration: How the Bible and Christianity Influenced the Writing* of *the Declaration of Independence* by Gary T. Amos. 1989. Wolgemuth and Hyatt. Brentwood, TN. 235 pages. $14.95.

Reviewed by Emmett L. Williams*

As the title of this book states, the author attempts to demonstrate that the Declaration of Independence is based on biblical Christianity and not deistic philosophy as often claimed. Creationists may be interested in certain arguments offered. In Chapter 2 Amos discusses the wording "laws of nature and of nature's God" found in the Declaration. He shows that the phrase has a Christian tradition. He quotes from Sir William Blackstone's *Commentaries on the Laws of England* (1765):

> (W)hen the Supreme Being formed the universe, and created matter out of nothing, he impressed certain principles upon that matter. . . . When he put that matter into motion, he established certain laws of motion. . . . If we farther advance to vegetable and animal life, we shall find them still governed by laws; . . . [The operations of inanimate and organic processes] are not left to chance, or the will of the creature itself, but are performed in a wondrous involuntary manner, and guided by unerring rules laid down by the Great Creator. . . . Man, considered as a creature, must necessarily be subject to the laws of his creator, for he is an entirely dependent being. . . . And consequently as man depends absolutely upon his maker for every thing, it is necessary that he should in all points conform to his maker's will. This will of his maker is called the law of nature (p. 43).

Also the writings of Sir Edward Coke *[Calvin's Case* (circa 1610)] are employed:

> The law of nature is that which God at the time of creation of the nature of man infused into his heart, for his preservation and direction; and this is *lex aeterna,* the moral law, called also the law of nature. And by the law, written with the finger of God in the heart of man, were the people of God a long time governed, before the law was written by Moses, who was the first reporter or writer of law in the world. The Apostle in the Second Chapter to the Romans saith, *Cum enim gentes quae legem non habent naturaliter ea quae legis sunt faciunt* [While the nations who do not have the law do naturally the things of the law]. And this is within the command of that moral law, *honora patrem,* which doubtless doth extend to him that is *pater patriae.* And that the Apostle saith, *Omnis anima potestatibus subdita sit* [Let every person be subject to authorities]. And these be the words of the Great Divine, *Hoc Deus* in *Sacris Scripturis jubet, hoc lex naturae dictari, ut quilibet subditus obediat superio.* . . . [This God Commands in Sacred Scripture, this the law of nature dictates, in order that anyone who is a subject might render obedience to the superior.] (T)herefore the law of God and nature is one to all. . . . This law of nature, which indeed is the eternal law of the Creator, infused into the heart of the creature at the time of his creation, was two thousand years before any laws written, and before any judicial or municipal laws (p. 44).

Amos quotes Blackstone again to illustrate that "the law of nature" is equal to the "law of God":

> The doctrines thus delivered we call the revealed or divine law, and they are to be found only in the holy scriptures. . . . These precepts . . . are found upon comparison to be really a part of the original law of nature, . . . As then the moral precepts of this law are indeed of the same original with those of the law of nature . . . the revealed law . . . is the law of nature expressly declared to be so by God himself; . . . Upon these two foundations, the law of nature and the law of revelation, depend all human laws . . . the law of nature and the law of God. . . . (p. 44).

In a discussion of inalienable rights, the author states:

> Genesis 1 and the creation model, therefore, are the Biblical basis for rights generally and for inalienable rights particularly (p. 108):

Attacking humanistic reasoning, Amos notes that: "The humanists, on the other hand, insisted that all rights were state-created not God-given" (p. 122). In other words, he makes a case that the rights of mankind are endowed by the Creator, not given to man by one of his organizations or constructs. The author shows by the writings of John Locke that he was not a deist as is often claimed (pp. 50-61).

The use of "Divine Providence" and a brief history of its importance is provided. Its relation to God as creator and sustainer of the world is given. The definition of Providence from the Westminister Confession (1646) is stated:

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> God, the great Creator of all things, doth uphold, direct, dispose, and govern all creatures, actions, and things from the greatest even to the least, by his most wise and holy providence (p. 154).

