

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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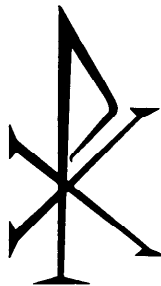


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COVER ILLUSTRATION

On the front cover are shown four kinds of plant, common in southern California, especially where there has recently been a brush fire. These illustrations are used, in black and white, in the article by Howe, elsewhere in this issue of the *Quarterly*.

The four parts show: upper left: California poppies, blue dicks, and others (13); upper right: lupines, *Lupinus succulentis* (14); lower left: chocolate lily, or mission bells (15); and lower right: *Ceanothus crassifolius*, also called hoary-leaved *Ceanothus*, or buckbrush (17). The numbers in brackets give the Figure in Howe's article in which these respective plants are shown.

These pictures were taken during a study of how vegetation recovers after a fire. It is shown in Howe's article that the different strategies of the different plants are evidence of skillful design on the part of the Creator.

POSTFIRE STRATEGIES OF TWO CHAPARRAL SHRUBS (CHAMISE AND CEANOTHUS) CAST LIGHT ON ORIGINS

GEORGE F. HOWE*

Received 10 August, 1981

How do you start with survival of shrubs after fire and end up discussing origins models? This is what Wells did when he claimed that Ceanothus evolved rapidly because its species could not resprout after fire but had to use the seedling mode of reproduction thereby being forced to undergo mutation, selection, and speciation more rapidly than plants like chamise that resprout.² This paper contains a review of some of the data that conflict with Wells' evolutionary hypothesis.

The problem of how a plant could have originally gotten the ability to resprout after fires is discussed in terms of the neodarwinian microevolutionary model, the newer evolutionary concept of "punctuated equilibria", and the scientific creation model. Keeley has proposed a "stochastic fire hypothesis" that fits quite well with our field data in particular and with the scientific creation origins model in general. Keeley argued that resprouters like chamise are well adapted for growth in areas where fires are frequent and that obligate seeders like Ceanothus have an advantage wherever fires come after long fire-free periods. The idea that both patterns of shrub growth after fire are advantageous under different circumstances supports creation scientists' belief that there is a plan in nature.

On first consideration it might seem that anything as prosaic as shrub survival would have little connection with the exciting controversy about origins presently raging between scientific creationists and megaevolutionists. Yet the very presence of two groups of bushes (chamise—which botanists call *Adenostoma fasciculatum* and a number of species of mountain lilac—genus *Ceanothus*) thriving throughout the chaparral shrublands of western North America poses serious problems for advocates of the various megaevolution origins models, as we shall see.

Meet the two Shrubs—Chamise and Ceanothus

Chamise is a member of the rose family even though its little evergreen leaves resemble miniature needles of spruce or fir, clustered along thin, dry, woody stems (Figure 1). A new section of stem and leaf growth appears each year during January and February. When chamise blooms a few short weeks later in May or early June, its dense clusters of small, cream-colored flowers clearly betray its rose family affinities and brighten the tip of every upper branch, causing the whole shrub to stand out against a backdrop of other dull grey-green bushes, yellow dried grasses, and brown soil (Figures 2-5). In fact, during the spring season, each species of shrub in the chaparral blooms at a slightly different date so that for a period of about two months the flowers highlight different shrubs producing a kaleidoscope of light and color that makes every hillside more beautiful than a chalk artist's picture under "black-light."

Chamise flowers soon fade to a rich brown color and the seed ripens, falling to the soil nearby. This cycle of growth, flowering, and seed production continues year by year but the bushes themselves seldom get much taller than two meters because older branches bend downward. In mature chamise forests that go for decades without burning, thick old stems and fallen branches produce a brittle pile of tinder that will burn with intensity during the next fire (Figure 6). Chamise is so highly flammable that it has also been called "greasewood" because the shrubs erupt into flame as if they were torches full of pitch or grease (see Figures 7-9). It is not a matter of "if" that next fire will come but simply "when" since every square inch of chaparral ultimately burns. The chaparral actually experiences senescence but it becomes a more diverse, productive, and rejuvenated ecosystem after fire. Generally, the longer a chaparral forest thrives before the next fire, the hotter and more devastating that fire will be.

Newcomers to Southern California understandably dream of owning a home right up in the beautiful brushy chaparral forests but soon discover that such a plan would put their home in constant fire jeopardy. Fire departments and insurance firms require owners of



Figure 1. Chamise stems are woody with narrow, needle-like leaves clustered into little bundles. These leaves are evergreen and up to 1/2 inch long. Not knowing otherwise, someone might mistake chamise for some type of strange little spruce or fir plant. Both green leaves and stem burn violently in chaparral fires; hence the other common name for this plant is "greasewood".

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Figure 2. Chamise flowers seen clustered at the tips of branches during May demonstrate that these plants belong in the rose family. The one-meter tape lends size perspective. Chamise plants produce many seeds, most of which lie dormant for years until the next fire burns the forest.

structures in the chaparral to remove all shrubs from a broad zone around each building every year before fire season.

After the fires, chamise plants have the ability to send forth fresh stems and leaves from the burned crown at



Figure 3. Chamise stems, leaves, and flowers can be seen here silhouetted against the sky. Old stems and lower sections of chamise plants become brittle, serving as a ready reserve of tinder just waiting for the next fire.



Figure 4. Chamise plants sometimes grow apart from other shrubs, like this one seen along Pico Canyon Road, Newhall, California. In the foreground are dried mustard plants and a live-oak woodland in the background. There are only four taxa (taxonomic groups) in the genus *Adenostoma*.

or just above the soil level (Figures 10-11). Within two or three weeks following the burn, these tender shoots we shall call “resprouts” are visible on many of the

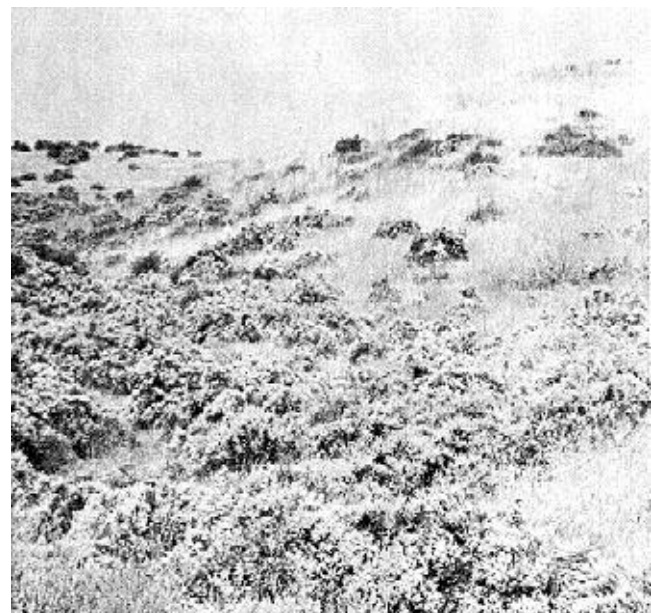


Figure 5. Chamise more often grow in dense clusters with other chamise as seen here, or mixed together with shrubs like mountain lilac, manzanita, and scrub oak. Chamise plants make up a large percentage of the chaparral brush cover in southern California. Here they are seen in full bloom on a slope opposite a stand of weedy grasses including rippgut and wild oats.

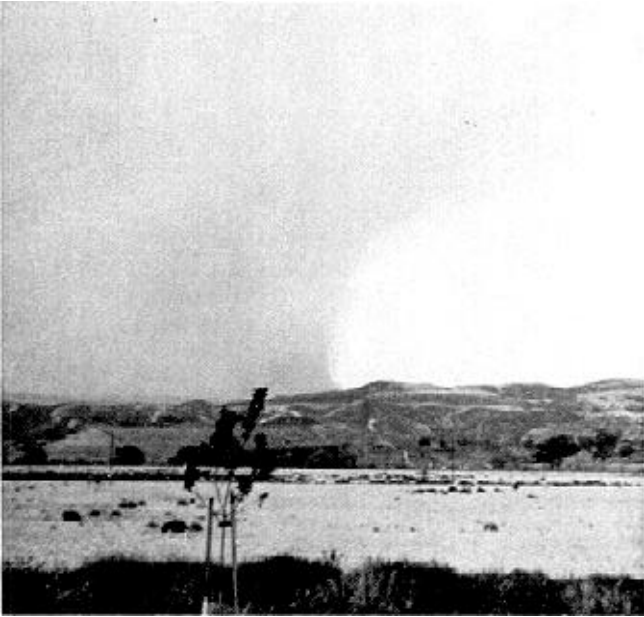


Figure 6. When chamise and other shrubs burn, a column of smoke can be seen for many miles.

chamise shrubs beneath a dead skeleton of the former shoots.

During the next rainy season following the fire, seeds also of chamise generally germinate in large numbers,



Figure 7. In August 1973, a thick stand of chamise mixed with *Ceanothus crassifolius* and other shrubs near Middlebank Road, Newhall, California, burned. A helicopter and fire crew are seen on the ridge top with a series of burned poles below. These poles were used as site locations for successional studies I reported in 1976—see reference 5. If a long time elapses between fires at any spot, plants like *Ceanothus* which produce large numbers of seedlings have an adaptive advantage, according to Keeley and Zedler.



Figure 8. With the Middlebank Rd. chaparral fire well under control, a crew of fire fighters is seen mopping up a few remaining hot-spots. Many of the burned chamise shrubs in the background resprouted after the fire. None of the *Ceanothus* plants resprouted; but *Ceanothus* produced numerous seedlings. Keeley has asserted that wherever fires come quite frequently, resprouters like chamise will have an adaptive advantage—see references 8 and 9.

producing tiny seedlings on the charred ground. But since the chamise resprouts begin growing almost immediately after the fire (earlier than these seedling which wait for rain) and since the resprouts arise from a root system which provides them with large quantities of stored food, the resprouts generally get taller sooner



Figure 9. After a chaparral fire burned stumps of shrubs remain. Broad zones of brush must be cleared to enable fire fighters to save structures.



Figure 10. Just eight weeks after the fire seen in figure 9, chamise stumps had produced sprouts up to 6 inches long. The keys give perspective.

than do the seedlings (Figure 12). During the first growing season after a fire, the ground is also covered with a profuse display of wild flowers. In many cases these are species like California poppy (*Eschscholzia californica*), the lupine (*Lupinus succulentis*) and others like the beautiful chocolate-lily (*Fritillaria biflora*) (Figures 13-14). Such a display as this is usually not seen again in that locality until a year after the subsequent fire.

Mountain lilac shrubs which are members of the buckthorn family, have leaves that are larger and broader than those of chamise, the shape varying wide-



Figure 11. After the Middlebank Road fire, chamise plants resprouted vigorously as seen here (note pen for perspective). Slightly to the right and up from the pen is a cluster of *Ceanothus crassifolius* seedlings. This is one of the species of *Ceanothus* that cannot resprout from old plants but is an obligate seeder. Wells (see reference 2) suggested that this inability to form resprouts is what forced *Ceanothus* to reproduce sexually by seeds and thereby to yield many more taxa (categories) than chamise.



Figure 12. A resprouted chamise plant can be seen at the upper left, about 10 months after the fire at Middlebank Road area. Wells (see reference 2) argued that resprouts play the major part in restoring a chamise population after fire and hence he felt that plants like chamise have undergone much less speciation than *Ceanothus*. But in the foreground here, near the pen, are several chamise seedlings growing vigorously 10 months after fire. They are still alive (1981) and contributing to the present population in that locality and others 8 years and more after the fire. Although such seedlings got a slower start, they produced an average of 86% of the new chamise plants on our postfire quadrats (see reference 4). We concluded from these results that chamise should have produced just as many taxa as *Ceanothus* and that Wells' evolutionary model cannot explain how chamise got only 3 taxa and *Ceanothus* 58.

ly among the 58 taxa (species and varieties) of this genus (*Ceanothus*) (Figures 15-17).

Can Evolutionists Explain why Chamise has only Three Taxa while *Ceanothus* has 58?

Why does the genus of chamise (*Adenostoma*) have only three subgroups (taxa) within it—only two actual species? Certain workers assumed that new chamise forests would arise after fire primarily from resprouted plants and not from seedlings because it was believed the seedlings would nearly always die in months or years ahead.^{1,2} Based on this, Wells³ reasoned that there would therefore be little or no chance for microevolution of chamise to occur because resprouting plants would have a vegetative restoration of the same old individuals after fire and the sexual basis for recombination, mutation, and speciation would be bypassed because the seedling did not survive.

The presence of many more taxa (58) in the genus *Ceanothus* Wells attributed to the fact that most *Ceanothus* species are unable to produce resprouts and therefore the old plants die. In such *Ceanothus* species



Figure 13. After a chaparral fire there is generally a glorious display of annual wildflowers as seen here with California poppies, blue dicks, and many other species. During the second growing season after a fire there are not nearly so many flowering herbs and the population will not recur in these proportions until the next fire.

all new plants must start from seeds formed by sexual processes. This obligate seedling link between-populations of *Ceanothus*, Wells reasoned, has caused considerable selection, mutation, and speciation which resulted in the production of many more taxa within that genus. But the basis for Wells' evolutionary argument is somewhat nebulous, as we shall see.

Linn Carothers and I⁴ found that at three different fire locations near Newhall, California, large numbers of chamise seedlings grew so well that in our quadrats they outnumbered resprouted individuals 86% to 14% after several years. On this basis we concluded that chamise seedlings certainly do survive and contribute substantially to the regeneration of populations after fire.

If such seedling survival is a key factor in enhancing evolution (as Wells asserted) then *Adenostoma* populations would also present widespread opportunity for speciation and they should have produced large numbers of taxa instead of only three. Wells' model thus falls short and we are left without an evolutionary explanation of why chamise has only three taxa and *Ceanothus* has 58.

Creationists Alternatives Regarding why *Adenostoma* has only three Taxa, and *Ceanothus* 58

In my 1976 paper⁵ I suggested some alternative ideas from the creation vantage as to how *Ceanothus* might have gotten 58 taxa and chamise only three:

1. The Creator may have established many distinct "kinds" of *Ceanothus* at the time of creation and only three types of *Adenostoma*.



Figure 14. This amazing growth of lupines (*Lupinus succulentis*) occurred after a 1970 fire west of Interstate-5 in Newhall, California. Lupine is one of those plants whose seeds must undergo high temperature treatment or scaring before germination will occur. This high-temperature-requirement looks like another design system pre-adapting certain plants like lupine to flourish after chaparral fires and then to lie as dormant seeds for decades until the next fire.

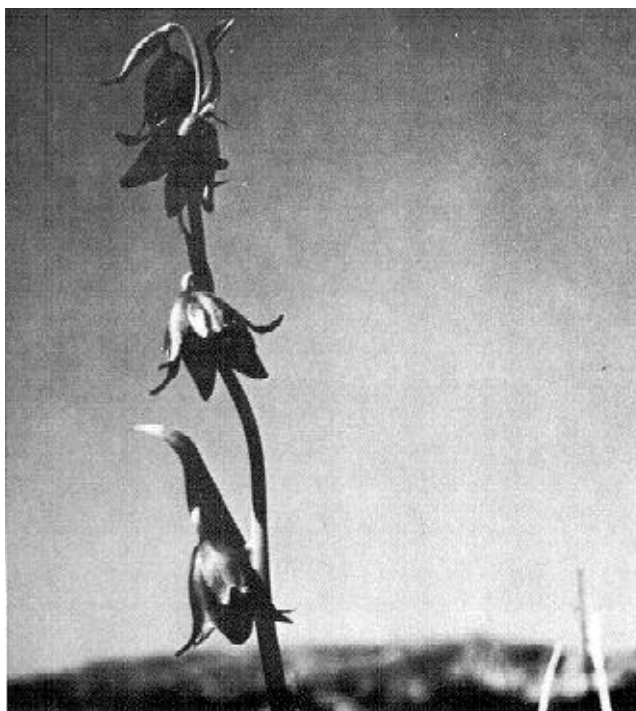


Figure 15. Chocolate lily (*Fritillaria biflora*) also known as mission bells can be found growing in the profuse stands of wildflowers subsequent to fire.



Figure 16. Leaves of most *Ceanothus* species are broader and larger than those of chamise. Here Lammerts holds one of the many *Ceanothus* plants in his very productive hybridization garden. Certain varieties of *Ceanothus* developed by Lammerts and others have become ideal landscape plants because of their spectacular flower display coupled with drought resistance. Various kinds of *Ceanothus* plants are suitable for hedges, ground cover, or individual plantings in yards and gardens. *Ceanothus* plants which cannot resprout are assumed by Keeley to have a distinct advantage after fires that come infrequently. The large number of seedlings will survive readily in the many open spaces found in the wake of such a burn. Creationists use Keeley's ideas as a tribute to design engineering evident in nature.

2. The Creator may have produced many more groups of *Ceanothus* rapidly after the flood without recourse to speciation—a general idea of Divine postflood activity that Lammerts has repeatedly suggested.

3. Many of the so-called “taxa” in the genus *Ceanothus* may be insignificant groups not worthy of the name “species” and allowed in current taxonomy. In addition to these three, readers may be able to devise other creation alternatives to Wells’ evolutionary hypothesis. Numbers 1 and 2 above rest on the concept of created design while number three relates to man’s imperfect attempts to establish a valid species concept among plants. While none of these creationist alternatives can be “proved,” only an overriding antisupernatural bias would prevent a worker from evaluating, testing, and teaching them as legitimate counterparts to evolutionary models which have themselves been shown inadequate up to this time.

What Makes Plants Able to Resprout After Fire, Anyway?

Any plant capable of resprouting after fire must be able to produce buds near soil level, buds that will resist death during the holocaust. To the best of my knowledge, no detailed study has been made of the physiological, developmental, and genetic basis for such resprouting. The mechanism for all of this probably

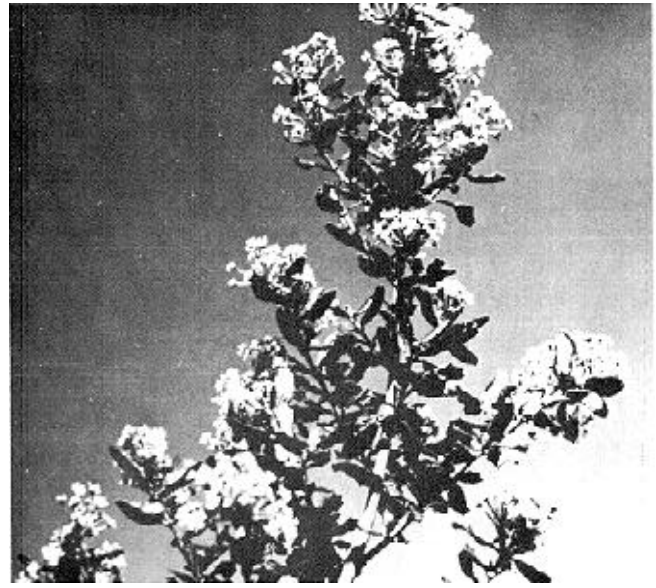


Figure 17. A stem of *Ceanothus crassifolius* known as the hoary-leaved *Ceanothus* or buckbrush is seen flowering here in silhouette against the sky. This species of *Ceanothus* is one of those which cannot resprout but must reproduce by seedling after fire. Far from being a disadvantage, this strategy seems to enable *Ceanothus* to flourish after fires that follow long fire-free periods.

hinges on the integrated action of several systems of genes located at various positions on chromosomes of the resprouting species. If so, all the genes necessary to produce the end result (resprouting) would be required at once in order that regrowth occur. But as with the origin of so many other complex systems, it is difficult to imagine how such an all-or-nothing collection of genes would arise by neodarwinian natural selection over long periods of time. If a particular plant had all the genes required for resprouting, there would be a definite advantage such that old plants would thrive after fire. But if any of the essential genes were lacking, presumably none of the other intermediate stages would be of any help to the plant in terms of physiology or selection. It would be hard to envision how such partial combinations of genes would ever have been preserved against the selection process and therefore it seems unlikely to this author that any plant would develop the ability to resprout by natural selection.

If it should turn out in future analysis, however, that this whole resprouting phenomenon is indeed a change in just one or two gene pairs (a very unlikely proposition) then creationists would see this as another example of what we call “variation within the kind” and it would have no bearing on ultimate origins or megaevolution. This whole area of finding out just why some plants resprout and others don’t would be a fine domain of study for some ambitious workers skilled in genetics, plant breeding, and physiology.

Would Evolution by Saltation, Jump Evolution, or Evolution Involving Punctuated Equilibria Help Explain How Plants got the Ability to Resprout?

Currently some evolutionists have suggested that ma-

for evolutionary changes must have occurred rapidly at certain special periods in geologic time. Such outbursts of evolution came, they believe, as punctuations in long periods of quiescence or equilibrium. The punctuated equilibrium model is tempting in that it could explain the gaps found throughout the entire fossil record. Likewise, it would seem to account for the rapid origin of intricate systems such as this mechanism for resprouting of shrubs that we have been discussing. By this view, one could assume that the entire genetic apparatus for resprouting after fire must have come quickly and as a complete package-deal, perhaps being functional from the very onset.

The saltation model falters, however, in precisely the same manner that Goldschmidt's "hopeful monster" or "macroevolution" concept failed. There has been no means discovered in field or laboratory by which these infrequent outbursts of rapid evolutionary development could have produced complex adaptations quickly. In his marvelous review, Ouweneel⁷ showed that saltation certainly could not rest on what geneticists have called "macro-mutations" or "homeotic mutations" as evidenced in the vinegar fly, *Drosophila*. Thus it seems that the saltation concept must be considered dead for lack of a genetic mechanism. In the creation model alone is there a reasonable understanding of how the necessary parts of a complex mechanism could arise at once so that the system would be operative and advantageous from the onset—direct creative action. Although the Creator's work cannot itself be studied scientifically, its results stand as clear testimony supporting its occurrence.

Design Significance for Resprouting and Non-Resprouting Adaptations

Keeley⁸ has also criticized Wells' evolutionary idea that *Adenostoma* somehow got few taxa because its crown sprouting pattern circumvented evolutionary mechanism. Keeley wrote that such ideas were "... not overly compelling" because the "... nonsprouters do not appear to have any such obvious advantage; sprouting species are very successful." Since both the sprouters (like *Adenostoma*) and the nonsprouters (like *Ceanothus* species) are "successful" after fire, Keeley decided to evaluate the possible advantages that each pattern of regrowth might have in its own right. He developed a "stochastic fire hypothesis" to explain how the obligate seeders and the sprouters might each manifest an adaptive advantage under different fire circumstances.

While Keeley did not bring up the topic of Divine control in origins, creationists would assert that this is exactly what might be predicted from the scientific creation model—that each pattern of regrowth after fire would have a specific design function of its own under certain circumstances. This is similar to the situation in animal anatomy where creationists have predicted that each of the so-called "vestigial organs" would have its own design functions in the body of the particular animal, and these predictions have been proving true as more research on organ physiology is undertaken. With shrubs then, creationists would predict that under par-

ticular fire conditions resprouting and non-resprouting species would each have an advantage. Let's see how such a prediction is borne out in Keeley's hypothesis.

Non-Sprouters Have the Advantage where Fires are Infrequent

On the basis of an extensive series of their own experiments and reports of others, Keeley and Zedler⁹ argued that obligate seeders such as *Ceanothus* species would possess a distinct advantage wherever there has been an especially long fire-free period before the burn. After such a long interval between fires, they reasoned, the resprouting individuals such as chamise would be few in number because old plants died in the stand before fire and because of a high percentage of total killing during the fire as a result of its great intensity (large amounts of accumulated fuel). Under these circumstances, Keeley and Zedler proposed that "... the longer the fire-free period, the larger the opening after fire." Since seedlings are well equipped to survive in large openings, the obligate seeder adaptation is proposed to be of advantage where fires are infrequent.

Resprouters Have the Advantage where Fires Come Often

On the other hand, they concluded that sprouting reproduction is advantageous where there has been a short length of time between fires. They reasoned that such a situation "... would be only slightly damaging to the sprouting species, and reproduction could be safely deferred or reduced for the first years after fire and all energy dedicated to growth." In fact, little or no seed may be produced by the very young seedling or resprouted shrubs for several years following fire. If another fire were to come very quickly, one would expect fewer seedlings surviving as a result of low seed numbers. Our own data fit the stochastic fire hypothesis at this point quite well because Carothers and I found that where two fires came within four years of each other on a gentle slope near Castaic Lake, California, many seedlings grew and survived after the first fire but we could find no seedlings (only resprouted plants) surviving after the second fire.¹⁰

The creationist sees this as evidence that the resprouter species were designed to fare well when fires are frequent and the non-sprouters (which ultimately funnel much of their energy into seed production) were geared to have the distinct advantage after long fire-free periods. In either case the end result is that the vegetation is efficiently restored—a tribute to a plan in nature.

But in the evolution models, how could these two different patterns of regrowth be expected to "evolve" at the same time in the same geographic region, and in response to the same factor—fire? It would seem too much to ask that natural selection produce just one pattern for survival after fires—resprouting, for example. To ask that it produce two different but very successful survival modes which respond to subtle differences in the length of the fire-free intervals seems even more unlikely. It will be more satisfying philosophically and scientifically for many workers to assert that these adaptations are evidence for design action by the

Creator. Accordingly, He formed some obligate seeders (like certain species of *Ceanothus*) for vigorous survival after intense fires where resprouters may have largely died. Conversely He formed some resprouters to restore vegetation efficiently after fires that come with greater frequency. In this case fewer seeds have been produced (because of lack of time) and the fire has been of lower temperatures so the resprouters flourish. It reminds one of a failsafe engineering system whereby regrowth will occur no matter what fire conditions prevail.

What at first seemed to be a dull study of two groups of little southern California shrubs has turned out to be crucial ground for testing creation research against evolutionary ideologies. It appears at this writing that the scientific creation model is superior.

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DOES CHROMOSOMAL REORGANIZATION REALLY LEAD TO THE ORIGIN OF NEW SPECIES?

WALTER E. LAMMERTS*

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Some people have appealed to chromosomal reorganization as a way of getting large changes in a hurry, as is needed according to the notion of punctuated equilibrium. It is shown here that there is no evidence that such changes will really lead to anything which is new, viable, and improved. Punctuated equilibrium is still a hypothetical process, for which no mechanism can be found.

Stephen J. Gould in his article entitled: "Is a New and General Theory of Evolution Emerging?"¹ states that "the most exciting entry among punctuational models for speciation in ecological time is the emphasis, now coming from several quarters, on chromosomal alterations as isolating mechanisms." Then he quotes the work of Carson with great approval. So let us see what Carson proposes in his paper entitled: "The Genetics of Speciation at the Diploid Level."² He states that "Indeed, the origin of the genetic basis of species differentiation appears as an important unsolved problem of evolutionary biology." (introductory paragraph.) After pointing out that often it is difficult to decide where the species line can be drawn between two gene pool communities, he then proposes new criteria for the determination of species boundaries and how they might have originated. Contrary to the usual basic assumption of neo-Darwinism that the effects of mutation and

recombination by meiosis and syngamy can reach into every corner of the genome (or gene pool of the species) and shake it up, Carson maintains that part or even most of it is essentially closed to that process in natural populations. In fact he claims that in every species there are two systems of genetic variability, the "open" and the "closed" system.

In the open system mutants are either codominants or simple recessives. Both homozygotes tend to be fully viable. He is of the opinion that these genes tend to have a superficial or possibly even a trivial effect, at least in their individual action. These he believes respond readily to either artificial or natural selection. Quantitative traits would come under this category. However, as I have pointed out in various articles, there has been as yet very little proof that any mutations are of value to the organism as regards survival and actually most are actually defective under the usual environment of the species. This has been fully discussed in my article: "Mutations Reflect the Glory of God's Handiwork."³ As to their responding to natural selection we have yet to see any demonstration. Thus even the classical case

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always referred to in college text books, that is, the melanic vs. the gray moth (*Biston betularia*) did not result in a uniform true breeding race of melanic moths. Even when the chimneys of England manufacturing districts made the bark of the trees the blackest that they have ever been, about 1% of the moths remained gray! Investigators found that this was because the normal gray type had a higher reproductive rate. And when environmentalists forced the manufacturers to eliminate most of the smoke, and the trunks of the trees became lighter again, the percentage of gray moths increased. To really prove the case for natural selection it should have been possible to observe the establishment of a completely uniform population of black moths free of any gray ones, and also incapable of interbreeding with them! Then indeed we would have had a clear cut demonstration of the origin of an incipient species by natural selection.

However, Carson's point is well taken that in order to have distinct species we must have closed variability systems of internally balanced blocks of genes or supergenes locked into strong epistasis. By this he means a non reciprocal interaction between nonalternative forms of genes in which one gene suppresses the expression of another affecting the same part of an organism. He believes that though inversion is not necessary for the establishment of these blocks, a genetic climate is created for them and also for chiasma localization. Now most inversions are of lower viability since they involve breakage of the chromosome. So it is unlikely that they would be established. In fact Carson does not believe that even linkage is needed if the epistasis is strong.

Mainly this type of system differs from the open system as regards its failure to yield easily to Mendelian analysis. Recombinational events occurring within the blocks result in individuals with reduced vitality or fertility, and often the recombinations are even lethal. Since the individual elements cannot be separated such regions cannot be mapped. Now most certainly in my breeding work I have come across such behavior; in fact it is the rule in rose breeding.

Now according to Carson certain genes or gene systems may be homozygous in closed systems but most are balanced heterozygotes which confer extra vigor. The stringency of natural selection in his opinion prevents the release of the genetic elements which are in this closed system as individual genotypes. These genes then are locked into a sort of obligatory epistasis. Now in my opinion though this sort of system undoubtedly exists and is typical of the differences between most species, it most certainly did not come about by natural selection but rather was built into the genetic system of the species at its creation.

Carson goes on to say that speciation is usually viewed as a gradual microevolutionary process. The genetic events which lead to speciation are thought to be individually simple, and so are merely the accumulation of advantageous mutations. Contrary to this Carson proposes that speciation is accomplished by a series of catastrophic events. It is initiated by an unusual forced reorganization of the epistatic supergenes of the closed

variability system. This is accomplished by a population condition in which natural selection is temporarily relaxed. It is then one in which the population greatly increases in size. This sort of thing might well occur following a season of unusually heavy rainfall, mild winter and early spring weather such as was experienced in the spring of 1969, when there was such a great profusion of wild flowers in California. Carson calls this the "flush" phase and the major genetic effect is that of a very great expression of genetic variation. No increased quantity or changed quality of recombination need occur. Due to the great number of individuals and ideal conditions recombination types are now able to survive, which under the usual adverse conditions would be eliminated by natural selection. These population flushes are inevitably followed by a crash in population size. Just as the flush phase is non selective so also in the crash phase survival is a random one which is not influenced by any natural selection. The permissive or ideal conditions (such as the high rainfall and warm weather in the spring of 1969) are suddenly removed entirely, forcing the scattering or death of millions of organisms without regard to their detailed genetic constitutions. Following this event only a single plant or animal called a "founder" may leave descendants. Such an individual may well have a most unusual recombination of genes from the usually closed variability system. In the absence of competition and in the newly improved environment this founder may very well survive, reproduce, and be the start of a radically different and quite new closed variability system. This might well be accomplished in a few generations. When there are sufficient numbers of individuals for natural selection to again become operative, it will have quite a different set of genetic materials to work on. Accordingly it is unlikely that the new closed variability system will precisely reconstitute the earlier one.

Carson then goes on to say that this new system may show a basic incompatibility when tested against the diploid genotype from which it came. Just how such a species level incompatibility would arise in the founder population is not made clear by Carson.

In our plant succession studies reported in 1974¹ Howe and I found the sort of survival postulated by Carson. A most unusual woolly, cylindrical leaf type appeared among the population of *Salvia carduaceae* in the ideal spring of 1969. The usual leaves of this species are pinnate with 6-8 pairs of well indented pinnae each having long spines. The cylindrical leaf type was rounded and very woolly, without any spines. It did not show up at all in the dry springs of 1970, 1971, and 1972. But in the very wet season of 1973 the only surviving plants in the plot were the cylindrical leaf type! So then the sort of survival postulated by Carson can occur. Unfortunately we did not test this cylindrical leaf type against the typical form in order to see if there was any incompatibility. Also it was not possible to continue the studies after 1974 in order to see if it continued to be the only surviving type.

Though Carson does not make clear just how incompatibility between the new and the old genetic system arises, I am of the opinion that many of our so called

species arise in just the way that Carson postulates. As to whether inversions and translocations ever can be established in such incipient species and so lead to complete intersterility remains to be demonstrated. C.R. Burnham⁵ reports that an interchange or translocation between chromosome 8 and 9 in maize when selfed gave rise to plants homozygous for the interchange and also normal plants without it. He does not report as to whether these homozygous translocation plants grew as vigorously as the normal type, but does state that they show ten bivalents at meiosis and have no more ovule or pollen abortion than do normal plants. Burnham has spent most of his life studying translocations in corn and has published a monograph on his finding.⁶ Though many translocations are lethal when homozygous, certainly some are not. There is still the problem of how such translocations could become established under natural conditions. Thus the plant in which the translocation originated would be semi-sterile of course, and so at a disadvantage as regards reproduction compared to all the normal type plants around it. The relatively few homozygous translocation plants among its offspring would at maturity be pollinated mostly with pollen from normal type plants in a cross pollinated plant such as corn. Accordingly most of the third generation plants would be semi-sterile and relatively speaking there would be even fewer translocation homozygotes. It is therefore necessary to postulate an isolation factor such that the homozygous new chromosome type would somehow only be pollinated by sister plants of the same chromosome constitution. Presumably this might occur by this translocation being tightly linked to a factor for later flowering than the normal type. There is then the possibility of a build up of translocations so that when the new founder type comes into contact with the original one, all of the hybrids would be quite sterile.

Obviously the same line of reasoning applies to inversions and the possibility of their establishments. It should be pointed out that in animals homozygous translocations usually have a significant lowering of viability and fertility. Thus in *Drosophila* fruit flies Dobzhansky reports that out of 332 tested only 14 had 100% viability, the others varying from 33% to 71% viability, and out of 120 of these tested for fertility only 32 were fully fertile.⁷ It is therefore not as easy evidently to establish new chromosome translocation types in the fruit fly.

This whole field of study is one which might well be undertaken when we have our research laboratory established and funds available for research workers. Mainly we need to know more about the problems involved in establishing translocation homozygotes under natural field conditions. Though papers dealing with this sort of study may have been published, I am not able to find them, and it seems that our evolution minded geneticists have mainly been interested in showing that they occur, calculating linkage with marker genes, as well as crossing over percentages, and of course studying their behavior at the reduction division, particularly at the mid-prophase stage. These studies are very necessary of course, but do not answer the question

as to whether or not they could become established under the usual field conditions.

My present feeling is that these chromosome reorganizations and in fact the very flush-crash-founder cycle postulated by Carson involved supernatural knowledge as to just how to effect the various gene system modifications following the catastrophe of the Flood and the later related and more localized ones. But should it be possible to show that this could all come about "naturally", it would of course make it much easier for creationists to convince their skeptical evolution minded colleagues that the remarkable species variation and adaptation we now see could actually have come from the relatively few plant and animal "kinds" which survived the Flood. Especially difficult is the problem we face in trying to explain how all of this could have happened in the relatively short time since this event. At least Carson removes the concept of such minute micro-evolution-progress due to mutation that the very idea of any speciation in less than hundreds of thousands of years is unthinkable.

Now what about polyploidy as an important factor in evolution? Stebbins and Ayala⁸ make the statement that "polyploidy is the limiting case of rapid speciation—requiring only one or two generations—through chromosomal change. "However, Stebbins is far from as enthusiastic about the value of them when he discusses artificially induced allopolyploids in his chapter on polyploidy, its occurrence and nature in his book entitled "Variation and Evolution in Plants."⁹ Thus he lists more than 25 allopolyploids which have been produced artificially and states that many of them such as *Crepis rubra-foetida* (Poolc 1931), *Layia pentachaeta-platyglossa* (Clausen, Keck and Hiesey, 1945a, and *Allium cepa-fistulosum* (Jones and Clarke 1941) have been so sterile in both the original and later generations that they would have been complete failures under natural conditions. Others such as *Primula kewensis* (Skirm 1942) and *Nicotiana glauca-langsdorfii* (Kostoff 1938b) have either been fertile from the start or have yielded highly fertile and in some instances constant types after a number of generations of selection. Now as regards *Primula kewensis* careful cytological studies have shown that pairing of the chromosomes is not entirely regular, and so it shows considerable variability and would hardly survive under natural conditions.

Karpechenko's *Raphanobrassica* hybrid at first claimed to be a perfect example of a successful amphidiploid has been shown by Richaria and Howard to be considerably less than that. The F₂ plants were only partially fertile and even in the F₄ fertility varied from only 5 to 42%! This and also Arne Muntzing's *Galeopsis artificialis Tetrahit* are quite fully discussed in my article on "Discoveries Since 1859 Which Invalidate the Evolution Theory."¹⁰

There I indicated that his artificial Tetrahit most probably originated by pollination of his triploid plant with a diploid pollen grain of the species *G. Tetrahit* which was growing nearby and so actually was the species rather than any synthetic hybrid. The main evidence for this conclusion is that the F₁ hybrid between *Galeopsis pubescens* (N=8) and *G. speciosa*

($N=8$) shows five to eight pairs of chromosomes at the reduction division. Accordingly one would expect some quadrivalents if his triploid plant had actually been pollinated by *G. pubescens*. (His F_2 triploid had 16 *G. speciosa* and 8 *G. pubescens* chromosomes.)

The problems involved in the presumed origin of our modern wheat varieties, that is the hexaploid *Triticum aestivum* have been discussed in detail in the article on the origin and distribution of cultivated plants by Howe and Lammerts in the June 1980 issue of the *Creation Research Society Quarterly*.¹¹ The conclusion was drawn that the various complex crosses involved in deriving our modern wheat from the basic diploid species could only have been accomplished by ancient and very skilled plant breeders! One of the lines of evidence is simply that wheat is obligately and tenaciously self-fertile. Accordingly it is very hard to imagine a situation in which for example the cross of the tetraploid wheat, previously derived from the two postulated diploid species, would cross with the grass *Aegilops squarrosa*, the species contributing the D genome. This cross is difficult enough to make even when the flowers of tetraploid wheat are first emasculated and then pollinated with *Ae. squarrosa*. So just how the normally self fertilized wheat would ever set seeds from such stray pollen of a different genus is not as easy to imagine as Stebbins would lead us to believe.

In conclusion it seems that polyploidy is far from the proven limiting case of rapid speciation in only a few generations. As pointed out in my article on discoveries since 1859 referred to above it is obvious that for any amphidiploid to qualify as an incipient species the

original F_1 hybrids should show no pairing, yet give a reasonable percentage of diploid gametes. The experiments with them should be conducted in such a way that only self-fertilization can occur, and the fertility and vigor of the F_2 should be at least comparable to that of the diploid species. Few if any of the reported amphidiploids qualify as regards all of these requirements.

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THE GENETIC INTEGRITY OF THE "KINDS" (BARAMINS): A WORKING HYPOTHESIS†

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Modern evolutionary theory is based on the assumption that all of heredity has its basis in the DNA genes. Evidence is presented here to show that that assumption is false. There are, in fact, two major interacting systems of heredity. The implications of these facts for Creationist research are discussed.

A. Introduction

Every schoolboy learns of Mendel's famous experiments, which showed that all heredity has its basis in the genes and that these genes are "particles".¹ The mutation of these genes is now regarded as the basic evolutionary process.

The appeal of these conclusions is obvious: if species are essentially genes, then by genic change species can be changed and the continuity of evolution can be explained. Evolutionary genetics would have impeccable scientific credentials.

However, what most never learn is that *neither Mendel nor any later scientist has shown any such thing.*

B. Mendel's Theory of Genetics

After the epochal work of Galileo and Newton, nature was generally regarded as a great *mechanism* whose workings could be described mathematically. If we knew the positions and motions of all the atoms at a given instant, then, in principle, all would be understood; and both past and future would lie open to our view. Mendel undoubtedly imbibed these optimistic ideas during his study of physics and mathematics at the University of Vienna (1851-1854); for he set his own experimental results in an atomistic context.

Mendel showed that observed *differentials* (e.g., round or wrinkled) among the features (e.g., shape of

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seed) of the members of a species (e.g., pea) could be correlated with the corresponding differentials among the parents which produced the gametes. That is all that Mendel's evidence demanded. Later research has demonstrated that the differentials are among the parental chromosomes, or, more precisely still, among the parental DNA's. But the two familiar conclusions are *not* demanded by either fact or logic:

(1) There is nothing in the results of genetical research that demands that the differentials be understood in atomistic terms (i.e., particles).

(2) Genetic methodology can only test differences, e.g. *blue* versus *brown* eyes; not "eyedness" as such. It has *never* been demonstrated that the *organizational pattern* of the organism's structure and processes is determined by the "genes".

These two points will be considered in turn. (Sections C and D).

C. Hereditary "Atoms"?

Mendel's atomistic bias has led, ultimately, to hopeless confusion in modern evolutionary biology.

In the early days of genetics ("Classical Mendelism") the conception of the gene was clear and precise:

(1) A gene is a discrete, independent, homogeneous particle on a chromosome;

(2) Each chromosome has a specific linear arrangement of genes (like beads on a string);

(3) The gene is the basic unit of function, mutation, and recombination;

(4) The gene stands in a 1:1 correspondence with an adult character.

On this basis the elementary evolutionary process could be regarded as a systematic change of gene frequencies in a species population. A scientific theory of evolution—one that is consistent with tested biological principles and observed facts—was clearly on the horizon.

However, genetics research soon demolished this view:

(1) A gene defined by one criterion (e.g., function) is *not* usually co-extensive with the "same" gene defined by other criteria. Thus, geneticists now distinguish genetic units of biochemical function (*cistrons*), recombination (*recons*), and mutation (*mutons*). Some cistrons may be repeated many times in the genome. E.g., the genes for each kind of histone protein in the chromosomes are repeated 250-500 times. Further confusion comes from the discovery of *introns* (genes with a non-coding function that occur within cistrons), *pseudogenes* (non-coding genes found between cistrons), and *transposons* (mobile genes that can be moved from place to place within the genome).

(2) Each gene usually has multiple effects; and a gene may govern the development of two or more characters which are not homologous.

(3) Each character is usually influenced by many genes (cistrons). Regulatory genes (acting as "switch-on" and "switch-off" signals)—some of which may be located far away from the cistrons they control—also influence characters.

(4) In different varieties or species, genes shown to be "identical" or "homologous" by breeding experiments may control different characters. Conversely, "non-homologous" genes may control the development of the "same" character.

(5) The phenotypic effects of a gene may vary widely in relation to the environment and in relation to the different gene complexes in which the gene may occur.

For examples and references concerning these points see any recent textbook of genetics, e.g., Reference 2.

In view of the points mentioned, it is now held (in neo-Mendelism) that there need not be a long-term persistence of any relationship between a gene and a character. The observable characters (phenotype) are the expressions of the unspecifiable, changing, and unpredictable interactions within the total complex of mutable genes which further interact with the environment and even with the changing internal environment during the organism's development. To say *now* that evolution is "change in gene frequencies",³ or "any change from one generation to the next in the proportion of different genes"⁴ is to say something that is quite meaningless: something that has no definable point of contact with the real adaptedness of real organisms in a real world.⁵

But this is not the end of the story. If these developments have placed evolution in a clinging mist, then the modern biomolecular understanding of genes has lost it in a dense fog:

... when the "old-fashioned gene" turns into a replicating sequence of bases in DNA which is active in controlling a DNA-RNA-protein sequence, theoretical biologists have little reason for any confidence that there are in existence sound theories of evolution and development waiting to be enriched, rather than thrown into chaos, by the new insight.⁶

The mathematical Marcel Schutzenberger explains the problem in this way:

Genes are seen as molecules (DNA) governed by chemical processes. These molecules have only "typographic" topology; i.e., we have a genetic "text" written in an alphabet with four "letters" (DNA bases) which is translated into a protein "text" written in an alphabet with about 20 "letters" (amino acids). These structures correspond (by development) with structures with a totally different topology—that of actual living organisms in the real world. Neo-Darwinian evolutionists are contending that selection acting on the population of real organisms brings about evolution when random changes have occurred in the population of genes. This contention is—to put it mildly—highly implausible.

... if we try to simulate such a situation by making changes randomly at the typographic level ... on computer programs we find that we have no chance (i.e., less than 1 in 10^{1000}) even to see what the modification would compute: it just jams.⁷

In order to work, the selection process must be planned and directed. Such considerations are, of course, taboo to neo-Darwinian evolutionists. The only

response open to them would seem to be the claim that the required direction or canalisation is a natural function of the developmental systems. But almost nothing is known of these systems:

Our ignorance of how genotypes produce phenotypes is, I believe, the greatest gap in our understanding of the evolutionary process—and it is a huge gap indeed.⁸

We thus have the situation that, lacking adequate theories of heredity and development, *the evolutionist has no scientific theory of evolution either*. His case is based on what he *hopes* will be discovered in the *future*:

... an adequate scientific theory of evolution must await the discovery and elucidation of new natural laws—physical, physicochemical, and biological.⁹

We can now turn to the second point.