Amos then quotes John Calvin in his attacks on deism:

> It were cold and lifeless to represent God as a momentary Creator, who completed his work once for all, and then left it. . . . (W)ithout proceeding to his Providence, we cannot understand the full force of what is meant by God being the Creator, . . . (who) is also a Governor and Preserver . . . by . . . Providence sustaining, cherishing, superintending, all the things which he has made (p. 154).

Divine Providence was understood in colonial times to have a Christian context. Consider this comment by John Esten Cooke (1884, p. 12) in detailing the colonization of Virginia:

> The first charter expressed this longing—"that so noble a work may by the providence of God hereafter tend to the glory of His Divine Majesty in propagating of the Christian religion to such people as sit in darkness and miserable ignorance of the true knowledge and worship of God."—"This is the work that we first intended." says a writer of the time, "and have published to the world to be chief in our thoughts, to bring the infidel people from the worship of Devils to the service of God."

One easily can trace the use of Divine Providence (in a Christian sense) even into the last century.

Dr. Amos has done modern Christianity a service by carefully explaining the biblical basis of the Declaration of Independence in opposition to so much historical revisionism of our day. The use of creationist concepts are essential to understand liberty and the rights of men. The book is redundant in places and unfortunately like so may modern writers, Amos trashes the Old South with an unnecessary remark about Jefferson Davis (p. 169). However the book makes worthwhile reading for creationists and those interested in the history of our country.

**Reference**

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# LETTERS TO THE EDITOR

## Creation Conference

Papers for the Third International Conference on Creationism (ICC), 1994, Pittsburgh, PA, are now being invited for submission. The theme of this ICC has been broadened to Developing and Systemizing the Creation Model of Origins. In keeping with this theme, this Conference is intended to be a "working" conference.

The interested author should submit a 500 word summary of his/her paper no later than 31 January 1993 to the ICC, Technical Review Committee (TRC), P.O. Box 99303, Pittsburgh, PA 15233. Early submission is highly recommended. Each submitted summary will be evaluated for possible inclusion into the review process. If this summary is accepted, the author will be assigned an editor who will work with the author to improve his/her paper, and who will have jurisdiction over its final acceptance. Papers that deal with the age of earth/universe should be from a young-earth perspective, or should offer a positive and constructive criticism of that perspective.

The Conference theme is partitioned into categories and sub-areas listed below. Each prospective author, with the submission of his/her summary, must explicitly indicate what category and sub-areas best classify the paper. The ordering of the major categories is judged to reflect their respective logical importance and need in the present development of the creation model of origins.

I. PHILOSOPHY OF SCIENCE
- 1) Biblical Hermeneutics
- 2) Biblical Studies
- 3) Scientific Methodologies
- 4) Comparative Philosophy
- 5) Education

II. LIFE SCIENCES
- 1) Biogeny
- 2) Antediluvial Biogeography
- 3) Postdiluvial Biogeography
- 4) Systematics
- 5) Genetics

III. ASTRO-SCIENCES
- 1) Astro-chronometry
- 2) Cosmogony
- 3) Cosmology
- 4) Planetary Geology

IV. SOCIAL SCIENCES AND THE HUMANITIES
- 1) Philosophy of History
- 2) Origin of languages and culture
- 3) Archeology
- 4) Comparative Mythology
- 5) Psychology
- 6) The Arts

V. EARTH SCIENCES
- 1) Geo-chronometry
- 2) Atmospheric Sciences
- 3) Oceanography
- 4) Geophysics
- 5) Hard Rock Geology
- 6) Sedimentary Geology
- 7) Paleontology
- 8) Glaciation
- 9) Geomorphology

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## The Big Bang-Proven?

"Wrinkles" in the fabric of the universe have recently been announced. The Cosmic Background Explorer Satellite (COBE), launched in 1989, has measured a slight variation in the temperature of background radiation, about 30-millionths of a degree. Such a temperature fluctuation is predicted by the Big Bang theory, and is needed to explain the observed distribution of galaxies. The new discovery has therefore been promoted as a major victory for cosmology.

If the data is confirmed, one problem with the Big Bang may indeed be solved. However, other important questions still remain. From where did the original energy source come and why did it explode? What is the source of gravity and other physical laws of the universe? What about the technical problems of missing mass and galaxy formation? A recent, supernatural creation still remains a credible alternative to the Big Bang.