D. Genes and Heredity

Heredity exists because the hereditary factors are copied from one generation to the next. Copying (replication) occurs on a template. So much time and energy has been devoted to understanding the DNA templates that it has been forgotten that there are other types of template in biological systems. The templates that concern us here are the cell membranes; because there is now extensive evidence that the organizational pattern of cells and organisms is encoded in these and *not* in the DNA templates. This phenomenon is often called *cortical inheritance*, since the main structure implicated in the research is the cell membrane (plasmalemma) itself (Latin *cortex* “bark”). In Protozoa the cortical pattern develops solely from a *pre-existing* cortical pattern of the same kind.¹⁰⁻¹⁷ Similar evidence exists for cephalopods¹⁸, amphibia¹⁹, desmid algae²⁰, and flowering plants²¹.

Evidence for a cell surface control mechanism is also found in the phenomenon of nuclear differentiation within a single cytoplasmic compartment, e.g. developing eggs, grasshopper neuroblast cells, pollen grains, cells of the developing stomatal complex, ciliates and foraminiferans.²²

Cell organelles such as mitochondria, and chloroplasts have been found to contain their own DNA. But as with the cells, it seems clear that DNA is not responsible for the production of the organizational pattern of these organelles. These organelles arise only from pre-existing organelles, or organelle primordia (pre-organelles).²³

E. A Creationist Model

The following is a Creationist response to this situation. We may propose as a *working hypothesis* that:

(1) The basic organizational patterns of biological structures are encoded in membrane templates (which we may call *cortomes*). This applies at two levels: the level of the cell organelles and the level of the cells.

Since at one or more points in the life-cycle, every organism is found as a single cell (e.g., the fertilized egg) the cell must be regarded as the organism's basic unit of structure, function, reproduction, and heredity. (Cell

Theory.) Hence we may suppose that the basic body plan of each created kind (baramin) is encoded in the *cortome* (Cortome Theory). We may further suppose that the cortome pattern does not change (vary); and that this is the scientific explanation of the integrity and permanence of the baramin (but see below). Damage to the cell may impair its normal functioning, and some elements of the pattern *may* become lost, reversed, or duplicated. But the essential nature of the pattern must remain unchanged. The types of change possible are illustrated by, on the one hand, the surgical alterations to the “frozen” cortical organization of Protozoa, and, on the other hand, the homeotic mutants of *Drosophila*.²⁴

(2) Differing developmental expressions of the cortome patterns are produced by different *genomes*, i.e., through the recombination and permutation of the genome factors.

These factors comprise not only the nuclear (chromosomal) DNA's, but also the non-homologous DNA's found in cell organelles such as mitochondria and chloroplasts. The genic factors do not produce the patterns of biological organization (though genic mutations may lead to an impaired expression of them), but govern the production of the physiochemical substructures of the organism (with, of course, their essentially “typographic” topology). The genic factors are not hereditary “atoms” but differentials among DNA molecules which correspond (through the production of the physiochemical substructures) with differentials among body conditions. These conditions permit or repress the various biological processes which are involved both in “reading” the cortome information and in producing the biological (organellar and cellular/supracellular) structures that are thereby specified.

F. Creationist Predictions

Two predictions can be made on this basis:

Firstly, the genomes of different metazoa may not be any more complex than one another. Indeed, they may not be more complex than those of some protozoa. The crucial differences lie with the cortomes; and the cortomes of different phyla may not require different complexities of genome to interact with them. Unfortunately, this prediction cannot yet be evaluated, because we do not know enough about genomes and their functions to know how to compare them. Certainly the amount of DNA per haploid component presents a very confusing pattern showing no real correlation with supposed evolutionary position.²⁵

Secondly, it is being assumed that although genomes vary within a baramin, cortomes do not. Thus it should be possible to find or produce experimentally in any species of a baramin any expression of the cortome pattern which is possible to that baramin. If (see below) each species has sequestered a particular range of genomes from the total range possible to the baramin, then recombination will provide genomes that in interaction with different environments (including special experimental conditions) will provide some phenotypes with expressions of the cortome that are **typical** of other species of the baramin. There is plenty of evidence which is suggestive of this.

As regards animals, the uniformity of the ethological "norm of reaction" in a kind is impressive. Among cichlid fishes, for example, any species seems able to recognize, and respond to, the behavior of any other species. This is true even if the species come from different continents, and the behavior is something which one of them does not ordinarily display. A most impressive case is the way in which the fry of egg-laying parents can adjust to mouth-brooding parents and vice versa.²⁶

Within a single species, it is not unusual to find individuals with the diagnostic characteristics of related species or even genera (within the baramin).

The teeth characteristics are important in mammalian classification; yet in a single sample of the deer mouse, *Peromyscus maniculatus*, Hooper found variant tooth patterns typical of seventeen other species of *Peromyscus*.²⁷ Hibbard found a fossil of the extinct rabbit *Nekrolagus* with the premolar pattern typical of the extant rabbits.²⁸ Similarly, the *Nekrolagus* pattern is occasionally found in living species.

Such considerations suggest that this should be a very fruitful area of research for Creationists. I believe that too many biologists have failed to understand the processes of variation and speciation because they have failed to understand the developmental processes. And they have failed to understand development because they have been deceived by dogmas of evolutionary genetics into asking the wrong questions. Creationists, who are in a position to do better, should see what can be done.

G. Further Facets of this Creationist Model

This preliminary analysis would be incomplete without reference to three other facets of a complete model: the *patterns* of variation, the *speed* of variation, and the *results* of variation.

(1) The Patterns of Variation

If we assume, as seems reasonable, that mutation has played a relatively minor role in the variation of natural species, then the different taxa of a baramin (genera, species, races) will differ in their sample of genic differences from a common pool. The resulting pattern of variation will be correlated with the pattern of environments to which the species are adapted. These environments usually present organisms with a mosaic or kaleidoscopic pattern of different ecological demands. Consequently we should expect a corresponding mosaic pattern of adaptive features. Such a mosaic pattern should prevail both within baramins and within taxa placed at higher taxonomic levels. This mosaic pattern of variation is exactly the pattern that detailed research has invariably uncovered.^{26, 29}

Further confirmation is provided by the plethora of conflicting phylogenies produced by specialists for almost every major taxon. The reason is that the specialists disagree as to which features are the most important. Our prediction is that the greater the number of features taken into account, the less and less easy it becomes to construct any phylogeny.²⁶

(2) The Speed of Variation

If all variants (species, etc.) which have arisen within a baramin simply sequester a particular narrower range of possible genomes out of a pre-existing broader range, then speciation may be exceedingly rapid. To appreciate this, one need not understand exactly how speciation occurs. The fact is that no one knows, as Lewontin admits:

*... in large part we know virtually nothing about the genetic changes that occur in species formation.*³⁰ (Emphasis in the original)

Future research may uncover phenomena that are not even thought of now. However, the "how" of speciation does not have the critical importance to us that it has to an evolutionist.

Genetic and electrophoretic studies have abundantly demonstrated that almost all animal and plant species have high levels of variation. In the Creationist model being proposed here it is supposed that this pre-existing variation is original (from Creation) and that it is adequate to account for the diversification within baramins which has occurred since Creation.

Evolutionists have usually regarded speciation as an extremely slow process. For instance:

*There appears to be a fastest rate of evolution of species under natural conditions, namely about 500,000 years per species-step.*³¹

J.B.S. Haldane believed that species of vertebrate might differ at a minimum of one thousand loci; and he calculated that, by his theory of the cost of selection, the complete replacements of alleles at this many loci would require at least 300,000 generations. Thus he also argued that it might take about 500,000 years for a new species to evolve.³² Nei, calculating from electrophoretic data, estimated that about 500,000 years had elapsed since the formation of sibling species of *Drosophila*; and about three times as long since the formation of non-sibling species.³³

However, in contradiction to these estimates, examples of extremely rapid speciation and change are being reported all the time.

About one third of the world's species of drosophilid flies occur in the Hawaiian islands. Yet the Hawaiian islands are geologically young; the island of Hawaii itself is said to be less than a million years old (sic). And the speciation is younger:

Many of the Hawaiian species of *Drosophila* have arisen in just a few thousand years.^{34, 35}

The same conclusion must be drawn for the diverse honeycreepers (*Aves: Drepanidae*) of these islands.³⁶

Again, at least five endemic species of the moth genus *Hedylepta* in the Hawaiian islands feed exclusively on banana; and they are distinguishable in many morphological features from their nearest relative, which feeds primarily on palms. Banana was introduced into Hawaii by the Polynesians only about one thousand years ago, so the banana-feeder must have developed from the palm-eating ancestor since then.³⁷

An original population of the fruit fly genus *Rhagoletis* (which infests hawthorns), gave rise to an apple-infesting race in the 1860's, and to a cherry-infesting race which was discovered in the 1960's.³⁸

Similar host races are known in the codling moth and in other insects. If these races are also reproductively isolated, then speciation has indeed been rapid. Rapid changes in butterflies have also been documented.^{39,40}

Industrial melanism, so often mentioned by evolutionists, is relevant here. It is not unimportant to note that in some populations of *Biston betularia* the melanism allele went from about zero to 98% in fifty years (1848 to 1898).

Finally, it has been reported that a strain of *Drosophila paulistorum* which was fully interfertile with other strains when first collected, developed hybrid sterility after having been isolated in a separate culture for just a few years.⁴¹

As regards fish, Lake Lanao in the Philippines is reported to contain fourteen endemic species of cyprinid fishes, with modifications of the teeth and jaw utterly unlike any other members of this huge family.⁴² Yet these have arisen since the lake was formed about 10,000 years ago. Rapid speciation of fish has also been reported in crater lakes of the northwestern Cameroons.⁴³ Five endemic species of cichlid are found in Lake Nabugabo, a small lake which has been isolated from Lake Victoria for less than 4,000 years.^{44,45}

In birds we have the classic example of the European house sparrow (*Passer domesticus*) which was introduced into North America about 1852. Since then the sparrows have spread and become geographically differentiated into races that are adapted in weight, in length of wing and of bill, and in coloration, to different North American environments.⁴⁶⁻⁴⁸ The divergence between racial populations has been compared in magnitude to that between many races of native bird species. Yet it has been accomplished in only about 118 generations (to 1980). By 1933 the sparrow had reached Mexico City where it has since formed a distinct subspecies. R.E. Moreau had concluded in 1930 that the minimum time required for a bird to achieve that step was 5,000 years; the sparrow required just 30 years. As has been aptly commented:⁴⁹

We can here judge the value of speculation compared with observation in analyzing evolution.

The European gray rabbit has been introduced into many other parts of the world. Early in the fifteenth century some were released on the small island of Porto Santo, near Madeira. They are now only half as large as the European stock, different in colour pattern, are more nocturnal, and cannot interbreed with their European cousins. A new species has arisen in only 400 years.⁵⁰

Rabbits were introduced into Australia about 1859; yet the wealth of variation now present there is very extensive, vastly exceeding that apparent in the European stock.⁵¹ Comparably rapid changes have been reported in Danish mammals.⁵²

There is similar evidence concerning plants.⁵³

Clearly there seems to be no reason to suppose that the traditional Biblical chronology poses insuperable problems to the Creationist biologist. The conditions following the Flood would have been of the same nature as many of those reported above, and likewise conducive to rapid variation.

(3) The Results of Variation

Creationists have often argued that the process of speciation will lead to progressive restriction of the original genetic potential in each line of descent. This seems obvious; but little research has yet been done to confirm it. There have been a few suggestive reports.^{54,55}

H. Conclusion

The theory of evolution cannot now be presented as a scientific theory. The evolutionist lacks the crucial theories of heredity and development which are essential to the modern Darwinian formulations.

The scientific case for Creation is—and actually always has been—consistent with all *known* principles and *observed* facts. Creationists have every reason to await future discoveries with confidence.

The scientific case for evolution is based on what it is *hoped* will be known *in the future*. Evolution is seen as a faith without foundation.

Appendix: The Irrelevance of Genes

Lewontin, in an important paper, has pointed out that it is only the chromosomes (*not* genes) that obey Mendel's laws; and that it is entire chromosomes (*not* genes) that are the units of evolution.⁵⁶ He found that as soon as we consider not single genes but many (more than 18) loci segregating simultaneously, the number of genes (and even whether there are separate genes) actually becomes irrelevant. Only chromosome characteristics matter. These observations strengthen the arguments presented in this paper.

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PLACEMENT SERVICE

Do you know of academic vacancies to which Creationists might be directed? The Creation Research Society would like to be in a position to be able to inform Creationist scientists of such vacancies. If you know of such positions, will you please inform Dr. John W. Klotz, 5 Seminary Terrace North, St. Louis, Missouri 63105, describing the position, and the academic requirements and training required, and giving any other information which might be available?

Graduate students who are interested in placement may write to Dr. Klotz for information about any available positions which are known to the C.R.S.

ELECTION RESULTS

In the annual election, held earlier this year, 140 ballots were cast. The following persons were elected to the Board of Directors for a term of three years, 1982-1985.

John W. Klotz
Richard G. Korthals
Henry M. Morris
Wilbert H. Rusch
Harold S. Slusher
E. Norbert Smith

Only ballots postmarked not later than 1 March, 1982, were counted, as had been announced.

THE BRAZILIAN ASSOCIATION FOR CREATION RESEARCH

Recently we have received some news about the *Associacao Brasileira de Pesquisa da Criacao*, the Brazilian Association for Creation Research.

The Association was formed in July, 1979. Since 1980 it has been circulating, on a monthly basis, Creationist articles to about four hundred members all over Brazil.

We have known for some time that Creationist work was going on in Brazil. No doubt the Association will be able to be effective in coordinating the work and in making it apparent to many that Creation is the best explanation of the world and the things in it.

The address is: Associacao Brasileira de Pesquisa da Criacao, Caixa Postal 37, 36570—Vicosa, Minas Gerais, Brazil.

QUOTABLE QUOTE

"History is full of instances in which people refuse (sometimes unconsciously but not always) to make an observation which disagrees with a preconceived notion

... Equivalent errors can be made in interpreting data ... usually by over-interpreting or ignoring part of the data. The story of the discovery of Pluto illustrates an example of this problem.

After the discovery of Uranus ... astronomers observed the orbit ... A discrepancy was found which J.C. Adams in England and U.J. Leverrier in France independently interpreted as a consequence of an eighth, as yet undiscovered, planet. ... Neptune was found ... most of the discrepancy in the orbit of Uranus was removed. Still agreement was not perfect ... a ninth planet was predicted to exist by Percival Lowell in 1906. In 1930, ... Pluto was discovered ... near the predicted position. Further observations showed, however, that Pluto was too small to have a significant effect on the orbit of Uranus and finding it near the predicted position was sheer luck. The discrepancies on which Lowell had based his calculations were due to inaccuracies in the observations. His prediction of the existence of another planet was based more on his desire for another planet to exist than on the gathered data."

Dearborn, David S., 1978. Tales of the travels of Newton Schwartz. *The Astronomy Quarterly* 2(8):229-236. (The quotation is from p. 234.)

THE SICKLE CELL TRAIT

KEVIN CURTIS MCLEOD*

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The sickle cell story is often put forward as a demonstration of evolution. Here recent medical knowledge concerning the trait is reviewed. It is seen that in sickle cell nothing has evolved, improved, or increased in complexity. All that happens is that in this case protection against one disease, malaria, is conferred by another disease, sickle cell.

History of Sickle Cell and Malaria

Among infectious diseases malaria is one of the greatest scourges to ever affect mankind. In the fifth century before Christ, Hippocrates differentiated the disease into fever occurring daily (*falciparum*), on alternate days (*vivax*), on every fourth day (*malariae*), and recognized the association of malaria (bad air) with stagnant swamps and marshes. Malaria was one of the causes of the decline of the Roman Empire. And during World War II, Pacific malaria-battle casualty ratio was 8-1 in American troops in New Guinea and the Solomons.

Malaria is an infection by the protist *Plasmodium falciparum* which is carried to man by the Anopheline mosquito. Introduced during the mosquito's blood-meal, the parasite proceeds through asexual stages within human erythrocytic (red blood cells, rbc's) and non-erythrocytic tissues.

Sickle cell refers to rbc's that are not shaped like normal bi-concaved discs but rather appear elongated, C-shaped, or sickled. The sickling is produced because of a genetic defect that codes for an amino acid substitu-

tion (valine for glutamic acid in the beta chain's sixth position) in hemoglobin protein. Thus this abnormal hemoglobin has a tendency to precipitate into tactoids when de-oxygenated deforming the rbc. Those having both sickle genes (SS) have Sickle Cell Anemia (1/500 or within 50,000 of the nations 22 million Blacks) that causes vascular occlusion, infarction, premature rbc destruction, ischemia, pain, dysfunction, necrosis,¹ and with many death in childhood.²

Sickle Cell was first described clinically by Dr. James Herrick, a Chicago physician in 1904. In 1949 Pauling and associates found through electrophoresis a way to differentiate the hemoglobins. This led to Sickle Cell being the first demonstrable molecular disease. The precise protein change between the hemoglobins (Hbs) came to light in 1959 when Vernon Ingram devised partition chromatography, the technique for detecting amino acid differences in proteins. Today so much is known about the molecular arrangements within Sickle Cell that it has been called the first 'atomic' disease.

Case for Evolution

Sickle Cell has been stated to be the best example that students of human evolution have of genetic adaptation to an infectious disease.³ In *Scientific America* there is

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this statement, "For anyone interested in population genetics and human evolution, the Sickle Cell story presents a remarkably clear demonstration of some of the principles at play. It affords, for one thing, a simple illustration of the principle of hybrid vigor."⁴

Now we will examine, perhaps, why some scientist offer such comments. With the high mortality rate seen among homozygotes for the sickle cell gene, the frequency of this mutant gene would be expected to decline within a population's gene pool. Because among some African communities a stable 20% have the gene (as trait carriers, Hb AS) then a beneficial relationship must exist.

Allison in 1954 first reported the association between the malarial parasite *Plasmodium falciparum* and resistance to this infection in the presence of abnormal Hb AS.⁵ In malarial environments three genotypes often exist, the normal Hb AA which suffers malaria infection, the Hb SS that die from the anemia, and Hb AS heterozygotes which seem able to survive in this situation. The estimated fitness of Hb AS in malarial environments is 1.25 times over the normal Hb AA.⁶

The authors in *Pathology of Sickle Cell Disease* point out that there are two outstanding explanations for the persistence of the sickle gene in the face of strong negative natural selection, (1) a balanced polymorphism (i.e. the heterozygote AS survives, while the homozygotes AA and SS face difficult experiences), and (2) a high spontaneous mutation rate.⁷ Along these lines the literature states, "... the Sickle Cell situation shows that mutation is not an unmixed bane to the human species ... Similarly other mutant genes that are bad in one situation may prove beneficial in another. Variability and mutation permit the human species, like other organisms, to adapt rapidly to new situations."⁸

How does Sickle Cell Trait, SCT, or those with Hb AS receive protection against malaria? In these individuals with malaria, it was observed that the parasite caused rbc's to sickle faster. The parasite lowers the pH of the infected cell by about 0.4 pH units which can increase sickling about 20-fold⁹ (normally 2-4% sickled cells are present). With the decreased pH about 40% of the infected cells will sickle. These rbc's are sequestered in low-O₂ vascular environments¹⁰ and phagocytosized¹¹, killing in the process the parasite. Thomas H. Maugh in *Science* remarks, "The effect of the mutant gene is thus not completely protective, but it does lessen the severity of the disease and may be sufficient to prevent death."¹²

The importance of this example is emphasized as noted again from *Pathology of Sickle Cell Disease*, "The heterozygous state (AS), on the other hand seems to be dichotomous, being detrimental under some conditions and protective under others ... The relationship between SCT and infection lies at the crossroads of genetics, evolutionary theory, ecology, hematology, epidemiology, and preventive medicine."¹³ And finally these comments by the biochemist Lubert Stryer, "The finding of mutant hemoglobins has enhanced our understanding of evolutionary processes. Mutations are the raw materials of evolution and the studies of sickle-cell anemia have shown that a mutation may be simultaneously beneficial and harmful. The disease of an in-

dividual may be a concomitant of the evolutionary process ...

Subjectively, to evolve must most often have amounted to suffering from a disease. And these diseases were of course molecular. The appearance of the concept of good and evil, interpreted by man as his painful expulsion from Paradise, was probably a molecular disease that turned out to be evolution."¹⁴

Sickle Cell Trait

In August of 1980 there was an unfortunate report of a previously healthy football athlete at Abilene Christian University having died from a Sickle Cell Trait crisis.¹⁵ Dr. James I. Duff in Abilene, with Clinical Pathology Associates, stated in his "Protocol of Necropsy" about this case, "Sudden death associated with SCT (all organs showed distention and plugging of vessels with masses of sickle cells)."¹⁶

In 1970 Colorado University also had an athlete experience a similar SCT crisis; and they presently, along with several Texas Universities, perform blood tests on their Black athletes for the trait.

Between March 1968 and February 1969 four deaths

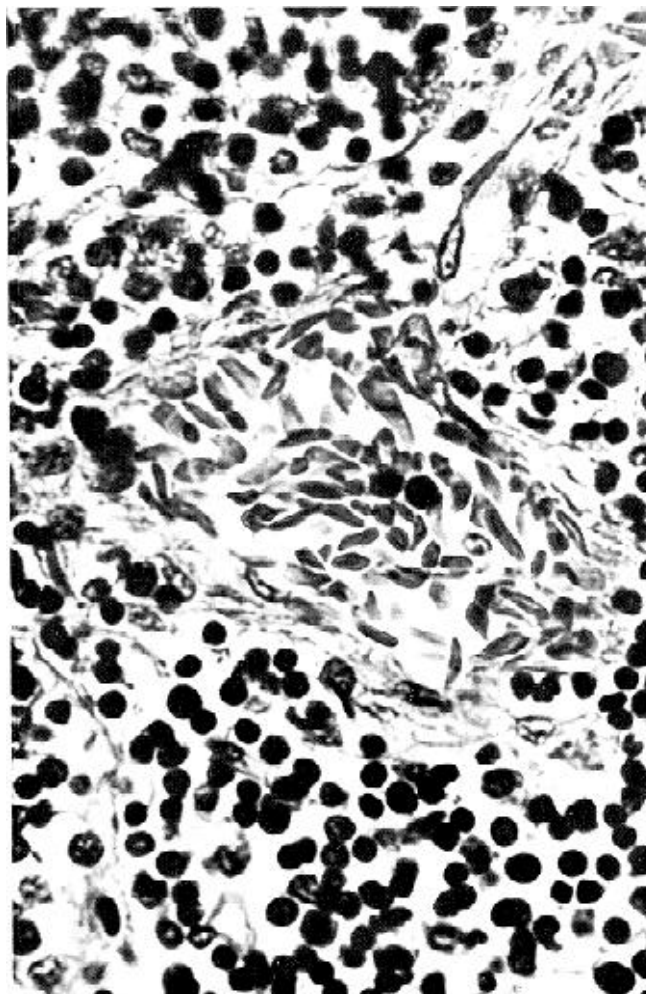


Figure 1. Lymph node in a patient with SCT crisis. Notice the sickled RBC's within the blood vessel.

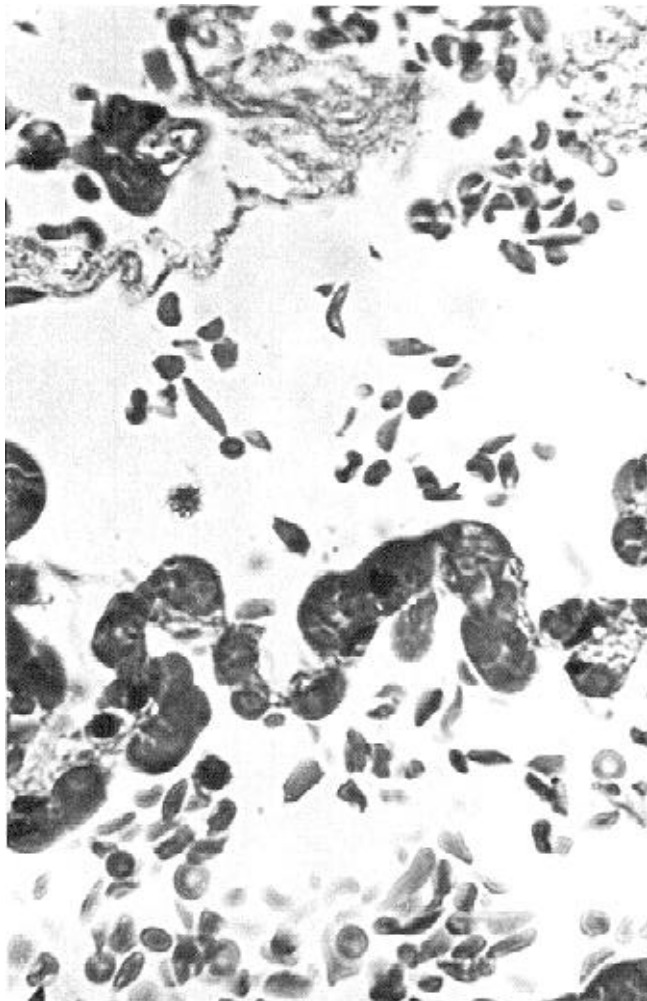


Figure 2. Lung in a patient with SCT crisis. Notice the extravagated and sickled RBC's in the respiratory spaces.

were attributed to SCT crisis among 4,000 Blacks at an Army basic combat training post. In his investigation on these incidences Dr. Stephen R. Jones commented, "it is generally not appreciated that certain complications of SCT may be fatal."¹⁷ And between 1970 and 1974 four recruits experienced SCT crisis, one leading to death, at two Air Force installations. Drs. Koppes, Clotman, and Butkus in their report in the *American Journal of Medicine* state, "The hypothesis is then developed that rhabdomyolysis and endothelial damage, terminating in severe coagulopathy, may more likely occur in patients with sickle cell trait who are subjected to vigorous physical exertion."¹⁸

A growing concern over the proper view of SCT is reflected throughout medical literature in varied opinions. The 1979 *Textbook of Medicine* says about the trait, "Carriers are discovered only as a result of routine testing or surveys, and should be assured of the trivial nature of the abnormality as well as its genetic implications."¹⁹ Other sources are now reporting, as does Dr. Robert M. Nalbandian the noted author of many works on Sickle Cell, "the heterozygous state for S Hb has been shown to be responsible for significant clinical

disease and even death and should no longer be considered an asymptomatic state."²⁰

This paper will now review some of the clinical and medical manifestations that may be found in the SCT carrier. Recent evidence on the trait has now caused some alert among the medical community as the authors of *Sickle Cell Hemoglobin* express, "There is a perceptive and growing body of information showing that the heterozygous S state is not without risk and hazard under conditions of physiological stress."²¹

There is the strong suggestion that acute intravascular sickling in persons with SCT may constitute a serious threat to life, since the sickling crisis may be precipitated by mild illness or physiologic stress in an otherwise healthy person.²²

What conditions precipitate a SCT crisis? Factors known to be important in initiating and hastening sickling include hypoxemia, acidosis, dehydration, and the presence of reducing agents such as lactate.²³ Once sickling begins the process can have a cyclic effect in that occlusion of capillary beds by the deformed rbc's causes blood stasis and thus hypoxemia and acidosis that induce additional affected blood cells to sickle. Also entrapment of sickled cells in lung capillaries causes blood to be shunted which adds to the hypoxemia.

The following is a list of clinical manifestations attributed to SCT; however, many individuals who are trait carriers may live totally unaware of their condition. Carriers have been shown to have greater risks with local or general hypoxemia in general anesthesia, pulmonary infarction at both high altitude and at sea level, splenic infarction, massive hematuria (bloody urine), renal papillary necrosis, renal medullary necrosis, renal failure, retroperitoneal fibrosis, higher incidences of leg ulceration, lower birth weight in infants of SCT mothers, retinal arterial occlusion following ocular trauma, and significant increased associations between maternal SCT carriers and perinatal mortality when mothers were subjected to anoxic stress.²⁴

In *Sickle Cell Hemoglobin* other impairments are mentioned, "Aseptic femoral head necrosis, superior longitudinal sinus thrombosis, and serious ocular pathology."²⁵ Carriers are reported to have higher incidences of Salmonella infections.²⁶ Although SCT may infer some protection against leprosy, it also predisposes carriers to acute exudative tuberculosis.²⁷ There appears to be a high correlation between pulmonary emboli, oral contraceptives, and SCT.²⁸ And following minor leg infections, carriers often have recurrent ulcers because of impaired healing.²⁹ Dr. David A. Sears writing in the *American Journal of Medicine* includes increased abnormalities within SCT carriers for splenic infarction, bacteriuria, phelonephritis in pregnancy, and in his discussion adds, "Even those who minimize the risks of AS hemoglobinopathy suggest that certain real hazards do exist for carriers of the trait."³⁰

A large controversy rages over suggested correlations between SCT carriers and physical/mental abilities. Drs. Bowman³¹, Orball, and Be11³² oppose the findings of Michael K. McCormack, Ph.D., who in a controlled study compared 19 carriers to 155 same-sex Blacks and

showed lower scores in maturity of skeletal age and in 4 of 5 intellectual measurements.³³

In the McCormick study of 120 autopsies with SCT, examination at necropsy showed that in 17.5% of the cases sickling was either the cause of death or a major contributing factor.³⁴

Within the military the Department of Defense, DOD, issued a directive that all incoming personnel will be tested for Hb AS as part of an occupational medicine program. (Dr. Nalbandia even suggests screening all AS individuals for the purpose of occupational counseling that would emphasize avoiding physiologically stressful careers.)³⁵ The DOD does not regard those with SCT to be diseased but fit for all military duty except for certain restrictions of assignment that might induce hypoxemia.³⁶ See Table 1.

In the Air Force Academy no individuals with SCT can qualify for admission; however, they may join the Air Force ROTC. Table 2 is a compilation of evidence from the *American Journal of Medicine* article entitled "Exertion-Induced Rhabdomyolysis, with Acute Renal Failure, and Disseminated Intravascular Coagulation in Sickle Cell Trait" regarding the four recruits mentioned previously experiencing SCT crisis in their training.³⁷

There is however the study in 1976 on the National Football League which showed that of the 579 Black athletes involved only 6.7% had SCT with no reports of crisis.³⁸ This 6.7% is below the national average which is approximately 8%.³⁹ And in a 1974 article, examination of Olympic Black athletes showed only 11 out of 760 (1.4%) had SCT and yet world-class performances were turned in.⁴⁰ It is interesting conjecture at this point to note the low percentage (1.4%) of SCT participants considering 1/13 Black Americans have the trait, with higher ranges (over 20%) in certain African popula-

Table 1

Army	Air Force	Navy
Flight Duty Diving Duty Airborne Duty Ranger Duty *includes parachuting	Flight Duty	Flight Duty Diving Duty*

tions, and up to a 30% frequency among certain people of southern India.⁴¹

To conclude this section three comments are worth mentioning. From *Sickle Cell*, "While individuals with the trait are generally asymptomatic under normal physiologic conditions, intravascular sickling, vaso-occlusion, and infarction can occur if oxygen tension is sufficiently lowered."⁴² These effects may be witnessed in states of hypoventilation, anesthesia, unpressurized high altitude flying (note conflicting reference article 43), exercise at high altitudes,⁴⁴ pneumonias,⁴⁵ shock,⁴⁶ and onset of stressful physical exertion.⁴⁷ Dr. Stephen J. Jones offers in his summary statements, "Why sudden death occurs in only a few who possess sickle cell trait is puzzling but may be explained by the relative amount of S-Hb present—the greater the amount, the greater the facility for sickling."⁴⁸ And finally, it has been considered that any presence of sickle gene as in SCT should be considered under the broader term of 'Sickle Cell Disease.'⁴⁹

Sickle Cell Gene

In this section several points concerning the mutant gene for Sickle Cell will be discussed. First it must be

Table 2
Clinical Manifestations and Conditions in Military Personnel with SCT Crisis³⁷

Date	Case 1	Case 2	Case 3	Case 4
Age, sex	19, M	19, M	19, M	17, M
Race	Black	Black	Black	Black
Past Health	Good, 18th day of training	Good, 25th day of training	Athlete, well conditioned	Athlete, well conditioned
Altitude (ft)	661	661	7,200	7,200
Location	San Antonio, Tex	San Antonio, Tex	Colorado	Colorado
Ambient Temperature	79 °F	83 °F	57 °F	75 °F
Presentation	Mile run, severe muscle cramps and swelling	Obstacle course collapse, severe muscle cramps and swelling	2 mile run collapse, muscle cramps and swelling	Obstacle course collapse, severe muscle cramps and swelling
Pulse rate	88	110	140	128
Hemoglobin (%)	39 S 60 A	42 S	37 S 62 A	40 S 58 A
Bleeding	Hemoptysis, GI tract	Intravenous sites	not clinical	4+ guaiac stools
Urine	Color brown	Color brown	Color red	Color brown
Outcome	Normal recovery	Death, hyperkalemia and hemorrhage	Normal recovery with elevated temperature for 6 wks	Normal recovery with elevated temp. for 6 wks

emphasized that although hemoglobin is specifically designed to carry molecular O_2 , it seems capable of performing this function throughout highly varied forms. Research is continuing to find new alterations in hemoglobin (in 1970, there were 59 known varieties of the alpha and beta chains,⁵⁰ with some 30 forms known to be less stable than normal Hb AA⁵¹).

Recent evidence using recombinant DNA techniques have shown that there are two distinct sickle genes that arose apparently from independent mutations in malaria-prone areas.⁵² One gene arose in West Africa and spread north; and a second gene originated in East Africa and spread to the Middle East and Asia.

However, other archeological and anthropological data conclude that the sickle gene may have arisen from a population in the Fertile Arabia area.⁵³ David M. Kurnit in his paper "Evolution of Sickle Variant Gene"⁵⁴ reports that the gene arose only 60-80 generations ago with a change of agricultural techniques in Africa some 1500-2000 years ago.

The appearance of the sickle gene in populations of Italy, Sicily, Greece, East Africa, West Africa, Southern and Southeast Africa, and along tropical islands, represents cross cultural, racial and geographical occurrences for the mutant gene. Because of this distribution the authors of *Pathology of Sickle Disease* state, "It has thus become increasingly difficult to explain the distribution of SCT on the basis of ancestral origins and racial affinity alone."⁵⁵ And the maximal estimate given for sickle gene mutation is high, 1.7×10^{-3} per gene per generation.⁵⁶ This evidence allows speculation that here in action is a highly mutable gene locus that may have allowed independent and isolated aberrations to occur.

And sickling is not restricted only to humans. To mention only a few known examples, it occurs among rachitic white rats, guinea pigs, and white-tailed deer.⁵⁷

Nor is the mutant Hb AS the only abnormal Hb or condition associated with resistance to malaria. Also implicated in resistance are Hb C in West Africa, Hb E in South-East Asia, beta-Thalassaemia in Near East, South-East Asia and Africa, and Glucose-6-Phosphate Dehydrogenase deficiency among tropical and subtropical regions.⁵⁸ Protection is also seen in fetal Hb,⁵⁹ in conditions of reduced ATP content in rbc's,⁶⁰ and in Latin America the absence of the Duffy substance from rbc membranes has recently been shown associated with protection.⁶¹

When Blacks were first brought from Africa to America some 250-300 years ago, the estimated frequency of SCT was 22%.⁶² Although America once had endemic areas of malaria, it was eradicated through control of the breeding places for the vector *Anopheles*. Removal of malaria or movements of populations into non-malarious areas is associated with a reduction in gene frequency for AS.⁶³ This decrease has been witnessed in this country where the SCT frequency has dropped from the original 22% to the present 8%.⁶⁴

How is this reduction explained? First, back mutation to normal hemoglobin is admittedly too slow a process for so rapid a change. Secondly, dilution effects in the gene pool may have played a role and have been investigated. A recent study used the Duffy allele as a gene

marker, for this gene is believed to have no known causes for selection and it is in high frequency among Northern European Caucasians but totally absent in African Blacks. Admixture between these two groups revealed interesting frequencies for the Duffy allele which ranged from 26% among Detroit Blacks to 3.7% in Charleston, S.C.⁶⁵ Northern Blacks appear to have had higher admixtures in their ancestry than Southern Blacks. However Dr. Phillip Herrick of the University of Kansas found elevated frequencies for two gene loci that did not experience dilutional effects from expected admixture results. These two gene sites are known to undergo selection and are—Glucose-6-Phosphate Dehydrogenase deficiency and Hb AS.⁶⁶

The third explanation, and what appears to be the most proper, is the genetically demonstrable increase in the number of those with Hb AA over Hb AS. The AS individual is slightly disadvantaged within this country with a fitness estimated to below the AA normal.⁶⁷ And the incidence of the AS trait may continue to decrease until equilibrium is reached with spontaneous new mutations.

Questions and Problems

1. Why the decrease of SCT frequency in this country?

This decrease is most significant because if this single amino acid mutation is a major and prime example of evolution then several points need clarification. The environment changed (no malaria in this country) and the gene S frequency quickly began to decrease. But if evolution had occurred, if improvement of the organism, if higher order, if greater complexity, if new information, if all of these or any one of these advantages had arisen—then why the drop-out? If an organism is going to have a mutation and then struggle through selection to establish that new gene only to have the environment change, and then this new event proceeds to remove this important phase of its evolution—how will anything advance? For natural selection on an evolutionary scale requires an environment that is constantly changing and challenging. Evolution must surely involve the retention of the newly gained segment of information in one situation in order to build upon that new order for the next challenge. In this regard Sickle Cell apparently fails.

2. Was new information added with the S mutation?

The only 'evolutionary' change that took place in Sickle Cell was one amino acid substitution; but Hb and the red blood cell looked at independently show no new information. Hb was not made to function better in its important capacity of transporting O_2 ; and the rbc structure was certainly not improved. In fact, the design seen within the rbc was itself drastically altered so that deformed cells were eliminated from the system; or else the sickling caused pathological situations with occlusions, infarctions, crisis in SCT, and death in anemia.

Creationists raise serious thoughts concerning this and the above questions, as, "The evolutionist is also challenged to show not merely that the alleged mutation survives, but more importantly that it has increased the information content of the organism or population regardless of environment."⁶⁸

3. Does SCT represent an example of 'hybrid vigor'?

Hybrid vigor or heterosis is most often defined as the offspring's increase in size, yield, and performance over the parental types. Within this frame of reference it is difficult to have SCT comply. Previously cited are many examples of medical problems that can be faced by the carrier. And this theme is repeated: "morbidity and mortality resulting from sickle cell trait has been recognized with increased frequency during the past two decades . . ."⁶⁹

It is acknowledged that SCT is but one of many conditions that may infer protection against malaria. And Hb S, unlike normal Hb A, when combined with other Hb variants is often seen with increased, not decreased, clinical disease. As in the doubly heterozygous state SC which causes a serious hazard and jeopardy for the neonate.⁷⁰ De-oxygenated AS shows 1 ± 0.46 c.p. units increase in blood viscosity over AA de-O₂,⁷¹ which can cause complicating hemodynamic problems.

And this point must be rendered that no matter the environment (malarial or non-malarial) these with 'hybrid vigor' will still reproduce offspring of which one quarter are born too defective to survive (SS).

4. Why does the more primitive type of Protozoa infect man?

Plasmodium have been shown to infect (this is an incomplete list) man, birds, monkeys, lizards,⁷² *p. falciparum* occurring in man, birds,⁷³ and monkeys.⁷⁴ It is curious that all bird and amphibian blood protozoa have typical protozoan mitochondria, double membraned with the intra-mitochondrial structure composed of microvilli. All mammalian malaria parasites are deprived of typical mitochondria but rather have a two-membrane structure similar to bacteria mesosomes.⁷⁵

The researchers involved in this evidence comment, "The reappearance of this primitive type of mitochondrion would fit well into this evolutionary hypothesis and would apply also to Plasmodia where the parasitic way of life might be connected with a loss and then reappearance of certain organelles. It is difficult, however to explain the presence of typical mitochondria in bird malaria parasites and of a primitive type in the closely related mammalian species; as both groups belong to the same genus, Plasmodium, and both are intracellular parasites inhibiting erythrocytes."⁷⁶

This indeed seems peculiar within an evolutionary scenario, considering that the more primitive amphibians and birds host the more advanced form of protist, while man (the relative newcomer) is infected by the supposedly more primitive parasite.

5. How should we view the recent origin of the sickle mutation?

Generally overlooked here (but especially by evolutionists) is the massive and complex interplay between this triad of man, mosquito, and protist. In the evolutionary view, mosquito and protist have struggled on this planet hundreds of millions of years before man; and their life cycles would certainly have necessitated satisfactory relationships before his arrival. Man has supposedly been *Homo sapiens* for the last 2 MY-250,000 years, depending upon which authority you address. Yet it is only within the last 10,000-5,000 years that man is truly seen with agriculture and

development. Creationists contend that man and agriculture have always been contemporary, and that recent origins for most matters involving man are to be expected. The total combination then of man, the clearing of tropical regions for agriculture, the endemic spread of malaria, and the mutation (a prediction from the Fall of Man with the advent of disorder as seen in the 2nd Law of Thermodynamics) allows us to see recent natural events as consequences of a hostile environment for which and to which man must be responsible.

6. Was the S mutation purely random?

There is much that is unknown about mutations, and the vast majority of what our knowledge points out is that in most mutations random processes alone are responsible. But in the case of Sickle Cell could other factors be involved?

Mutation research is a scientific hot-bed and the list of naturally occurring mutagens is rapidly expanding.^{77,78,79} Toxic influences exist in malaria⁸⁰ and cholesterol products, the main sterol of malaria parasites,⁸¹ in autoxidation processes have recently been shown to be frameshift mutagens.⁸²

This broad speculation also stems from the occurrence of the sickling phenomenon as seen in different races of man, arising independently in different geographies, and from its presence in different animals, coupled with our most incomplete knowledge of the inter-relationships between parasite/host and mutagen/mutation. New discoveries are being made as this statement from *Pathologic Basis of Disease* declares: "The evidence grows stronger that the chromosomal aberrations are not merely random but affect particular chromosomes and specific loci within the karyotype, and indeed, in experimental neoplasms, some relationship between the inducing carcinogen and the cytogenetic change is beginning to emerge."⁸³

Discussion

Most evolutionists, including the noted genetist J.B.S. Haldane, view disease as one of the most important agents of natural selection in human evolution. Darwin recognized a role for disease in human evolution.⁸⁴ Statements are often encountered as, "The existence of any disease is the expression of a transient evolutionary process that ought to be explainable."⁸⁵

Stuber has already stated that the origin of good/evil itself most probably evolved as a consequence of a molecular disease. Allison makes this comment in his "Sickle Cell and Evolution," "Finally, the sickle cell findings, offer a cheering thought on the genetic future of civilized man. Eugenists often express alarm about the fact that civilized societies, through medical protection of the ill and weak, are accumulating harmful genes: e.g., those responsible for diabetes and other hereditary diseases. The sickle cell history brings out the other side of the story: improving standards of hygiene may also eliminate harmful genes—not only the sickle cell but also others . . ."⁸⁶

However if disease is one of man's most important evolutionary prods; then the question arises what defined roles have preventive medicine, health organizations, and medical research had in attempting to

eradicate the very challenges that will purify our species, strengthen the fittest, and elevate man to higher complexities. Without the rudder of disease will not man be adrift in the directionless swirl of an evolutionary sea?

A Creationist view of disease, however, might regard cases such as Sickle Cell as natural consequences of the processes in force since the Fall of Man. Disease will not improve the organism or the population, nor is it a transient evolutionary process. For, as Creationist may predict, disease states will increase with time, via chance and accumulation, without intervention by man, i.e., the intelligent use of the wisdom endowed to him by the Creator.