There is an embarrassing overkill in recent science statements: "We have found the Holy Grail . . . It's like looking at God." Since astronomers do not even know the origin of our nearest neighbor, the moon, a bit more humility is surely in order.

Revived efforts to combine the Big Bang with the biblical creation story are futile. Various origin theories will continue to roll on by, unlike the majestic creation account. The beginning of the universe, including mankind, remains supernatural and therefore beyond reach of the scientific method.

Cosmologists apparently cannot control their rhetoric, perhaps due to their pursuit of more funding. The reader must therefore read between the lines, including the "ifs" and "maybes." Do not let the recent brash statements detract from the wonder of the Creation. Perhaps the origins experts will someday realize their inability to explain the miraculous.

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## Alleged Informational Insufficiency of the Genome: A Rebuttal

Robert Kofahl (1992), like Lester McCann (1991) before him, would rid us of the "grand unproved assumption" (Kofahl, 1992, p. 146) that the *totality* of genomically-based information is sufficient to account for cell differentiation and function, organogenesis, and embryonic development, as well as prescribe the limits of biological variation. He offers, in its stead, a Vitalistic metaphysical paradigm. As justification, he submits "quantitative estimates . . . for the insufficiency of the genome" (p. 147), focusing on the neuronal network of the brain's cerebral cortex. We find his estimates for this and other examples discussed seriously flawed. For example:

(1) By restricting genomic information to that represented only by codons (p. 146), Kofahl would limit us to the now obsolete "one gene, one peptide" concept of gene action. This view remarkably undervalues the *effective* informational content of genes and gene products otherwise, as discussed elsewhere in detail (Lumsden et al., 1992). His thesis ignores the abundantly well-documented principles of information amplification by cascade, feedback (Alberts et al., 1989; Parsegian, 1970) and transduction (Lumsden et al., 1992), principles operating within a genetically determined cybernetic framework. Meanwhile, no consideration is given to the variety of mechanisms for amplifying genetic informational capacity per se, or the expression of that information. For example, eukaryotes, as reviewed by Anderson (1991), a single DNA sequence (i.e., one gene) can code for several different proteins (i.e., the generation of peptide isoform diversity by alternative splicing in the processing of the nascent RNA transcript). This principle alone would expand the potential expression of human genomic information (calculated by Kofahl to be a maximum of 4.15 billion bits, p. 146) by at least four orders of magnitude (Denton, 1986). Another example would be the combinatorial diversification evidenced in lymphocytes which explains the tremendous variety of antigen binding sites that can be generated from a limited number of gene segments (Alt et al., 1987; Alberts et al., 1989). Phenotype may also be affected by quantitative genetic modifers, influencing the concentrations of certain proteins vis-a-vis the presence or absence of discrete protein species (Wilson, 1985). For example, most eukaryotic cells contain actin and myosin, but not all are muscle cells, and not all muscle cells are striated muscle cells. Meanwhile, respective of cytodifferentiation, the genome is both initiative *and reactive,* not an inflexible blueprint. The explanation lies in the realm of inductive developmental principles, however, not arcane metaphysics.

(2) The premise that ". . . 95% of the genome's DNA is 'junk'" (Kofahl, 1992, p. 146) implies that a nucleotide sequence not translated into peptide structure is informationally worthless. This misconception, by the way, has an *evolutionary* basis (Orgel and Crick, 1980). See Lumsden et al. (1992) and Felsenfeld (1985) for a contrary view of the informational significance of non-translated DNA.

(3) Serious students of neurobiology will, we daresay, find Kofahl's static wiring diagram concept of neuronal networks (p. 147) and his calculations based thereupon remarkably naive if only for the oversight that *synapses* (vis-a-vis dendrites per se) (Figure 1) are the primary "anatomical" units of interneuronal networking. Kofahl's model also fails to consider that neural connections are made and broken, dendrites are sprouting and regressing, associations rearranging, throughout life (Brown et al., 1981; Alberts et al., 1989). Then there are the myriad aspects of neurochemistry re: information cascade and signal diversification (Berridge, 1985; Snyder, 1985). The latter reflect the genetically prescribed multiplicity and diversity of synapses—numerically, typologically, temporally, locationally and functionally—as well as the presence of nexus junctions and a plethora of receptors and ionophoric channels. Additionally, there are altogether diffusable neurotransmitters such as endogenously generated nitric oxide and carbon monoxide (Snyder and Bredt, 1992), which function independently of the aforementioned surface membrane structures. Collectively, these features not only abrogate his calculations (and conclusions) but are significant to a resolution of Kofahl's enigma. We note that signals—their generation, reception and processing and the responses they elicit—are facets of information which in some