Man's proper view of disease (as most naturally witnessed in the world) should contain two major elements, compassion and responsibility. With compassion man will continue to seek to alleviate suffering and with responsibility man will direct energy and talents toward improving his dominion over this world. But in this regard man has not been left alone, for by following the Creator's plan for life one can truly eliminate a major host of illness and disease.⁸⁷

In conclusion, this paper has attempted to look in depth at the entire problem encountered by SCT. The individual with the trait should not be made alarmed but rather aware of the special conditions and genetic consequences involved with this condition. Medical personnel might heed this statement by Drs. Nalbandian and Murayama, "It is poor medicine and perhaps irresponsible to mislead sickle-cell trait individuals to believe that they are as invulnerable to unusual or severe physiological stresses as non-S trait individuals."⁸⁸

Sickle Cell Trait and malaria may probably best be viewed as one less serious impairment causing non-expression of a major and more serious injury. Dr. Gary E. Parker⁸⁹ expressed this same idea and comments from a letter with Dr. Duane T. Gish are most enlightening. "While the sickle cell gene, when paired with a normal gene, is a benefit to the individual who is infected with malaria, it has no overall benefit to the population. Possession of one of these genes does increase the survival rate to malaria, but such individuals survive to reproduce, increasing the number of individuals dying of sickle cell anemia, so the number of individuals who survive malaria as a result of carrying this trait is balanced by the increase in the number of individuals who die of sickle cell anemia. There is thus no overall benefit to the population. It is the rare situation in which one injury, namely the sickle cell trait, helps the individual to survive another injury, namely infection by malaria."⁹⁰

And finally, perhaps, evolutionists themselves are beginning to tire of the case presented by sickle cell trait. In his defense of the evolutionary neoclassical theory against Darwinism, Lewontin has pointedly remarked, "So it is no use trotting out that tired old Bucephalus, sickle-cell anemia, as a proof that single locus heterosis can exist. Anyone who has taught genetics for a number of years is tired of sickle cell anemia and embarrassed by the fact that it is the only authenticated case of overdominance available. 'If balancing

selection is so common,' the neoclassicists say, 'why do you always end up talking about sickle cell anemia?'"⁹¹

Acknowledgements

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A CRITIQUE OF AFAR MAN AS THE ALLEGED COMMON ANCESTOR OF LATER AUSTRALOPITHECINES AND HOMO

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Claims have been made by Dr. Donald C. Johanson (Cleveland Museum of Natural History) that fossil finds at Laetoli and Hadar in Ethiopia reveal that 3.5 million years ago, a creature named as *Australopithecus afarensis* existed which had sufficient features to prove that it was the common ancestor of *A. africanus* and early *Homo*.^{1,2} (Although I do not believe the time scales quoted, I shall not argue against them in this article). Johanson's position in 1976 was that true *Homo* fossils were found in the same stratum as *Australopithecus* thus proving that "early" man and *Australopithecus* coexisted at 3.5 m. years BP. (This is still the viewpoint of Mary and Richard Leakey, who insist that no *Homo* evolved from any *Australopithecine*).^{3,4} However, by

1979, Dr. Johanson had second thoughts and believed that the Hadar and Laetoli fossils were not separate species but instead belonged to a single species, the long-missing ape-man, *Australopithecus afarensis*.

Let us now examine the position in regard to Johanson's change of mind; and also his continuing clash with the Leakeys.

Firstly we shall examine the evidence presented in Johanson's first assessment in 1976, 19 months after the Hadar finds.¹

On page 801, Johanson is quite clear on one thing. The 40% of a full hominid skeleton known as Lucy is "without doubt" that of an *Australopithecine*. On page 801a he writes that "Lucy is far from the genus *Homo*" and that the mandible is V-shaped like that of *Australopithecus* and not parabolic as in modern man. In the article Johanson constantly stresses the stark contrasts

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between Lucy and the *Homo* finds at site 333 at Hadar. The Site 333 fossils he refers to as *Homo* several times. He describes the Hadar specimens as "a species *strikingly like our own*" (p. 791).

Descriptions of hand, foot and jaw bones are given which show beyond doubt that site 333 at Hadar yielded human fossils. The hand is described as "uncannily like our own in size, shape and function" (p. 808). He described how clay casts were taken of the jaws and teeth of members of the search party, and one woman's jaw "bore a startling resemblance to a 3 million year old specimen".

Johanson refers to "*Homo*" fossils several times in his article and always makes a clear distinction between the *Homo* fossils and Lucy. He refers to the "rotating" *Homo* thumb at site 333 as "fully capable of manipulating tools with finesse." (Incidentally, recent finds at Hadar have uncovered tools dating from 2.5 million years ago which were "not made by Lucy or any other Australopithecine").⁵

However, when we turn to *Science* 81, we find that Dr. Johanson has changed his mind and now claims that Lucy should be lumped in with the other fossils at Hadar and Laetoli and given the new title "Afar Man" (*A. afarensis*).² But as he tries to reconcile the "advanced" features of some of the fossils with the "primitive" features of others it is difficult to follow the reasoning.

Although Johanson attacks the Leakeys (pp. 52-53), much of his article would seem to disprove his own case and strengthen that of the Leakeys. For instance on p. 50 he describes certain dental features of the Australopithecines and then goes on to say "When you pick up an Australopithecine jaw, those are the things you notice. When you pick up one of the Hadar jaws, you *don't* see those things. You see, on the average, smaller molars and larger front teeth. *Those are human traits*".

Only a few fragments of crania were recovered at Hadar; and the meaning of these is ambiguous. Not enough material exists to be sure of brain size, or cranial morphology. Indeed it is not even certain that the cranial fragments belong to Australopithecines or to *Homo*.

On page 52 Johanson admits that as far as teeth are concerned "the Hadar fossils are a great deal more like *Homo* than they are like the Australopithecines." On page 53 he states that "Lucy was not typical of the collection", and on page 55 that Lucy is "embarrassingly un-*Homo* like".

Johanson estimates the weight of Lucy at about 70 lbs. and that of the larger Hadar specimens at up to 150 lbs. The larger creature is obviously Man because on Johanson's own admission, the only other candidate at that size could be *A. robustus*. The latter is very un-*Homo* like and in any case did not evolve until 1/2 to 1 million years later.

It is impossible to believe that the very *Homo*-like jaws at Hadar and Laetoli would fit an Australopithecine skull. Such a creature would be a biological monstrosity. Previously we have been assured that the ape-man, when found, would be stooped and have an ape/human body and an ape/human skull. The facts of the human jaws and teeth now of course have laid this tale to rest. Human jaws do not fit ape skulls. In fact,

Johanson himself once said that the Hadar jaws would be a good fit for Richard Leakey's skull 1470—a *Homo* specimen!

It is no wonder that the Leakeys' and Johanson disagree so completely. In my opinion the Leakeys have the far stronger case. It is clear that at Laetoli and Hadar we have, by Leakey's and Johanson's own admissions, two separate creatures—

a. A fully human creature from the soles of the feet up to the teeth and jaws.

b. A primitive Australopithecine ape.

By joining Lucy, the undoubted Australopithecine, to the human fossils, Johanson seems to have invented an ape-man and incidentally to have made himself famous. But he is not without critics. *Time Magazine* chided him for making so much out of so little.⁶ Other anthropologists, too, surely feel that the procedure is inconsistent.

Also, proved is the fact that, as the Leakeys point out, even at 3.5-4.0 million years ago, *Homo* and *Australopithecus* were co-existing. No ancestor is known for either; and the previous candidate *Ramapithecus* has gone out the window.⁷

The Creationist case remains safely intact.

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CORRECTIONS

Mr. R.E. Wehrwein, Pastor of St. John's Evangelical Lutheran Church, Okabena, Minnesota, has pointed out that the superlative use "*me'od me'od*" occurs in the Old Testament in several other places besides the two in the account of the Flood, mentioned in the article "The Hebrew Flood Even More Devastating than the English Translation Depicts", in the *Quarterly* for March, 1981. Other places include: Genesis 39:43, Exodus 1:7, Numbers 17:7, 1 Kings 7:47, 2 Kings 10:4, Ezekiel 9:9, and Ezekiel 37:10.

Dr. G.R. Akridge, the author of the article, agrees. However, every one of these uses cited is in connection with something extraordinary. So the argument in the article is not weakened.

In the article "Speciation or Irruption: the Significance of the Darwin Finches", by G.H. Harper, in the *Quarterly* for December, 1981, in Table 1 on page 172, the top line was shifted. The heading of columns should have read: Abbreviation, Border km, Target width km, log₁₀ target width, and Geospizine species abundance.

COSMIC SPACE AND TIME

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In this article the big-bang theory is examined critically. Points considered include problems having to do with initial values, entropy, the initial expansion rate, the relative abundance of matter and antimatter, the formation of stars and galaxies, the interpretation of the cosmic red shift, the missing mass, uncertainties in the Hubble relation and constant, the distribution of quasars, the synthesis of elements, and the Schwartzschild radius of the universe. It is concluded that the big-bang theory fails to provide a satisfactory explanation of the universe.

Pick up any contemporary article by any evolutionist on the subject of cosmology and you will be impressed by the assured certainty with which the processes and ages of the universe and its constituents are known. But below the popular surface there lurks quite a different story. There are a considerable number of problems with which the modern cosmogonical theories, despite their sophistication, have been unable to cope. Certainly there is no comprehensive evolutionary view of the universe which can escape super-miraculous elements which point to the Creator.

The most highly favored cosmogonical model today is the big-bang theory. As a theory, it resulted from the observation that almost all faint and, presumably, distant galaxies appear to be receding from the earth at speeds which increase with their distance. Starting from trigonometric parallaxes and passing through Cepheid variable stars to the brightest galaxy cluster members, man has constructed a cosmic distance scale. The resulting distance scale involved billions of light years and it has allowed a more or less linear (but see later) relation to be developed between a galaxy's redshift (presumably a measure of the galaxy's speed along the line-of-sight away from the earth) and the galaxy's distance. The slope of the resulting line is called the *Hubble constant* and its inverse, which has units of time, is taken as a measure of the age of the universe. Such an interpretation of the Hubble relationship implies that the entire universe and all that in it is was once compacted into a single point. Since the interpretation of the Hubble effect is that the matter constituting the universe is presently expanding outward from that point, evolutionists speculate that all matter exploded violently from said point, and that explosion is termed the *big bang*.

To the evolutionist, the most unmentionable of the problems associated with the big bang is its ultimate origin. Whence is all the material that makes up the universe? Any theory about any origin will, of necessity, involve mathematical terms which depend inversely on the coordinates. Such terms will end up being indeterminate at the origin. In other words, the mathematician or physicist will end up dividing by zero at the origin. Take the density of the universe as an example. Density is simply the total mass divided by the volume. Now the mass of the universe presumably remains constant (from the first law of Thermodynamics), but as the big bang is extrapolated back in time, the volume of the universe goes to zero. This makes the density equal to

some finite number divided by zero and the solution to that is indeterminate.

To avoid dealing with such indeterminate solutions the physicists and astrophysicists do not really start the universe at time zero but, instead, start a fraction of a second (10^{-44} second) later than time zero. Likewise they do not start at zero size but start at a radius equal to the speed of light times said time which is 10^{-34} cm. But this merely begs the question of indeterminacy.

The Heisenberg uncertainty principle (that both an object's position and its momentum; or its energy and its time, cannot be known to utmost precision) is invoked as an excuse for such negligence; but this means that the Heisenberg uncertainty principle should be independent of matter since the evolutionists thus assume that the principle existed before the universe and that the universe resulted from the principle. Yet the uncertainty principle is only definable in terms of material substance as either: $\Delta E \Delta t \sim h/2\pi$ where ΔE is any change or uncertainty in energy, Δt is the uncertainty in time (i.e. when the object has energy, E) and h is Planck's constant; or else it is defined in terms of position, x , and momentum, p : by $\Delta x \Delta p \sim h/2\pi$.

Invoking the Heisenberg uncertainty principle to account for the origin of the universe is thus to revert to the old question of which came first—the chicken or the egg—and does not solve anything.

Allied with the question of the ultimate origin of the universe in a big-bang context is the problem of entropy. There is a real problem here as to how such a chaotic mess as the big bang is purported to have been should ever evolve into the ordered universe which we know today. Evolutionists generally attempt to circumvent this problem of entropy by pointing out that the overall entropy of the universe remains constant as long as it is assumed that the universe expands adiabatically. But this is trivial, since to assume that the universe expands adiabatically is to assume that the entropy remains constant in the first place. The definition is thus circular.

Evolutionists disdain the miraculous when it comes to nature and the creation; but the big bang is even more dependent upon miracles than is the Genesis 1 account of creation. Let us, for the sake of argument, assume the big bang model to be correct. In that case, the universe exploded into existence some 10 to 20 billion (10^9) years ago. Yet we find then that the miraculous is still present, for as Robert Dicke has written:

If the fireball had expanded only .1 per cent faster, the present rate of expansion would have been 3×10^3 times as great. Had the initial expansion rate been .1 per cent less and the Universe

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would have expanded to only 3×10^{-6} of its present radius before collapsing. At this maximum radius the density of ordinary matter would have been 10^{-12} gm/cm³, over 10^{16} times as great as the present mass density. No stars could have formed in such a Universe, for it would not have existed long enough to form stars.¹

For a chance fluctuation of the Heisenberg uncertainty principle, that was some exact fluctuation! But then there are those evolutionists who would maintain that if it had not happened just so precisely that we would not be here to observe it. Hypocritically, the same people will not allow creationists to argue the anti-parallel of the argument, namely, that the presence of such design in the universe argues for the existence of the Designer.

Most of the big-bang models, and there are several, predict that equal amounts of normal matter and anti-matter arose from the initial stages of the big bang. Yet the universe appears to be constituted primarily of normal matter; at least, that is the evidence from observational radio astronomy.

If a radio wave travels through a magnetic field, then the wave's plane of polarization is rotated by that field. Such an effect is called *Faraday rotation* and occurs in such a way that the polarization plane is curled in one direction if the field is due to normal matter, and it is curled in the opposite direction if the magnetic field is due to antimatter. Reinhardt² observed that the rotation of the polarization plane of radio waves from celestial sources was primarily in one direction. This indicates that the universe is primarily made up of one type of matter; presumably, normal matter. There are some theories, however, which have been proposed to account for the apparent lack of antimatter in the observed universe. The best of these theories require that the universe be expanding evenly in two directions and at a different rate in the third direction (dimension).³ But this, too, is not observed.⁴

The big-bang has other problems, too. Evolutionary models have never been successful in accounting for the formation of a single star, let alone an entire galaxy or cluster of galaxies.⁵ Virtually every star-formation model invoked today assumes that both stars and galaxies started out as density irregularities in the very early stages of the big-bang. Without such an assumption, the physics of collapsing gas clouds will not allow for the formation of objects even remotely resembling the major constituents of the universe.

In order for such density irregularities to be present in the early stages of the big bang, certain explanations have been proposed. These include magnetohydrodynamical "pinch" effects (like plasma bottles or magnetostriations)⁶, but the existence of such pinch-effects in the early stages of the universe requires that there presently be a cosmic magnetic field. The existence for such a cosmic magnetic field is in doubt, there being conflicting evidence for and against it.⁷ Furthermore, the 3-degree Kelvin black-body radiation field shows no evidence for any significant clumps of matter at a time believed to be about a million years into the big bang.⁸

Throughout the speculations of the evolutionists, which speculations we have mentioned this far, the evolutionists have assumed that the Hubble constant is

indicative of a real expansion of the universe; but for over a decade, now, Halton Arp⁹ has been pointing at cases which contradict the Hubble interpretation of the redshift. Arp first found a statistical correlation between the sky positions of quasars and bright, nearby galaxies. Furthermore, he has pointed out that if quasars were local objects, that then they cannot result from being thrown out of the nuclei of galaxies, the most popular "local" theory, for then we should observe as many blue shifts as red shifts; but only red shifts are observed.

Arp has also found cases such as NGC 1199 where an object with a redshift amounting to 13,300 km/sec is found to be located in front of a local galaxy with a Doppler shift (redshift) of 2,600 km/sec.¹⁰ Recently the local hypothesis for quasars has suffered further setbacks, the luminous bridges mentioned by Arp being dismissed as optical effects, the bending of light in gravitational fields, or diffraction effects similar to that observed by bringing one's thumb and forefinger together when they are silhouetted against a light. As we shall note shortly, if quasistellar objects are really at cosmological distances from earth, then the result is disastrous for the evolutionists.

Another assumption that lies buried in the Hubble relation is the assumption that the cosmic distance scale is known. Underlying this is the further assumption that all parts of the universe look alike (cosmological principle). But if the distance scale, as presently adhered to, is even remotely correct, then there is the problem of the missing mass. The rotation of galaxies appears to be non-Keplerian; indicating that there is some 10 to 30 times as much material in a galaxy as can be accounted for by its luminosity (light output). For a cluster of galaxies, the discrepancy between the light and dynamic mass estimates increases to factors of 100 to 500 or more.¹¹

If Bouw's detection of the rotation of the Virgo cluster of galaxies is correct,¹² then judging from the shape of the rotation-curve, either Newton's law of gravity appears to break down at large distances or else there is a tremendous mass distribution in galaxy clusters. If this is so, then this, too, must sooner or later be taken into account by the big-bang evolutionary models.

Then there is the problem that although the relation involving the Hubble constant is taken to be linear, in actual fact the data do not give a straight line at all. Evolutionists can only fit a straight line through it by assuming that departures from linearity are due to evolutionary effects. Such departures are subsequently defined to be evolutionary and set the standards for evolution in galaxies as a whole. The true shape of the Hubble relation is much closer to being quadratic than to being linear.

Even if the Hubble constant is accepted, and the linear relation, evolutionists are still not out of the rough with the big bang model. The actual value of the Hubble constant is tremendously uncertain. Modern estimates range from 20 km/sec/Mpc to 125 km/sec/Mpc. For the last several years the value has been arbitrarily set at 50 km/sec/Mpc since this is the highest value consistent with the geological age of the earth and the lowest value even remotely consistent with observa-

tion. In other words, the evidence is that the universe, according to the Hubble constant, is too young to have allowed for the evolution of the earth. This is especially so in light of recent evidence which raises the Hubble constant back up to a value of 95 km/sec/Mpc, a value which corresponds to only 10 billion years for the age of the universe.¹³ This leads to further problems because if we assume that the uranium and thorium were produced by some unknown process at the time when the galaxy was formed, then using the same argument that is applied to the dating of terrestrial rocks and extraterrestrial meteorites, it appears that the Milky Way must be at least 12 billion years old, an age which exceeds the age of the universe according to Hubble's constant.¹⁴ Even some stars and some star clusters are claimed to be older than 10 billion years.

Browne and Berman¹⁵ applied the usual evolutionary age determination logic to rhenium-187 and osmium-187 abundances and came up with an age of the universe of at least 20 billion years and, more comfortably, 29 billion years. This figure far outstrips any "comfortable" Hubble age.

All this serves to cast doubt on the Hubble constant as an indicator of age. As Akridge¹⁶ has suggested, though, the Hubble constant may be purely a measure of the initial density of the universe at the time of the creation and that it thus cannot legitimately be extrapolated back in time to give any meaningful age.

As if the aforementioned radiometric problems were not enough, the assumption that quasar redshifts are cosmological in nature leads to a very interesting conclusion. Said conclusion is noted by Varshni with the following words:

It is shown that the cosmological interpretation of the red shift in the spectra of quasars leads to yet another paradoxical result: namely, that the Earth is the center of the Universe.¹⁷

Varshni found some 57 groupings among a sample of 384 quasars. His groupings were purely in terms of similarity of spectra, not in values for the redshifts and not for clustering in areas of the sky. On the contrary, his objects are not necessarily near each other when projected onto the sky, but he did find that the value of their red shifts was very coincidental. He thus concludes that if the cosmological red-shift hypothesis is true, that the 57 groups are arranged on 57 spherical shells, all centered on the earth (see Figure 1).

After considering and dismissing two other alternatives, Varshni finds that he is forced to conclude that if the redshift hypothesis is accepted for quasars, and that likewise, if the big-bang model is accepted for them, that then:

the Earth is indeed the center of the Universe. The arrangement of quasars on certain spherical shells is only with respect to the Earth. These shells would disappear if viewed from another galaxy or quasar. This means that the cosmological principle will have to go. Also it implies that a coordinate system fixed to the Earth will be a preferred frame of reference in the Universe. Consequently, both the Special and the General Theory of Relativity must be abandoned for cosmological purposes.¹⁸

There might be a tendency to dismiss this as a chance

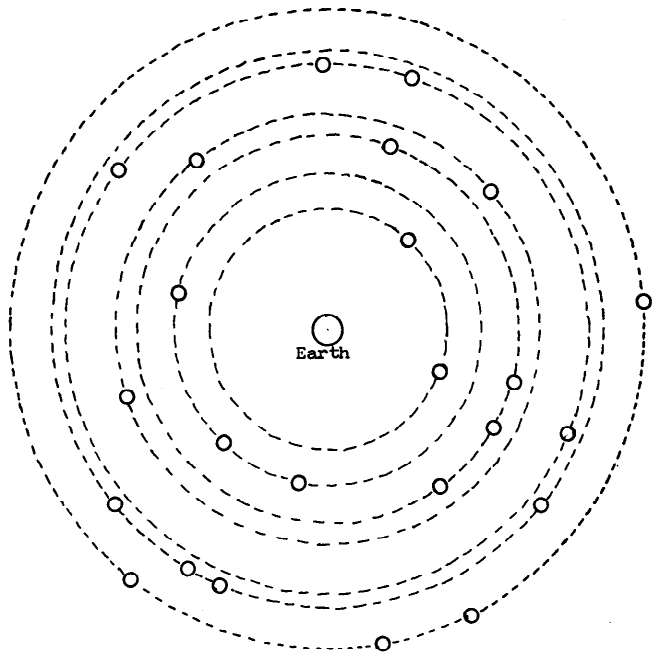


Figure 1: A two-dimensional representation of Varshni's result. Here the quasars are represented as distributed on circles which are centered on the earth. Note that moving the point of viewing away from the center to one of the quasars will destroy the cosmological principle in that the other quasars will no longer appear centered on the quasar. It will be understood that this drawing is not necessarily to scale.

occurrence; but Varshni does consider the odds and concludes that the odds against a chance occurrence is 3×10^{86} to one.¹⁹

Removing the cosmological redshift hypothesis does not necessarily help the evolutionists, for, as Arp and others have pointed out,²⁰ there are serious problems with any local explanation for quasars, not the least of which is to explain their redshifts since all other redshifts would thus also be suspect. Varshni's alternative is that the quasars are local, but then we might question as to why there is not a greater dispersion in the redshifts of the 57 groupings; they would still appear to be centered on the earth.

The bulwark of the evolutionist's evidence for the big bang is the 3-degree Kelvin blackbody radiation. This radiation is believed to be due to the light released when electrons and protons first combined to form atomic hydrogen some one million years into the course of the big bang. The temperature of the universe at that time is calculated to have been about 3,000 °K and what makes up the 3°K radiation field today is that 3,000° field redshifted by a factor of $z = 1,000$.

Here, too, a curious situation arises. The redshift of the hydrogen flash is thus taken to be 1,000, but the highest redshift of any observed object is less than 4, and that is for a quasar at that! Where, then, are the objects with intermediate redshifts? Where are the objects with redshifts between $z = 4$ and $z = 1,000$? Was the universe devoid of objects for all the intervening billions of years?

There is a possible creationist interpretation of the cosmological 3° Kelvin radiation field and it does not

involve any evolution at all. There is a "curious coincidence" which was first mentioned by Hoyle *et al.* in 1968²¹ and which was echoed by Clayton in 1969.²² If we assume that all the elements in the universe were created *in situ* by nuclear fusion from hydrogen, and if the resulting photons were then thermalized (so as not to be potentially life-threatening,) then the resulting radiation field would have a temperature of 3° Kelvin and would have a black-body spectrum. Actually, Hoyle and his colleagues considered only the conversion from hydrogen into helium and that not necessarily *in situ*, but their estimate for the mean density of the universe is probably low so that the effect remains when we consider all the elements.

Evolutionists are thus faced with a miraculously balanced big-bang, which somehow managed to start sometime after time began and thus avoided insurmountable difficulties which it would never have overcome in the first place, a miraculous placement of the earth at the apparent center of the expansion, and contradictory values of the ages of earth, Galaxy and universe. But their problems do not end there. Hoyle²³ has drawn attention to yet another "coincidence" which happens to be a particular favorite of his. The nucleii of atoms exhibit energy levels in much the same way as electrons exhibit energy levels about the nucleus. Now it so happens that carbon-12 has a nuclear energy level at 7.655 Mev and oxygen-16 has a level at 7.119 Mev. If we accept nuclear fusion to account for the elements (even fusion *in situ* some 6,000 years ago), then the relative placement of these two energy levels is nothing short of miraculous.

The energy levels themselves are due to properties of the strong nuclear force and the electromagnetic repulsion between protons. Change these two properties ever so slightly and there would result a drastic change in the two aforementioned energy levels. The change would be such that almost all the atoms that are now carbon-12 would have gone on to become oxygen-16. The implication of this is clear; no carbon, no life as we know it.

Finally, there is one other factor which has not been dealt with in either the evolutionary or the creationist literature as far as the author is aware. The astronomical literature for the last 10 years has been abuzz with rumors and speculations about *black holes*. A black hole is defined as a clump of matter which has been so compacted that its gravitational field has overwhelmed all other forces so that its escape velocity exceeds the speed of light. Nothing can escape a black hole; at least, not a massive black hole.

For a given mass, M , the radius, R , to which the mass must be compacted in order to become a black hole, termed its *Schwarzschild radius*, is given by: $R = 2GM/c^2$, where G is the gravitational constant, and c is the speed of light.

According to Dirac's large number cosmology, there are about 2×10^{78} nucleons in the universe.²⁴ At a mass of 1.67×10^{-24} gm per nucleon, this yields a total mass for the universe of 3×10^{54} grams. The Schwarzschild radius of a universe of that mass is about 500 million light-years; far less than the currently held radius of the

universe. In order to save the big-bang cosmology are we to believe that the universe escaped from out of its own Schwarzschild radius or that the physics of black holes does not work for the universe?

Otherwise, if we accept the missing mass as being above and beyond the mass of the Dirac cosmology, thus giving us a factor of 500 to play with, can we conclude anything at all from the Dirac cosmology? In particular, can we conclude anything about the age of the universe from Dirac?

In connection with our discussion of black holes we might make note of some recent developments in the field. There is mounting evidence that quasars, Seyfert nuclei and the nuclei of normal galaxies are all related and represent more or less a continuum of states or characteristics. The nuclei are taken to be supermassive objects; objects above 6 solar masses are defined to be supermassive objects but when it comes to these nuclei hundreds of thousands to millions of solar masses are considered to be involved. If this should prove to be the case, then Varshni's observation will hit with a vengeance, for the centrality of the earth cannot be removed by any such development as the demonstration of an apparent link between the nuclei of normal galaxies and quasars.²⁵

We have considered only a few of the fundamental problems which face modern evolutionists in their struggle to hold on to their atheistic naturalism—their "bang! you're alive" model. Much of what has been critiqued here will be outdated in the years to come for such is the nature of modern science. After all, historically, today's science is tomorrow's superstition; especially in an age where a theory is considered "fruitful" if it raises more questions than it answers. In the light of our study it would appear that the big-bang is a superstition and is devoid of any factual basis in reality: it is based on some of the least understood, most speculative, and least investigated assumptions ever adopted by any man. Truly it is "science falsely so called" (I Timothy 6:20).

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- ²⁵According to current theory masses over about 60 solar masses up to 5.4×10^6 solar masses and then those over about 7.5×10^6 suns will all end up as black holes. This theory ignores a well known theoretical "fact", namely, that stars above about 6 solar masses will not contract homologously. Instead, such stars should (ignoring the problem of initiating the collapse in the first place) collapse only up to a certain point beyond which it cannot contract and during which phase material should be falling onto the star which thus gains mass. Eventually the star "explodes" or "burps", losing mass. This burp is followed by a period of material again falling onto the star and the cycle starts all over again. Of all the evolutionary theories, this one is the best that there is to account for the apparent continuity from galaxy nucleus to quasar. From a creationist point of view this has two effects: first, it lessens the energy problem of sustaining quasars for 10^7 years, the new theory making them only a periodic phenomenon and second, it provides creationists with a complete spectrum in one model since the model need not have anything at all to do with time or evolution. Such behaviour on the part of galactic nuclei is independent of whether they have evolved or not. There are problems with the new theory and these problems are the same as face black hole enthusiasts with accreting disk models. There is also some question as to whether or not any material blown away from the supermassive star would collapse back onto its surface in a time scale which is short on a scale of 10^7 years. But most of these are problems for evolutionists. Finally, this theory avoids black holes since it indicates that supermassive stars will not ultimately collapse into a black hole. Black holes would have to come into being in other ways, if they exist at all.

THE OKLO NATURAL URANIUM REACTOR EXAMINED FROM A CREATIONIST'S VIEWPOINT

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In 1972 evidence was discovered that a body of uranium ore found at Oklo in Gabon, Africa, had once been a natural reactor. At least six reactor zones existed in the pre-Cambrian rock found at Oklo. Some have believed that the evidence indicates an age of 1.9 billion years for the reactors. In this paper, arguments are presented which show that the data are consistent with a more recent date for the self-sustaining chain reaction which was achieved—a date, in fact, which would be compatible with young-Earth Creationism.

In 1972, while analyzing some uranium which had been mined at Oklo in Gabon, Africa, some scientists working at the nuclear-fuel-processing plant at Pierrelatte in France discovered some ore which had an abnormally small percentage of U-235 as compared to U-238. In most ore the fraction of the total uranium which is U-235, called the enrichment, is 0.72%. No natural uranium had ever been previously discovered which was more than $\pm 0.1\%$ different from 0.72%. In trying to explain why the particular ore being analyzed was different, it was found that a fission chain reaction had occurred in this ore, hence a natural reactor had existed (probably started by an influx of water to serve as a moderator) long before man ever discovered fission or built a nuclear reactor. The various arguments involved have been discussed by Cowan.^{1,2} It also seems to have been concluded that the data are not consistent with an age for the reactor less than about 1.9×10^9 years. The author does not agree that this conclusion is necessary, and in this paper would like to present arguments to

show that a younger age can be supported by the data, in fact an age as recent as 6000 years or so. There are four areas which need to be discussed: I. Interpretation of the Reactor as it Relates to the Genesis Flood, II. Nd-142 Concentration and Fuel Depletion, III. The Total Number of Megawatt-Hours of Energy Produced by the Reactor, and IV. The Effective Multiplication Factor for the Neutron Population.

I. Interpretation of the Reactor as it Relates to the Genesis Flood

In historical geology, it has become common practice to relate different strata found at a location to a "geological time table" spanning a few billion years. Creationists do not deny that the different strata exist, but interpret them in terms of different types of sediment deposited by the Genesis flood.³ In the Oklo area of Africa, the surface rocks are pre-Cambrian rocks, which according to standard historical geology are the oldest and lowest lying strata. According to our young earth model, the pre-Cambrian rocks would either be the lowest lying sediments from the flood, or else the pre-flood rocks.

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II. Nd-142 Concentration and Fuel Depletion

One result of any fission chain reaction is a production of fission fragments. Any viable theory of the Oklo reactor must therefore be able to explain and correlate two sets of data. One is the percentages and amounts of U-235 and U-238 left in the Oklo ore at present. The other is the amounts of different isotopes of the fission product elements remaining in the ore at present. Both of these sets of data, plus a theory, give us estimates of the amount of fission that has occurred, and both sets of data must result in the same estimate if the theory is correct.

There are approximately thirty elements which are produced with reasonable probability as a result of fission.^{4,5} Approximately 15 of these elements were found in the Oklo ore, still present and immobilized.¹ The other 15 were probably dissolved and carried away by the water percolating through the ore (This process is called leaching.)

One element which did not leach away and was particularly suitable for numerical studies is the rare earth element neodymium (Nd). It is suitable since it has seven stable isotopes: Nd-142, Nd-143, Nd-144, Nd-145, Nd-146, Nd-148, and Nd-150; and one of them, Nd-142, is not formed as a result of fission.^{1,4,5} The fact that Nd-142 is not formed as a result of fission means that we can calculate the background levels of the other six isotopes from: a) the amount of Nd-142 present locally at different points in the reactor zones, and b) the known percentages of neodymium that are the different isotopes of neodymium in natural deposits found elsewhere on earth. This method of calculation involves the assumption that these percentages of neodymium isotopes are the same at different locations and were the same 1.9 billion years ago or 6000 years ago (depending on which model is accepted); but in this paper we will assume that this assumption is correct. We then have a viable method of calculating how much of the different neodymium isotopes were present at the different points in the reactor zones before any fission took place.

From these studies of neodymium we can estimate the number of fissions which must have occurred to produce the neodymium. (Actually, small corrections must be applied to take into account neutron absorptions such as those which change Nd-143 into Nd-144 and Nd-145 into Nd-146.) We can then calculate independently, from the percentage of the uranium left at present as U-235 and the actual concentration of uranium, the amount of uranium that must have fissioned. These two ways of calculating the number of fissions must agree. From initial uranium concentration, N_i^U , final uranium concentration, N_f^U , initial enrichment, E_i , and final enrichment, E_f , one can calculate the number of U-235 atoms depleted as

$$\Delta N^{U-235} = E_f N_f^U - E_i N_i^U \quad (1)$$

Multiplying by the ratio of microscopic fission cross section to the microscopic absorption cross section then gives the number of fissions, to be compared with the number of fissions calculated on the basis of neodymium concentrations. At this point, one must introduce a theory in order to give values for the initial enrichment, E_i , and initial uranium concentration, N_i^U , since

these cannot be measured (They refer to the past, before any available measurements.) In the recent creation model, E_i probably must be 0.72%, although the study of pleochroic haloes indicates that decay constants have been variable^{6,7}, and hence the enrichment may have been slightly different. However, in this work we will assume that E_i is 0.72%. If the conventional 1.9 billion year age of the reactor were the correct model, then E_i should be about 3% due to the different rates of decay of U-235 and U-238.

In both our recent creation model and the conventional model, the results at first come out wrong, the apparent amount of fission that occurred does not come out equal to the amount that should have occurred to produce the present quantities of neodymium. Part of the discrepancy is due to: 1) fission of Pu-239, 2) decay of Pu-239 to U-235, 3) fast neutron induced fission of U-238, and 4) possible changes in the size and shape of the ore. When these factors are taken into account, those who developed the conventional 1.9 billion years age model concluded that the data are consistent with their model. At first it seems as if our creation model cannot explain the actual data realistically. In fact, Cowan et al.² concluded that the data were inconsistent with an age less than about 1.9 billion years. According to their line of reasoning, a recent age for the reactor gives an amount of fission less than the amount that the present concentrations of neodymium in the reactor zones would indicate. However, Figure 1 shows why this conclusion is not correct, according to reasoning that the author would like to propose. In the reactor, the higher temperatures present, plus the increase in defects in solids caused by radiation (which causes a greater probability of diffusion⁸), caused a slow diffusion of atoms outward, and this diffusion would have nearly halted after the reactor shutdown. The graph of Nd-142 concentration (Fig. 1) shows that more Nd-142 is present at the edges of the reactor zone, and the concave upward shape indicates that Nd-142 has had a decrease in concentration in the interior of the reactor. This graph is a plot of data given by Cowan et al.² for the 2'P' traverse of one of the reactor zones. Other data give similar results. Recalling that Nd-142 is the isotope not produced as a result of fission, this tells us that more of the neodymium isotopes were present to begin with than assuming a constant-in-time Nd-142 concentration would indicate. Thus fewer fissions were needed to produce the observed amounts of neodymium! It is the author's contention that the recognition of this point brings the data into consistency with the recent creation model for the Oklo reactors!

III. The Total Number of Megawatt-Hours of Energy Produced by the Reactors

The reactors envisioned according to our recent creation model turn out to be a bit different from that of the "conventional" theory. The total energy that the Oklo reactors produced was about 440 Megawatt-years according to our model and 15,000 Megawatt-years in the "conventional" model.¹ By comparison, the now famous Three Mile Island reactor, which was rated at 2772 Megawatts of thermal power, would have produc-

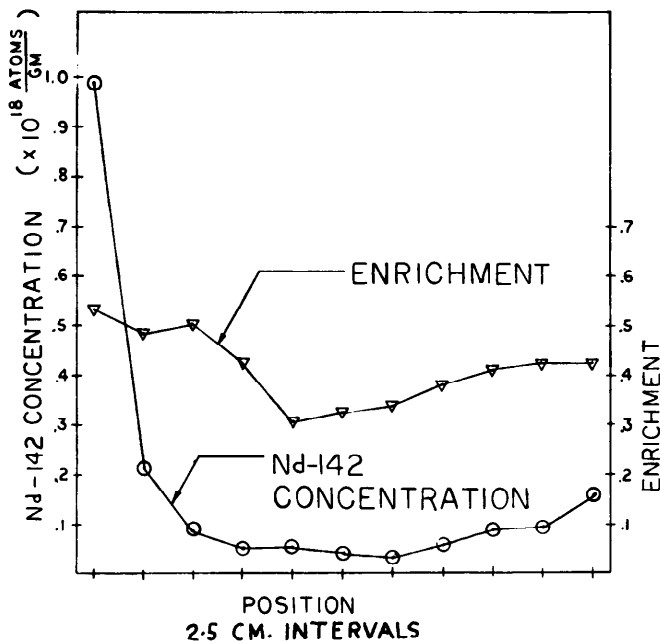


Figure 1. A graph of the Nd-142 concentration and the enrichment versus position in the reactor zone. The data plotted are the data given by Cowan et al.² for the 2'P' traverse of reaction zone 2. The points plotted are about 2.5 cm apart.

ed these amounts of energy in two months and 5.4 years, respectively, operating at full power. The conventional model requires more energy to have been produced since two billion years ago the percentage of uranium that is U-235 would have been 3% instead of 0.72%, with the result that more fission had to occur.

IV. The Effective Multiplication Factor for the Neutron Population

It is commonly stated in texts on nuclear engineering that it is not possible to build a working nuclear reactor with the combination of natural uranium (0.72% U-235) as fuel and ordinary water as the moderator. The uranium must be enriched to at least about 1% U-235. While the author does not dispute this fact, it should be pointed out that the Oklo reactors did not have to produce continuous electrical power, or to be designed to be an efficient nuclear power plant. For example, the reactors could have operated in spurts, governed by the ground water concentration as a function of time, with the time between operations being used for fission product poisons (substances with a large probability of unproductively absorbing neutrons) to decay away. Kuroda⁹ applied the four factor formula for the infinite multiplication factor K_{∞} and concluded that uranium ore with an enrichment of 0.72% was nuclear physically "stable", i.e. could not become a reactor. However, his analysis assumed that the fast fission factor ϵ was exactly 1.0. Also, the numerical analysis of the effective multiplication factor can be improved for a water-moderated, low enrichment system by taking into account epithermal fission in the manner outlined by Glasstone and Sesonske.¹⁰ Let us go through such an analysis for various water concentrations in the Oklo ore.

Let r be the ratio of the % water by weight to the % uranium by weight in the ore. As a rough approximation, we may ignore the presence of other substances besides water and uranium oxides. Then, by assuming various values for r , it is fairly straightforward to calculate the effective multiplication factor using Glasstone and Sesonske's method. The only problem has to do with the fact that we do not have known, regular sizes of fuel pellets or water channels. In calculating the effective resonance integral, we may use the approximation outlined by Glasstone and Edlund.¹¹ To find the buckling, B^2 , we can calculate the geometric buckling by assuming the reactor zone was a cube with a side length $a = 1$ meter. Although the shapes seem to have been irregular^{1,2}, this seems to be a reasonable size and approximation. Then we get

$$B^2 = 3\left(\frac{\pi}{a}\right)^2 = 3\left(\frac{\pi}{100\text{ cm}}\right)^2 = 3.0 \times 10^{-3} \text{ cm}^{-2} \quad (2)$$

The rest of the calculations are straightforward, except that of the fast fission factor, ϵ . In a low enrichment, water moderated case, as Weinberg and Wigner¹² have pointed out, neutrons which leave one fuel element have a reasonable probability of causing fission in neighboring fuel elements. This is called the "interaction fast effect". An assumption of $\epsilon = 1.0$ is thus not justified. Also, the fuel in our natural reactor cannot be said to be placed in a regular array of fuel elements, and cannot be characterized by just one parameter (such as the volume of the water divided by the volume of the fuel parameter used by Glasstone and Sesonske for the regular lattices they considered). It might be informative to imagine the fuel to be small spheres of uranium bordered by water in some directions, but touching other spheres of uranium in other directions, forming irregular "blotches". In any case, the maximum that the fast fission factor could be expected to be is about 1.2. If we assume this value, Table 1 shows the values we get for the infinite multiplication factor, k_{∞} , self-consistent with the value of B^2 given by Eq. 2 and with an effective multiplication factor, k_{eff} , equal to one. Thus, it is seen that criticality can be attained under these conditions, hence our theory of a recent age for the reactor is reasonable.

Conclusions

It can be said on the basis of the arguments given here that there is nothing in the neodymium and uranium concentration data that prevents us from interpreting the Oklo reactor as a recent phenomenon, having occurred only several thousand years ago. When the concentration of natural uranium was large enough, there does not seem to be anything that would have precluded a natural reactor from starting up when the water concentration was right. Thus the Oklo phenomenon is consistent with a young age of the earth. Further work needs to be done to see if it can be proven on the basis of numerical analysis that the young age model of the Oklo reactor is the only plausible one.

Appendix A

In this appendix, we will explain the calculation of

Table 1. Reactor Parameters

r	.06	.08	.1	.2
ϵ	1.2	1.2	1.2	1.2
P_{28}	.73	.77	.79	.86
P_{25}	.98	.98	.99	.99
η	1.33	1.33	1.33	1.33
f	.93	.91	.89	.79
k_{∞}	1.10	1.12	1.12	1.09

the effective multiplication factor in more detail. In order to take into account fissions caused by epithermal neutrons (neutrons which have not quite slowed down to thermal energies), a method such as that of Glasstone and Sesonske¹⁰, which is an improvement over the usual six factor formula, may be used. In this method, the infinite multiplication factor k_{∞} is given by the equation:

$$k_{\infty} = \eta f \epsilon p_{28} p_c \beta \quad (3)$$

Here η is the reproduction factor, f is the thermal utilization factor, ϵ is the fast fission factor, p_{28} is the overall capture escape probability for the U-238, p_c is the capture escape probability in materials other than uranium (here approximated as 1.0), and β is calculated from p_{25} (the capture escape probability for U-235) in the manner given by Glasstone and Sesonske. The values of these parameters in our case are given in Table I. These values given in Table I support a value of k_{∞} bigger than one, and are consistent with a value of the buckling, B^2 , appropriate to the Oklo reactor zones. Since these values were found using an enrichment of 0.72% U-235, they show that a self sustaining chain reaction could have occurred in the Oklo ore even if the enrichment was only 0.72%, hence in recent times. Thus we find that the effective multiplication factor calculations are consistent with a young earth model.

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Reality: Real or Conventional?

(Continued from page 68)

countered the long-age theories was one of rejection, partly because this position goes contrary to years of indoctrination both from the mass media, and his elementary, high school, college, and graduate school training. Further, almost every book produced by the secular press implicitly assumes the long-age belief structure. As I explored this area further, I found the matter was not so straightforward as many of us assumed, and there is some evidence for the short-age position and there are problems with some, if not many, of the arguments for the long-age position. Likewise, with my initial exposure to the geocentric ideas, it seemed that serious discussion in support of this was unthinkable. Further extensive reading and discussion about these topics though, caused me to conclude that my earlier judgement was premature. In some areas I have had to rescind both verbal and published statements. Hopefully, these experiences will make me more cautious in the future and more apt to listen carefully to both sides of an argument before I take a position—and then caution should encourage me to always take a tentative position, and to continue to look at both sides.

Summary and Conclusion

In summary, a complex indoctrination process causes most people to develop a certain world-view which may or may not be congruent with reality. Because most of the mass media, schools and the social environment as a whole are fairly consistent in what they indoctrinate,

(Continued on page 39)

THE MOSAIC BUILDING CODE

MEIR BEN-URI*

The author has come to believe, from long study, that incorporated in the instructions about the Tabernacle and the Ark of the Covenant, in Exodus, is a building code: instructions about the exact way of building them, and of setting up the Tabernacle after each time it was moved. In this article some of his investigations are described.

The Portable Sanctuary

In most books on the history of architecture, nothing is said about the *Mishkan*—the Tabernacle—the portable sanctuary described in Exodus. The famous French modern architect, Le Corbusier, did, it is true, mention it in his book *Future Architecture*.¹ On the other hand, the author-architect Josef Ponten, in his work in two volumes, *Architecture Which Has Never Been Built*, mentioned people as diverse as Alexander the Great, Michael Angelo, and the modern German architect Poelzig; but he did not mention Bezaleel and Aholiab, who worked on the Tabernacle.² To be sure, the Sanctuary was, in a sense, many times rebuilt. It was the first recorded prefabricated construction; for it could readily be taken apart, moved, and set up again, as the Children of Israel moved from place to place in the wilderness on their way to the Promised Land.

In the course of over 30 years of studying the God-given instructions for the Tabernacle, as recorded in Exodus, I have come to believe that in the Hebrew there exists a building code. The Hebrew *we'assista* carries, I believe, the connotation of measuring; and associated letters and words are to be counted in numbers. In most translations the Hebrew word is simply rendered: "thou shalt make". Then follows instructions about the making.

Anyone familiar with architecture, whether according to the oldest or the most modern schools, would agree that the divine command in Exodus contains all the relevant steps: inauguration, planning, foundation, and so on up to occupation and bringing in the furniture.

What I have called the preamble to the building code, in Exodus 25:8-9, contains, in the Hebrew, 19 words, made up of 71 letters. I believe that built into them is a key—a code—giving the shape of the Sanctuary, the court with the Tabernacle. See Figure 1 and Table 1. This key may have served as a mnemonic device, to ensure that the Tabernacle be set up correctly on each of the many occasions after it had been moved.