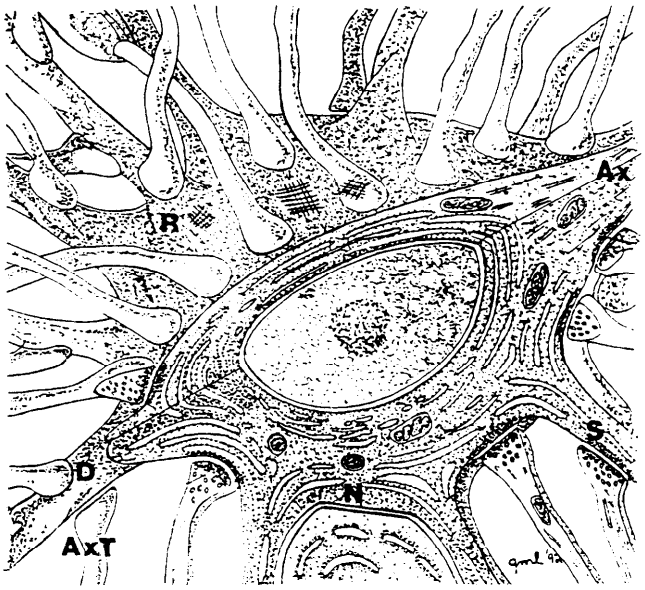


**Figure 1. Artist's reconstruction (from electron micrographs) of the perikaryal region of a cortical neuron, illustrating dendrites (D), axon terminals (AxT), synapses (S), receptors (R), a nexus junction (N) and axon (Ax). Inspired by plates 120-125 in Krstic (1979).**

instances may impinge directly on neuronal differentiation (Walsh and Cepko, 1992). Kofahl has also apparently overlooked the considerable body of literature identifying the scaffolding principles, neurotropic factors, the role and mechanisms of selective adhesion, chemotaxis and electrical fields, and the dynamics of neuronal production, maturation and interaction that relate to the ontogeny of the nervous system, summarized in part by Alberts et al. (1989, chapter 19). Kofahl's largely unreferenced discussion (p. 147) of previously suggested solutions to the problem of neural network specification bespeaks a somewhat less than contemporary appreciation of microneuroanatomy, neurophysiology and neural development.

We share Kofahl's awe of the complexity of the brain, and neurobiology in general. Like Kofahl, we do not find its explanation in the evolution paradigm. We suggest, however, that the answer biologists would seek to the conundrum Kofahl posits hardly ". . . seems to demand belief in the (scientifically) incredible" or reliance on "(scientifically) ridiculous assumptions" (p. 147). Indeed, what mysteries Kofahl (1992) might enlighten us by his "New Proposals" might already be elucidated, at least to a significant extent, in the scientific literature he would decry. See Brittis et al. (1992) and Walsh and Cepko (1992) for some recent examples of the productive application of empirical cellular and molecular biology vs. nebulous metaphysics, to this end. Neuroscience, among the most active areas of current biological research endeavor, is not *requiring* of unfounded speculations (though such may arise), but the acquisition and cogent assessment of tangible data. Kofahl's rhetoric offers us a poor substitute for disciplined inquiry and diligent scholarship.

We submit, Kofahl's analysis and assertions notwithstanding, that his statement (p. 146) of ". . . compelling evidence to support the view that the genome is not sufficient, further, that the sum of physical structures in the cell is not sufficient" is specious, at least to the extent that such "evidence" he cites is at all *compelling* to his conclusion. As an address of what he identifies at the outset as a scientific problem, Kofahl's science respective of this issue is wanting. Simplistic analyses of complex problems, generating simple solutions, in putative support of the creationist (vs. evolutionist) perspective may have appeal, but profit nothing when they will not stand rigorous scrutiny.