The Mosaic Law was strictly taught, and meant to be strictly kept. Are we not to believe that the Mosaic building code was intended to be followed just as strictly? Bezaleel and Aholiab were described as being competent and capable in following that code.

It is interesting to note the differences in Solomon's time, at the building of the Temple, as it begins in 1 Kings 6:2 and 2 Chronicles 3:1. For one thing, no native architects seem then to have been available. The construction of the *Mishkan* was quite different from that of the *Mikdash*, the Temple. Again, the temple was not to be disassembled and moved; so there was no need to

number the parts. Whereas some way was necessary of ensuring that the Tabernacle be assembled in the same way each time. There was no modernisation or evolution of it, nor was any wanted. For 40 years this sequence of disassembling, moving, and re-assembling continued, the people being kept in holiness with the holy Ark, within the holy Tabernacle, in their midst.

The Code and the Sanctuary

"Let them make me a Sanctuary, that I may dwell among them. According to all that I shew thee after the pattern of the Tabernacle and the pattern of all the instruments thereof, even so shall ye make it".

To visualise the Sanctuary, audible communication alone is hardly sufficient. Just as today audio-visual methods are common in teaching, so it happened between Moses the teacher and Bezaleel and Aholiab and their assistants, the students of construction and architecture.

I have called my method of investigation here Epigraphic Topology. It is not something particularly new; in principle it goes back to ancient Egypt.

I prepared a strip of paper (likely papyrus would have been used anciently) and wrote on it, letter by letter as a scale, the Scripture of Exodus 25:8-9. This I call the Epigraphic Yardstick of 71 units. I believed in the truth of the existence of a Biblical code; and tried to apply my experience of architecture, art, and even music to understanding it.

The Sanctuary needed first of all a big space, in the middle of which was the Tabernacle. The court around the Tabernacle was 100 cubits long and 50 cubits wide, for a total perimeter of 300 cubits. (Exodus 27:9-19.) A yardstick is not very practical for measuring such long distances. So I decided to try a line—a cord 50 cubits long, something like a surveyor's chain or tape.

The first sentence of the building code appeared to me perfect for beginning the measuring. There are 10 Hebrew letters. This suggests the scale: one letter represents 5 cubits. Now it was a matter of topology to move a finger along the design and to follow the divine message. See Figure 1 and Table 1, to follow the explanation.

1, 2, 3, 4, (as numbered in Figure 1) from north to south; this correlates with a word of four letters (in Hebrew): *we'assu*. So this indicates 20 cubits, as shown. Next 5, 6, a word of two letters: *li*. So there are 10 cubits. Next 7, 8, 9, 10, a word of four letters: *Mikdash*. So here are another 20 cubits. And so on, following the design around. The line from north to south, 1-10, is the partition between the two fifty-cubit squares of the court. The Tabernacle is situated according to the two letters, 5-6 as shown, in the western court. The Tabernacle itself was 30 cubits long and 10 cubits wide. The

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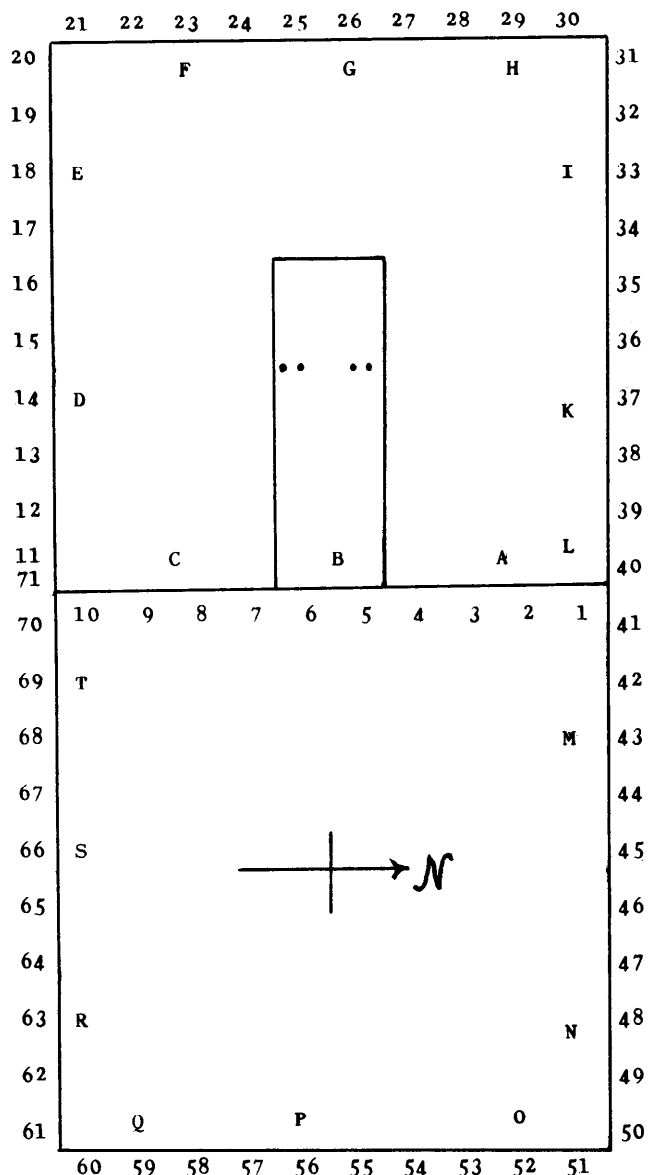


Figure 1. This shows the pattern of the Tabernacle, as given in Exodus 25:8 & 9. The scale is this: the whole enclosure was 50 cubits wide, and 100 cubits long. The numbers around the perimeter show the connections with the letters, as shown in Table 1 and discussed in the text, one letter indicating five Mosaic cubits. The arrow pointing north show the orientation.

Hebrew letters really explain this connection; for in the old Hebrew way of indicating numbers by letters, l indicates 30 and i indicates 10. (I means, of course, the Hebrew letters corresponding to l and to i.)

Here is more evidence that this method of Epigraphic topology really works in showing the pattern. In Figure 1, and referring to Table 1, follow with your finger from letter to letter, and from word to word. It is seen that the 71 units, as tabulated, really give the construction of the Sanctuary as an architectural plan. The number 71 is the Hebrew letter corresponding to w.³ This letter joins the letter number 11, which is also a w in the beginning of the word *we'schachanti*. As said already, this is the preamble to the code.

Table 1. This shows how the measurements around the Tabernacle, as in Exodus 25:8 & 9, and as shown in Figure 1, correspond to the words and letters of the Hebrew text.

A. And let them make	וַעֲשׂוּ 1-4
B. Me	לִי 5-6
C. a sanctuary	מִקְדָּשׁ 7-10
D. that I may dwell	וְשָׁכַנְתִּי 11-16
E. among them	בְּתוֹכָם: 17-21
F. according	כְּכֹל 22-24
G. to all that	אֲשֶׁר 25-27
H. I	אֲנִי 28-30
I. show	מֵרָאָה 31-34
K. thee	אֹתְךָ 35-38
L. the	אֵת 39-40
M. pattern	תְּבִנִית 41-45
N. of the Tabernacle	הַמִּשְׁכָּן 46-50
O. and the	וְאֵת 51-53
P. pattern	תְּבִנִית 54-58
Q. of all the	כָּל- 59-60
R. furniture thereof	כֻּלּוֹ 61-64
S. even so	וְכֵן 65-67
T. shall ye make it	תַּעֲשׂוּ: 68-71

The Poles of the Ark

A next step in demonstrating the existence of a building code is to show the pattern of the poles (staves) from the holy Ark.⁴ Let us concentrate on only the epigraphics of the pole.

In Exodus 25:13-16 are 30 words in 120 letters, beginning: "*We'assita bade atze schitim*..." The corresponding epigraphic in Exodus 37:4-5, is shorter: only 15 words containing 60 letters, the first word being *wa-ja'as*. The difference between the two passages, I believe, relates to the contrast between something considered as intended to be built and the same thing as completed.

Both poles were to be put into the golden rings of the holy Ark. The rings are described in the epigraphic. They are on the sides of the Ark, at a distance of 1.5 cubits.

The question immediately occurred, why so many letters about the poles of the Ark, far more than about the poles of any of the other items of holy furniture? It was also striking that there are twice as many letters, and words, in the epigraphic of Exodus 25:13-16 as in the other, Exodus 37:4-5. It would seem a strange coin-

cidence, in Hebrew or in any other language. Of course, it is not a coincidence. We are concerned here, not with rhymes or with music, but with construction by divine law. The meaning is, do not try to change anything in letters or in words. This is exemplified in the traditional intonation in the reading of the Torah, which has been kept as a law since the time of Ezra the Scribe (Ezra 7:10) and Nehemiah (Nehemiah 8:1-3).

Incidentally, this is something unique. There is no evidence of any epigraphics, or mnemonic devices, on the Babylonian, Egyptian, and other ancient furniture which the archaeologists have excavated.

Table 2'. This shows how the measurements of the staves correlate with the letters of the Hebrew text of the shorter description: Exodus 37:4 & 5.

1. וַיַּעַשׂ And he made
2. בָּרֵי staves
3. עֲצֵי of wood
4. שִׁטִּים accacia
5. וַיַּצֵּף and overlaid
6. אֹתָם them with
7. זָהָב gold
8. וַיָּבֵא and he put
9. אֶת־הַבָּרִים the staves
10. בַּטָּבַעַת into the rings
11. עַל on the
12. צִלְעֹת sides
13. הָאָרֹן of the Ark
14. לְשֵׂאת to bear
15. אֶת־הָאָרֹן the Ark

The answer to the question, why so much is said about these poles, is to be found in the words: *Betabaot harron jiheju habadim lo jassuru mimenu*. "The poles shall be in the rings of the Ark; they shall not be taken from it."

The poles of the holy Ark, in the Holy of Holies, kept the cubit of Moses as the only unit of length for the construction of everything which was commanded in cubits. Here one cubit was indicated by 8 letters, half a cubit by 4 letters, inscribed on the gold-covered poles of acacia wood. Moses is not only the spiritual authority, he is also, with the size of his arm, from elbow to middle finger, the physical, material, expression of the law which should be obeyed.⁵

The length of the poles of the Ark is 15 times half a cubit. From east to west the poles are in three sections. From the entrance between the two columns to the rings

in the holy Ark is 3.5 cubits; between the two rings for the one pole 1.5 cubits; and on to the end) of the poles to the west 2.5 cubits. This is illustrated in Figure 2. Table 2 gives the longer passage: Exodus 25:13-16. Table 2' gives the shorter passage: Exodus 37:4-5.

There is, I am convinced, much more to be under-

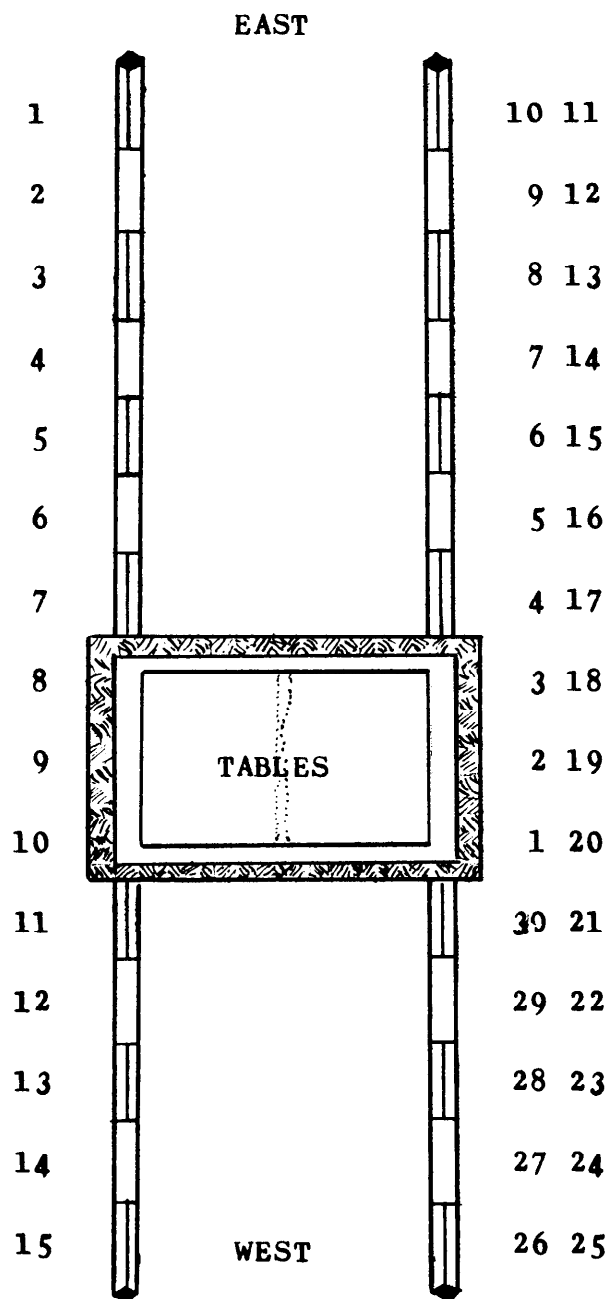


Figure 2. This shows the Ark of the Covenant, with the poles (staves) by which it was carried, as described in Exodus 25:13-16, and 37:4 & 5. The poles were fifteen half-cubits long, as explained in the text; and four letters correspond to a half-cubit. The Ark itself was two and one half cubits long. "East" and "west" show, of course, the orientation when the Tabernacle was set up in one place. The way in which the numbers correspond to the instructions in Exodus is shown in Tables 2 and 2'. The Tables of the Law are shown in the Ark; it is stated in 1 Kings 8:9, that they were still there in Solomon's time.

Table 2. This shows how the measurements of the staves correlate with the letters of the Hebrew text of Exodus 25:13-16.

1.	וַעֲשֵׂתָ	And thou shalt make
2.	בָּרֵי	staves
3.	עֵצִי	of wood
4.	שִׁטִּים	accacia
5.	וְצִפִּיתָ	and overlay
6.	אֹתָם	them with
7.	זָהָב:	gold
8.	וְהִבַּאתָ	and thou shalt put
9.	אֶת־הַבָּרִים	the staves
10.	בְּטָבַעַת	into rings
11.	עַל	on the
12.	צִלְעֹתָ	sides
13.	הָאָרֶן	of the Ark
14.	לִשְׂאתָ	to bear
15.	אֶת־הָאָרֶן	the Ark
16.	בָּהֶם:	therewith
17.	בְּטָבַעַת	In the rings
18.	הָאָרֶן	of the Ark
19.	יִהְיוּ	shall be
20.	הַבָּרִים	the staves
21.	לֹא	they shall not
22.	יִסָּרּוּ	be taken
23.	מִמֶּנּוּ:	from it
24.	וְנָתַתָּ	and thou shalt put
25.	אֶל־הָאָרֶן	into the Ark
26.	אֵת	the
27.	הָעֵדוּת	Testimony
28.	אֲשֶׁר	which
29.	אֶתֵּן	I shall give
30.	אֵלֶיךָ	thee

stood here. As an architect, I feel that I have only begun to unravel something of the Biblical Building Code.

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²Poten, Josef. 1925. *Architektur die nicht gebaut wurde*. Deutsche Verlags Anstalt. Stuttgart.
³It may be worth noticing, in this connection, that in Hebrew w is a coupling letter, often meaning "and".
⁴Baker, Hollis, 1966. Furniture in the ancient world, origins and evolution. *The Connoisseur*, page 96, has shown that storage chests, carried on poles, were common in Egypt, being often shown on monuments. Again, anyone who has seen the furnishing from Tutankhamen's tomb must have remarked that the techniques were very similar to those used for the furnishings of the Tabernacle. Of course, this does not make the instructions, as recorded in Exodus, any less inspired; it was the logical thing that the work be done according to techniques and patterns with which the workmen were familiar, so long as those would fill the purpose.
⁵Is it possible that the poles may be served also as the ultimate standards of length for Israel, and maybe other things from the Tabernacle as standards of weight, etc.? Certainly weighing things in the Temple seemed the natural thing to do centuries later. See Ezra 8:33 and 34.

Reality: Real or Conventional?

(Continued from page 35)

most people develop a certain set of views about reality. Unless they have had significant exposure to dissonant views through contact with influential and respected persons, such as teachers, parents, or ministers, or from their own independent reading, most people react negatively when their views are challenged. The more educated persons sometimes are actually more adamant in holding a narrower view of reality, partially because education itself is an indoctrination process and is often one-sided. Thus, many persons, especially highly educated persons, are very resistant to information which contradicts their world view. They typically respond by utilizing many or most of the psychological defense mechanisms discussed by Freud and more extensively by others, including rationalization, denial, compensation, avoidance, and sometimes even anger and the other more neurotic defense reactions.

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THE LONGEVITY ACCOUNTS IN ANCIENT HISTORY

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The longevity accounts in the Bible, mostly in Genesis, were contested by some, but nevertheless were accepted as valid by such persons as Josephus in the 1st century, Augustine in the 5th century A.D. and the Puritan scientists in the 17th century A.D. WHY was subject not to doubt, but to varying speculations.

Recorded in the Bible, especially Genesis, are: (1) greatly extended lifespans, and (2) also delayed sexual maturation; and both must be related. Also in the Bible are: (3) an abatement or decline of lifespans after the flood, and (4) yet a phenomenal vigor in the lives of the patriarchs. Observed in nature are: (5) great normal size for most fossil animals, and (6) an abatement or decline in the size of animals in the Pleistocene, which is equated to the post-ice-age, post-flood era.

It is theorized here that before the flood the atmosphere was like the present atmosphere in constituents for oxygen, nitrogen and argon, but was different in humidity or water vapor, and especially in carbon dioxide. Contemporary CO₂ levels are 330 parts per million, partly due to burning of fossil fuels in our age of petroleum. At the turn of the century it was 290 ppm. However, before the flood atmospheric CO₂ is considered to be 5000 ppm, some 15 times the current concentration.

The decline in atmospheric CO₂ is considered parallel to, and caused by, a decline in temperatures of the oceans. Cold oceans will absorb CO₂ out of the atmosphere like a blotter; and it is believed that oceans have dropped in average water temperature from a preflood 60° F. to a current 38° F. This is the physical cause for the depletion of atmospheric CO₂.

A decline in CO₂ physiologically results, (specific only to the skin and the brain), in a vasodilation of blood vessels, and hence in oxygenation of the brain cells. The progressive decline of CO₂ and hence the decline in oxygenation of the brain cells, especially of the cells in the hypothalamus in the mid brain, is considered the cause of the accelerated aging.

Accelerated aging is believed caused by a more rapid breakdown of the suppression system of the hypothalamus. A more active hypothalamus causes the diseases of aging. This is the hypothalamus dysregulation theory.

Besides the decline in lifespans as seen in Genesis after the flood, there was also a decline in the age of patriarchs at the time of their firstborn son, hence a decline in age of arrival at sexual maturity, and presumably skeletal maturity. Hence the smallness of contemporary animals compared to fossil ones.

The numerical ages of the patriarchs are one class of data. The phenomenal vigor of the patriarchs is seen as supplying a strong internally consistent additional data base, indicating that the data are reliable. Examples are taken in the lives from the 5th, 10th, 15th and 20th generations after the flood in the person of Joktan, Sarah, Job and Caleb.

Yet another corroboration in the hypothesis of atmospheric decline in CO₂ is seen in the change of ancient climates. North China and Palestine are given as illustration, further underscoring the theory.

General History and our Hypothesis

Modern science originated at the same time, in the same locations in Northern Europe, where the Protestant reformation took hold, and especially in those areas where Calvinism was strong.¹ Simultaneously capitalism, like science, developed in these same societies according to Max Weber, Robert Merton, Joseph Needham and others.^{2,3,4} These areas included Prussia and the other independent North German states, Holland, Switzerland, to some extent France, and, somewhat later, Scotland and England.

The Puritans of England arose a little later than did the Calvinists in the other aforementioned areas; and their society was blessed with more peace and less war. As the Puritans became prominent, they also developed a considerable interest in science.^{5,6} Their broad and intense academic interests included both the Word of God and the works of God; in Biblical laws and in natural laws, or principles in natural science. In fact, they considered both science and nature had one and the same divine author.

The Puritans, not questioning the veracity of the long lifespans as recorded in Genesis, Job and Joshua, did, however, wonder how and why. Many Puritan scholars repeated and endorsed the view which Josephus proposed, circa 90 A.D., namely that the patriarchs were long-lived because of their virtuous behaviour and their diet.⁷ Martin Luther attributed ancient longevity to a higher level of wisdom which the ancients had attained, and suggested that after the flood man could no longer acquire deep knowledge.

Thomas Browne (1605-1682) suggested that lifespan was shortened to prevent overpopulation. Thomas Burnet (1635-1715) correlated decreasing lifespan with increasing population, and supposed that one caused the other in some way. Count Buffon (1707-1788) postulated as late as 1749 that there was a causal relationship between gravitational attraction and aging, and that in antiquity the earth had less gravitational attraction and hence there was slower aging.

In our essay it is proposed that it was indeed a difference in diet of the ancients which caused their greater lifespan. However, it was not as Josephus supposed, a diet of food which would undergo digestion. Rather it was the diet of air taken in by respiration (and the corresponding blood acidity) and in brain oxygenation which was different.

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This essay proposes, as a basic assumption, that at the time of the flood, circa 2400 to 2500 B.C., the earth's atmosphere contained approximately 1/2% carbon dioxide, which is 5000 parts per million. The current concentration of CO₂ in the atmosphere is 330 ppm; and this is increasing due to burning of fossil fuels in our age of petroleum at a rate of about 0.7 ppm per year.⁸ The atmosphere is estimated to have contained 290 ppm as recently as 1900.

Figure 1 illustrates our view of the concentrations of atmospheric CO₂ throughout history and especially the postflood decline. It also implies that the flood included a planetary ice dump over the magnetic polar regions, a very sudden phenomenon of celestial origin.⁹

If the atmosphere lost great amounts of CO₂, to where did it go? It is well known that warm soda pop will quickly lose its fizz; its CO₂ rapidly evaporates. This is much slower with cold soda pop even with high concentrations of CO₂ in the pop. This illustrates that the oceans absorb CO₂ out of the atmosphere and return some of it in a deep and complex interaction. Cold oceans will absorb enriched CO₂ out of the atmosphere rapidly.

If the earth had 5000 ppm of CO₂ in the preflood era, this caused a very effective greenhouse effect, which in turn kept and maintained high temperatures and high humidities even in the polar regions. Based on the examples of fossil redwoods and other flora, much of it subtropical in Iceland, Greenland, Siberia, Spitzbergen and elsewhere, an estimate of surface temperature in the high latitudes of 60° F. is reasonable, and defensible.