In part 1 (p. 147) of his four-part "New Proposals," by his antecedent reference to McCann's (1991) "cellular intelligence" paradigm (p. 147), Kofahl, like McCann, seems to misplace information and intelligence and their hierarchial relationship re: baramin (Lumsden et al., 1992), Kofahl's inferred familiarity with the tenets of information theory notwithstanding. Yet Kofahl apparently concurs that an *external* intelligence is the source, or cause, of the information on which cells, therefore organisms, operate biologically (Morris, 1984, pp. 89-92; Lumsden et al., 1992). However, it is not altogether clear whether Kofahl views the "intelligence required for development" (p. 147) as a *sustaining* (i.e., on-going) primary causality *immediate* to the effect (here ontogeny) or as a causality presently acting *mediately* (i.e., establishing by original fiat the instrumentality of natural laws, then acting through them) per Morris (1984), Lumsden et al. (1992) and Genesis 2: 1-3. Are we, in either event, to conclude that the putative genomic informational *insufficiency* Kofahl alleges came by Divine Design? Dysteleology? A body of information that was less than "very good" (Genesis 1: 31) at the outset? Note, the existence of a genome that operates in the present by natural principles is *not* evidence of a purely materialistic or evolutionary origin! The question respective of our debate with Kofahl is whether present-day biological mechanisms are explainable, operationally, by natural processes, or do they require continuing Divine intervention?

Meanwhile, what is "new" about parts 2 and 3? To what, we also wonder, does he limit (re: part 2) ". . . the biochemistry, metabolism, and other housekeeping processes of the organism" (p. 147) and (re: part 3) adaptationally significant variation, if these parameters do not contribute to, indeed are not intimately and requisitely integrated with, those addressed in parts 1 and 4? Part 4 is moot, given the failure of Kofahl's "evidence" to demonstrate the salient point—genomic informational insufficiency. However, the implausibility of macroevolution is evident from the nature of the information carried by the homeotic genes, among others (Ouweneel, 1975). We note parenthetically that the distribution of these "master genes" now seems to be ubiquitous and their functions broader in scope than Kofahl's reference to them (p. 148) might suggest (see Lumsden et al., 1992: Rennie, 1991; and Marx, 1992). Punsters have, in fact, not inaccurately referred to them as "designer genes." While not yet answering Kofahl's question about the informational locus for feather design (p. 146), model systems, such as the nematode *Caenorhabditis elegans*, amenable to clarifying the role of developmental control genes in specifying other structural ontogenies (Ferguson et al., 1987), are answering the broader questions.

Where the thrust of Kofahl's treatise is concerned, we submit that he attempts to solve a problem that does not exist. What would ". . . fly in the face of hard scientific facts" (p. 146) and, perhaps, contradict Genesis 2:1-3 as well, is not the genetic explanation but his recourse, in this instance, to misplaced metaphysics (Lumsden, 1992).

We further suggest that where the McCann (1991) and Kofahl (1992) articles are concerned, creationists should heed Harrison (1933, pp. 319-320), as he was warning his fellow embryologists in context, to beware the ". . . anthropomorphisms and relics of our demonology . . . which may lend a false sense of security to our explanations but may also suggest foolish questions that can never be answered." [Harrison uses the term *demonology* here in the sense of great energy, urgency, or skill, not in the *spiritual* sense!]

With all of the credible scientific arguments that can be brought to bear against the evolution paradigm, we find Kofahl's effort superfluous. By Kofahl's own admission, his proposal is not only ". . . highly speculative . . ." (p. 146) but a proposal that ". . . is not a scientific hypothesis . . ." (p. 147) in the first place. We have no problem whatsoever with "metaphysical research programmes" (Popper, 1976, p. 168, per Kofahl, 1992, p. 148) that responsibly and *knowledgeably* reference hard science, critically or otherwise, but find Kofahl's article an exception to that principle. For a cogent discussion of Popper's thoughts on this subject, see Johnson (1991, chapter 12, "Science and Pseudoscience").

Finally, where Kofahl would identify *vitalism* as a biblical principle, as he understands it and would apply it, we suggest readers also ponder the historical roots of vitalist *philosophy* as a "natural principle" (Morris 1989) and how, in that context, it is currently being applied in New Age pantheism and Gaia-ist "science." Where Kofahl (p. 148) would find that vitalism ". . . has its proper place in the conceptual framework of Christian research scientists . . ." and entreat ". . . more research by Christians . . . (with) . . . this fundamental spiritual and philosophical commitment," such study, with critical discernment of what is biblical and what most definitely is not, would not be a trivial exercise.

We would answer the questions posed in the title of Kofahl's (1992) article as follows:

(1) *Is the genome sufficient?* Yes.

(2) *Where is the design information?* In the genes, as prescribed and so programmed by Creative intelligence, at the time of fiat creation of the archtypes.

(3) *What limits variation?* See (2) above, the necessity for coadaptation of components as a pre-condition of integrated function and, therefore, the biological constraints against *ad libitum* mutation. Cats cannot become bats through "dats."

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*CRSQ—Creation Research Society Quarterly*

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## Isotope Correction

In his article "Isotope Ratios and Variable Constants" (1992, p. 165) Harold Heinze stated:

> It can be said with confidence, however, that Cook's [lead] ratios *demand* accelerated decay in the past. Cook gave many convincing calculations that can only be explained by an extremely high flux of fast neutrons in the past in these [uranium / lead] ores.

These claims would be of monumental significance if they were substantiable. Unfortunately, my investigation of Cook's evidence for the high flux of fast neutrons has led to some disturbing discoveries which seriously, if not totally, undermine these claims.

As a single example, consider Cook's first lead ratio example—an uranium ore body in Katanga, Belgian Congo (presently Shaba, Zaire). Cook (1966, p. 54) states:

> In this ore quite generally $Pb^{204}$ is zero as also is Th. Yet, there is present in this ore some $Pb^{208}$! Where did it come from? The absence of $Pb^{204}$ implies that there is no original [i.e. common] lead in this ore; apparently all of the lead is radiogenic. On the other hand, since there is no Th either, the $Pb^{208}$ could not have come from Th decay. It evidently, therefore, had to come from the (n, γ) reaction $Pb^{207} + n \rightarrow Pb^{208} + \gamma$.

When I read Cook's reference for the Katanga Pb data, I found that Cook was working from a table of results which had been compiled from the work of a large number of individual researchers and research groups. The table was slightly ambiguous as it had a dash where the $^{204}$Pb abundance should have been in many instances. Cook had obviously taken this dash to mean that there was no $^{204}$Pb abundance in these cases.

As I surveyed the table further it became apparent that a dash probably did not signify zero as there were a number of entries for ore bodies at other geographical locations than Katanga which gave $^{204}$Pb as "0.00." This immediately called into question Cook's assertion that "in this ore quite generally $^{204}$Pb is zero."

It was necessary to go back to at least one of the original sources for the Katanga data to be quite certain about what had been found in the Katanga ore. One of the original references was a 1939 paper by Nier. This paper showed several of the actual spectrometer output graphs which were used to determine the relative abundances of the various Pb isotopes for the Katanga ore. It also listed a series of 10 results from repeated measurements on various components of the ore. In six of these cases the $^{204}$Pb entry was left blank. In the four other cases, however, it was given. In each of these four cases the $^{204}$Pb abundance was very small, in fact only an upper limit for the abundance of $^{204}$Pb was given in three of the four cases.

Nier's findings relative to the Katanga ore are absolutely clear in this paper. He did not find that $^{204}$Pb is quite generally zero for this ore. He found that the component of common lead was very small—so small, in fact, that his equipment was operating near its sensitivity limit just to measure the $^{208}$Pb peak. The $^{204}$Pb peak, *which is 29.5 times smaller than the $^{208}$Pb peak in common lead*, often was just too small to be measured. In the one case when it could be measured it was present in the expected ratio of $^{208}$Pb to $^{204}$Pb for common lead.

Cook was mistaken, and his lead ratio evidence for fast neutrons vanishes when the mistake is corrected. These kinds of mistakes are unfortunate and generally unnecessary. They can be avoided by checking the original source whenever possible—something we all need to be careful about—and by taking the time to work through the arguments of previous creation scientists whose results we would like to build. Failure to do so can mean that we are building on a foundation of sand—as has apparently happened in the present case.

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## QUOTE

The spiritual crisis of the West had come about, Voegelin would explain elsewhere, largely as a result of Western man's overemphasis on the material-sense-perceivable aspect of reality to the neglect of the human spiritual dimension. This neglect, he held, was a concomitant of the rise of modern natural science and technology. "The magnificient advance of science in Western civilization," Voegelin declared in an important article on "The Origins of Scientism," is paralleled by an unspeakable advance of mass ignorance with regard to the problems which are existentially the important ones." The seventeenth- and eighteenth-century fascination with the "new science" of mathematized physics, he contended, led to the point of "underrating and neglecting the concern for experiences of the spirit" and "developed into the assumption that the new science could create a world view that would substitute for the religious order of the soul." From the seventeenth century onward, according to Voegelin, the spiritual impoverishment of Western man progressed at an increasing rate; it reached an unprecedented level in the nineteenth century, setting the stage for the moral and spiritual anarchy of the twentieth.

An important theme in many of Voegelin's works is the idea that man cannot live in a fully secularized universe, since such a universe provides no orientation for his life and no satisfaction for his deeper spiritual hunger. Human nature, Voegelin believes, abhors a spiritual vacuum, and when the older, transcendent God has fallen from view or become discredited, new objects of worship will inevitably emerge whose content in the modern period is usually drawn from the inner-worldly arena studied by the various sciences. The eclipse of the heavenly God must inevitably lead, according to Voegelin, to the creation of various earthly divinities:

> Men can allow the contents of the world to grow to such an extent that the world [i.e., as a whole] and God disappear from view, but they cannot eliminate the problems of human existence. These problems live on in the individual soul and when God has dropped out of sight behind [the contents of] the world, then the contents of the world become the new gods; when the symbols of the transmundane religiosity are prohibited, there appear in their place new symbols that have been developed out of the inner-worldly language of science.

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## QUOTE

First, among the great systems of philosophy of history constructed between 1750 and 1850 there are a few in which a deist god figures as the absentee landlord of Nature. Second, at least two of these systems of history, those of Saint Simon and Auguste Comte, supplemented the scheme of successive ages of history with a newly invented civil religion expressly designed to displace Christianity. Third, in Hegel's system, history figures as a kind of biography of the Absolute Mind, which is Hegel's formula for god, no longer "the maker of heaven and earth" but rather a god coming to be himself through the development of human consciousness. Philosophy of history, then, far from being anti-religious, pretends to the status of an "ersatz religion," a new religion proposed to take the place of faith in God, the Father of Jesus Christ.

Philosophy of history is a form of the loss of reality. "Loss of reality," a concept coined by Eric Voegelin, has profound meaning in the context of Voegelin's philosophy of consciousness, a meaning which it would take too long to explain fully at this point. As I am going to steer this paper in the direction of empirical evidence, I hope that the phenomena will speak for themselves and illustrate the concept.

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## QUOTE

How did the younger generation, the generation of the modernists, receive the pessimistic conclusions that were widely drawn from the Victorian study of the phenomena of science? "A Free Man's Worship" (1918), by Bertrand Russell, Eliot's tutor in philosophy at Harvard, suggests one answer:

> That Man is the product of causes which had no prevision of the end they were achieving; that his origin, his growth, his hopes and fears, his loves and his beliefs, are but the outcome of accidental collocations of atoms; that no fire, no heroism, no intensity of thought and feelings, can preserve an individual life beyond the grave; that all the labors of the ages, all the devotion, all the inspiration, all the noonday brightness of human genius, are destined to extinction in the vast death of the solar system, and that the whole temple of man's achievement must inevitably be buried beneath the debris of a universe in ruins—all these things, if not quite beyond dispute, are yet so nearly certain, that no philosophy which rejects them can hope to stand. Only within the scaffolding of these truths, only on the firm foundation of unyielding despair, can the soul's habitation be safely built.

Tuttleton, James W. 1987. T. S. Eliot and the Crisis of the Modern. Modern Age 31(3-4):276.

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