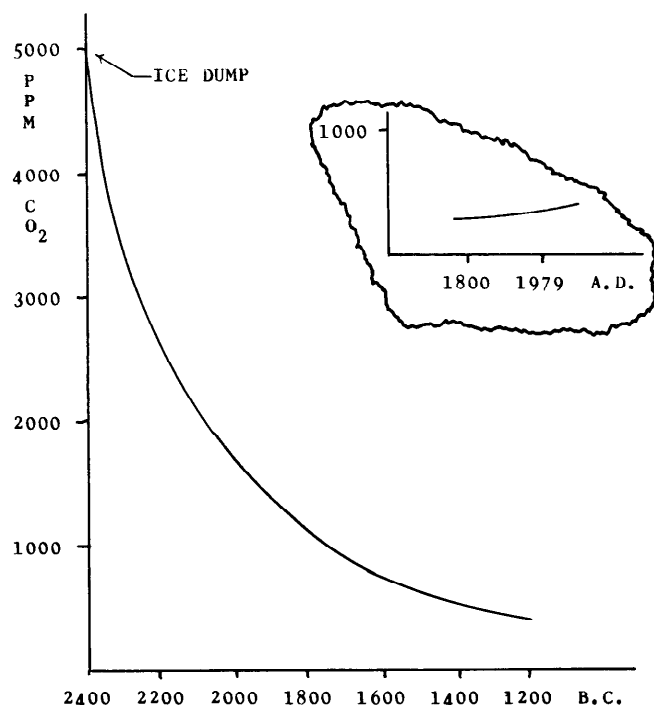


Figure 1. This shows the way in which, it is suggested, the concentration of carbon dioxide in the atmosphere decreased, from a previous figure of about 5000 parts per million. The inset shows how in recent times the concentration has begun to increase. It is suggested that, at the time of the Flood, ice from an extraterrestrial source was dumped onto the Earth.

Table 1: Distribution of carbon dioxide in the biosphere and elsewhere; pre-Flood (pre-ice-age) era and the present compared.

	Pre-Flood 20th Century	
In the Atmosphere	21 %	1½ %
In the Terrestrial Biosphere	8 %	2½ %
In the Marine Biosphere	8 %	7 %
In the Oceans	63 %	89 %
Assumption 1	Living and dead organisms are included in the marine and terrestrial biospheres.	
Assumption 2	Average temperatures of ocean water in the two eras is 60° F. and 38° F. respectively.	
Conclusion 1	In the preflood era with warm temperatures, high humidities and enriched CO ₂ there was far more mass flora than the in the current scene with deserts, tundras and depleted CO ₂ .	
Conclusion 2	Even more than in the terrestrial biosphere, out of the atmosphere came most of the CO ₂ which the colder oceans ultimately captured.	
Conclusion 3)	The time span for the new low plateau of CO ₂ to be achieved was 1200 to 1500 years.	

Our study of solubility charts for both fresh and saline water indicates that at 60° F., the oceans will absorb about 70% as much CO₂ as at present temperatures.¹⁰ In the current scene, the average temperature of all sea water is a chilly 38° F.¹¹

Table I illustrates our judgment concerning the distribution of CO₂ in the pre-flood (pre-ice age) era as compared to the current 20th century scene. This is not to imply that the volumes of circulating carbon throughout the biospheres of the two eras were the same.

Hypercapnia and Physiology

Hypercapnia is an enriched atmosphere in CO₂ above the 20th century norm of 330 ppm. Hypocapnia is depleted CO₂. When hypercapnia occurs in laboratory conditions, the blood in vertebrate animals automatically becomes more acidic. One result of a more acid blood is a superior retention of calcium and zinc and other trace elements, except copper which zinc flushes out. Another possible effect should be an elimination of arthritis caused by alkaline blood.

A more important effect of enriched CO₂ is an expansion, or dilation, of blood vessels in the brain (and in the skin but not in other tissues). For example, Sokoloff reports,

It is generally agreed that CO₂ exerts more powerful effects on the cerebral circulation than any other means of physiological or pharmacological significance . . . The carbon dioxide normally present in blood exerts a tonic vasodilator action on the cerebral blood vessels, and a fall in arterial P(CO₂) normally results in cerebral vasoconstriction and reduced cerebral blood flow.¹²

In another essay, we postulate more completely the hypothalamic disregulation theory of aging.¹³ Briefly, it is believed that with more CO₂ and vasodilated blood vessels, there would be more oxygen available to the brain cells, as there was in the preflood era. The greater oxygenation of brain cells results in better retention of

cell electrosensitivity. In the hypothalamus, a small gland in the mid-brain orchestrating aging for the neuro-endocrine system, the loss of electrosensitivity of hypothalamic cells results in a breakdown of the suppression system of the hypothalamus.¹⁴ When the suppression system breaks down, the hypothalamus becomes increasingly active, and this results in the diseases of aging. This occurs prematurely with hypocapnia and low atmospheric CO₂ levels.

Animals in the fossil record are larger than contemporary animals, but not because they grew faster. Rather, the reason is that they grew at the same rate for longer; they had an extended period for arriving at sexual maturation and for arriving at skeletal maturation.

From one viewpoint, the preflood atmosphere was enriched in CO₂ to a level about 15 times that of the current scene. From another the entire human race and all animal and plant life have existed in an abnormal, CO₂-depleted, hypocapnic environment for some 4000 to 5000 years. Which is normal, the current 330 ppM, or the pre-industrial 290 ppM, or the preflood estimate of 5000 ppM? It depends on from which perspective one views hypercapnia and hypocapnia. Most view it from the current level of 330 ppM merely because they are not really aware of the prehistorical condition.

The Biblical Data 1: The Numerical Data

We assume the preflood patriarchs, like the postflood patriarchs, are real persons, not mythological persons. We view the books of Genesis and Job as viable history—and as viable medicine consequently. Some medical theories on aging only allow room for very minor adjustments in man's life potential; Genesis and Job are otherwise. And the hypothalamic theories for aging (including the hypothalamic dysregulation theory which we favor) also allow for major changes in aging rates, both faster and slower, depending on the success of the suppression mechanism of the hypothalamus.

This raises a good many questions. One is, "Could conditions similar to the preflood era, with approximately 5000 ppM of CO₂, be used experimentally on 20th century animals with telling effect?" We think so. Another question might be, "Under conditions of enriched CO₂ in a micro-climate such as a home or an office building could 20th or 21st century man's lifespan be significantly extended?" We think so. Yet a third question might be, "What are the predicted levels for atmospheric CO₂ expected to be reached due to burning fossil fuels and limestone kilning?" Probably 400 to 450 ppM by 2050 A.D. And a fourth question might be, "Is the recent increase in atmospheric CO₂ in any way related to the increase in height of recent generations and/or the increase in lifespan?" We think so. Experimentation, both hypercapnic, control and hypocapnic is imperative.¹⁵

We are asking questions which nobody has hitherto thought to ask, or at least not since the time of the Puritan scientist-theologians 200 and even 300 years ago. Our view of Genesis and Job is in sharp contrast to mainstream modern academia (nourished on Lyellianism and Darwinism) which considers Genesis to be roughly equivalent to mythology, and considers Job

roughly equivalent to Shakespeare, figurative rather than historical as we do.

Our view is also in sharp contrast with too much of modern evangelical thought which considers science an alien and possibly even an irrelevant area, and often approaches it defensively. And such modern evangelical/fundamentalist thought will tend to regard these great accounts of longevity in Genesis of Job as true, but beyond understanding. Therefore we pose these great questions to both modern science, especially modern medicine, and to the Christian/Jewish theological arena.

Can enriched CO₂ in laboratory conditions produce extended or delayed sexual maturation, and its associated delayed skeletal maturation (gigantism)? Can this principle—not new but 5000 years old, but nevertheless newly noticed—be applied to alter mankind's longevity in the direction of enhancement? And can this new understanding of an old principle relate to an enhancement of a revised or invigorated greenhouse effect for earth's climate?

Will the reader allow us, kindly, to indulge in three or four rhetorical questions? Did Adam live 912 years? Did Methuseleh, Noah and Seth live 969, 950 and 912 years respectively? Are these figures of speech and not real persons (as one respected learned correspondent affirms)?

Isaac Asimov (a prominent modern writer on science and the history of science) has brushed aside this issue with a quick suggestion that the counting was done in months, not years. Is this quick suggestion too quick? How does Asimov explain Abraham's lifespan of 175? (Did he live 14.58 years?) Or Job's lifespan of 210 years or thereabouts? Or Arphaxad's of 438 or Sarah's of 127 or Peleg's of 239? He doesn't address this interrelated issue. What could he say?

We shall meet similar scepticism, or cynicism, concerning these ancient lifespans in the days of Josephus and of Augustine, and see how these two men, affirming the ancient accounts, handled their responses.

Numerical Data

The "beget and begot" chapters of Genesis are somewhat repetitive, more than somewhat amazing, and to some uninteresting. However, they indicate not one but two things. One is a delayed senescence or long lifespan and the other is a delayed physical or sexual maturation with its correlated issue of delayed skeletal maturation. Both are important, and perhaps equally so. Table 2 illustrates delayed physical or sexual maturation.

Now that delayed maturation has been observed and noted with reasonable carefulness, our attention shall be turned toward the long lifespans. This information could be presented in tabular form easily. However when it is plotted on a graph, a new relationship appears which may escape attention in a tabular presentation. This is the curve of abatement or declining of lifespans after the flood. This curve is very similar to the curve of CO₂ abatement seen in Figure 1.

Figure 2 embraces 28 patriarchs of whom 9 were entirely preflood, 17 were entirely postflood and 2 (Noah

Table 2: the recorded ages of the Genesis patriarchs at the birth of their heirs.

Pre-flood and Pre-Ice Age Category	
Adam	130
Seth	105
Enos	90
Kenan	70
Mahaleel	65
Jared	162
Enoch	*65
Methusaleh	187
Lamech	182
Noah	*500

Average, omitting (*) the highest and the lowest ages: 124 years

Post-flood and Post-Ice Age Category

Arphaxad	35
Selah	30
Eber	34
PELEG	30
Reu	32
Serug	30
Nahor	*29
Terah	38
ABRAHAM	*86
Isaac	60

Average, omitting (*) the highest and the lowest ages: 36 years.

- Assumption 1 All twenty of these names are real persons.
 Assumption 2 Textual transmission down through the centuries has been essentially faithful and accurate.
 Conclusion 1 Physical maturation in the postflood era occurred 3.4 times faster than in the preflood era.
 Conclusion 2 The lives of the first ten postflood patriarchs heavily overlapped.

and Shem) lived in both eras. These data in Figure 2 (far more than those in Table 2) are what causes so much amazement, bewilderment and perhaps curiosity among Biblical believers. Because these same data (if they are data and not mythology) are so alien to modern, or even medieval experience, they have caused cynicism and skepticism among academics who profess no commitment to a Biblical faith. Nor are these people to be blamed. If they ask questions about these matters, answers need to be given for the questions; and the "show me" attitude is most appropriate.

In this article, the Biblical data will be stressed. To do so is by no means to suggest that the climatological, geochemical and medical aspects of the matter are unimportant.

The Biblical Data II: Internal Consistency of Reports of Vigor

In Figure 2, perhaps some noted that "Peleg" and "Abraham" were capitalized in contrast to the other names and wondered why. Peleg was in the 5th post-flood generation, a grandson of Shem's grandson (Selah). The sequence is Shem, Arphaxad, Selah, Eber,

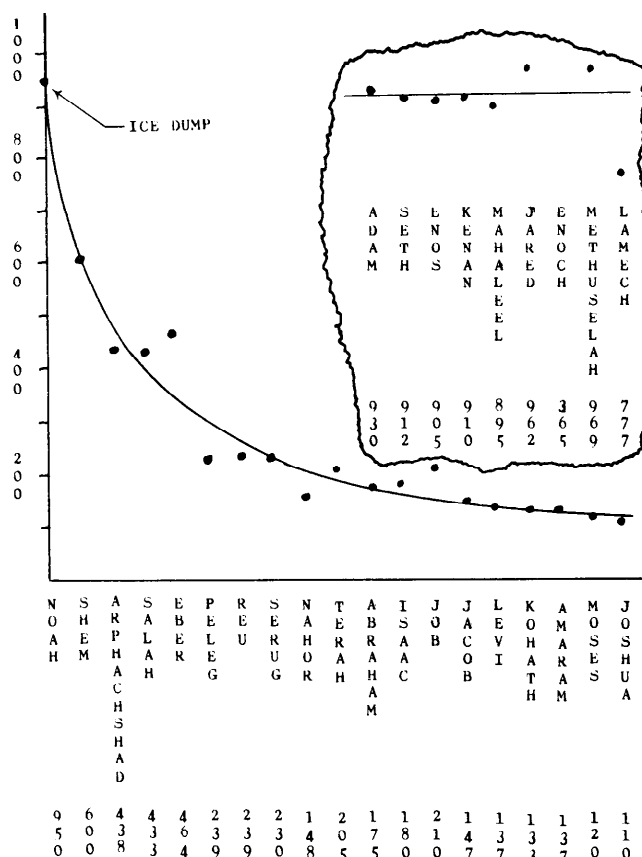


Figure 2. This shows the ages to which the patriarchs, and some others, lived. The mean curve is a sort of best fit to the individual points. The inset, to the same vertical scale, shows the antediluvian patriarchs. The point for Enoch, who did not die but was translated at age 365, is not shown. Again, the dumping of ice onto the Earth from outside is indicated.

Peleg, Abraham is in the 10th postflood generation. Job is around the 15th and Caleb (not in the Figure) is approximately the 20th. These are representative generations, about every 5th, after the flood. How internally consistent is the account of, not their length of life alone, but also their vigor in life?

JOKTAN. Joktan was recorded as being Peleg's brother. Peleg's age at his death is recorded as 239. It is presumed that Joktan lived about as long as his brother; Genesis is silent on that. Joktan's great-grandfather (Arphaxad) was born 2 years after the flood, "Yoktan" is derived from the prime root *gaton* meaning to diminish or abate. According to a Hebraist, our correspondent and publisher, Marvin A. Luckerman,¹⁶ Joktan or Yoktan in Hebrew means "shortening".

Joktan and his brother Peleg lived during the era when, if Figure 2 accurately describes the ancient scene, the curve of declining lifespan was precipitously dropping. Some of the ancients of that era must have become alarmed about something involving shortness or declining. Perhaps it was shortness of lifespan, but perhaps it was also the increasing shortness of the period of time required for coming to sexual/skeletal maturation. Consequently this kind of meaning was imparted to Peleg's younger brother by his alarmed parents, one of whom was Eber.¹⁷

The Book of Jasher, of disputed origin, treats the material in Genesis but in an expanded form; and it is in general harmony with both the Biblical and the Talmudic accounts concerning the abatement of lifespan at that time. Jasher is quoted as follows:

And to Eber were born two children; the name of one was Peleg for in his days the sons of men were divided and in the later days, the earth was divided. And the name of the second was Yoktan, meaning that in his day the lives of the sons of men were diminished and lessened.¹⁸

The Tamudic tradition is similar in viewpoint:

The brother of Peleg was called Joktan, because the duration of the life of man was shortened in his time.¹⁹

It is presumed that Joktan lived approximately as long as his older brother, Peleg. The Bible does not record his lifespan; neither does Jasher or the Talmud. But what is recorded is that he had 13 sons (Gen. 10:26-29). Probably he had a similar number of daughters. And possibly some children who did not survive infancy or childhood were not counted. At the very least it is presumed Joktan had 20 children, and 25 is reasonably likely. To say the least, one must consider patriarch Joktan to be an example of vigor.²⁰

SARAH.²¹ Sarah is the only woman in Genesis whose age was recorded at the time of her death, 127 years (Gen. 23:1). Sarah lived 63% longer than the average contemporary American woman, who has a life expectancy of, surprisingly, 78 years. Sarah's father-in-law (Terah) is recorded to have lived 205; her husband (Abraham) to 175, her only son (Isaac) to 180 and one grandson (Jacob) is recorded as having lived to be a ripe age for today of 147, but this was not considered a ripe old age for that era.

At the age of 89 years, when most modern American women are residing at the cemetery in body, Sarah had a surprise baby: laughably, her first. Apart from the element of divine intervention and/or miracle/surprise, this barren woman became pregnant. In her ovaries there must have still been at least one of her complement of 512 eggs, or ova. We presume that she was in or approaching menopause. Today in America, 95% of the women have completed menopause by the age of 53.²² Sarah, when she became pregnant, was 68% older than nearly all modern American women when they have completed menopause.²³

Yet another feature of Sarah's life reflects a slower rate of aging. While Sarah was in her 80's, she and Abraham encountered an Amorite sheik, the king of Gerar. Sarah was viewed as a fair woman, still attractive and beautiful at least to an extent. At modern rates of aging, this is inconceivable.

When Sarah died at the age of 127, Abraham, about 10 years her senior, became a widower at about the age of 137, perhaps 138. Soon he remarried. He maybe elevated one of his servant-women, Keturah, to become his third wife. By Keturah, this twice-over septaugenarian (2x70) had a third family. Keturah bore Abraham six sons (Gen. 24:1-2) possibly plus an unrecorded number of daughters.

Sarah seems to have been aging at about 60%, possibly 55% the rate of modern American women. Her hus-

band, who sired at least six children after the age of 140 (and who lived to be 175) was aging at a similar rate. Beyond the basic numerical data, the late beauty of Sarah, and her age at the time of Isaac's birth, and Abraham's record of double-septaugenarian paternity, all argue for vigor, a remarkable vigor, if the Biblical account is to be accepted at all (along with Josephus, the Talmudic tradition, etc.) Vigor was noted in the case of Joktan also.

JOB.²⁴ Job's trial by Lucifer occurred in the approximate year 1660 B.C.²⁵, probably in March of that year. Job's age at that time was not recorded. What was recorded is that he had 10 children; but apparently there were no grandchildren. All were suddenly destroyed by a "*ruwach*", a bolidic or meteoritic explosion, mistranslated a "whirlwind". The occasion for the gathering of the children has occasionally been guessed at by commentators, and the guess has been a birthday party. If Job was about 70 years old; which is in harmony with Table 2, perhaps his children, ten in number, were gathering for an engagement party; Job's oldest son must have been approaching the time for marriage.

Several commentators on the Book of Job suggest that Job was 70 years old at the time of his trial. Their theological reason is that after the trial, Job's ample herds of 11,000 live stock (including asses, camels oxen and sheep) all were doubled in each category. And his lifespan thereafter, doubled or otherwise, was recorded, another 140 years.

So the Lord blessed the latter end of Job more than his beginning . . . After this lived Job a hundred and forty years, and saw his son, and his sons' sons, even four generations. So Job died, being old, and full of days. Job 42:12a, 16, 17.

Job saw 4 generations in his last 140 years. Roughly, this suggests about 35 years per generation although this could be made somewhat higher. This agrees with the tradition that Job was about 70 when his trial befell him, and this reason, rather than the doubling of Job's possessions, is why this essay is in agreement that Job was about 70 years old at the time Lucifer's diabolical intervention in his life occurred.

It has been observed that Joktan's recorded very ample paternity is an example of vigor. Abraham's third family is a similar record. And after Job's trial, after the age of about 70, Job had another 10 children, again an example of ample vigor.

Sarah's late beauty, and her probable delayed menopause were also cited. What are other characteristics of aging? Gray hair is of course one. When Job underwent the Luciferian trial, neither he nor his three good friends understood the unseen spiritual conflict. They were sympathetic with Job, but they soon began to differ, to contend and to argue with Job, becoming miserable comforters. One of these friends was Eliphaz, Esau's son, Jacob's nephew, Joseph's cousin.

Eliphaz, in the course of remonstrating with Job, made the following casual but very significant comment:

With us are both the grayheaded and very aged men, much elder than thy father. (Job 15:10)

It has been established that Job was about 70 years old at the time of the trial. This is based on his first 10 children, and the delayed maturation which was experienced in that era. Our view, and hence our assumptions, needs stating. We assume that the Book of Job has historical veracity²⁶. It was undoubtedly presented in a dramatic-type of presentation originally. But this drama is not as one today might view Shakespeare, which was substantially non-historical (or history rewritten.) We see the Book of Job as historical, and the literal interpretation inherently seems substantial. In this context review the above-cited quotation, Job 15:10. This one casual sentence brings forth three age-related issues:

1. Job, age about 70, was not yet gray-haired.
 2. Job, age about 70, had a yet living father, perhaps 120 or so.
 3. Job's living father, perhaps 120 yrs old, was nevertheless not yet in genuine old age.
- Within the last century Isaac had died at age 180 and Jacob at 147.

Here again, in the case of (1) Job's childrens' delayed maturation, (2) Job-the-septaugenarian's second and very ample family, and (3) Job's lack of gray hair at age 70, vigor appears. The principle of vigor lends internal consistency to the numerical data concerning the veracity of the extended lifespans, and the delayed maturity which is repeatedly observed. Job seems to have aged at a rate of about half that of modern American males. More technically, his early maturation was at about 60% as fast as modern American men and his later record suggests after the trial he was aging perhaps only 40% as quickly as modern American men.

CALEB.²⁷ Caleb, an Israelite general, circa 1400 B.C., was in approximately the 20th generation after the flood, as compared to Job in the 15th, Sarah in the 10th and Joktan in the 5th. Caleb led the Israelite army in the conquest of Southern Palestine. At 85, he was an acting field commander, possibly wielding battle ax and shield like his subordinates. In today's American army, field commands are denied to generals at the age of 55 or over, on the precise grounds of a lack of vigor. Caleb maintained, perhaps with some bravado, that he was as vigorous at 85 as he had been at 40.^{28,29}

DATUM EXCEPTION. Biblical data are unified and internally consistent concerning long lifespans, and the decline thereof after the flood. There may be one exception. A collective rather than an individual case. This is referred to both in Deut. 2:14 and Josh 5:4. All of the Hebrew men of war who left Egypt (Caleb and Joshua excepted) were dead by the time the Hebrews crossed the Jordan, 40 years after entering the wilderness. Allowing that males 30 years and younger were not counted as men of war, this clearly means that all men who crossed the Jordan, Caleb and Joshua excepted, were 70 years old or under.

JOSEPHUS. Beyond the authors of Job (perhaps Joseph) and Genesis (clearly Moses), another historian/author is cited. He lived some 1500 years later than Moses and 1700 years later than Joseph and Job. Flavius Josephus (37-100? A.D.) lived at a time when the new low levels of lifespan, and, we believe, atmospheric CO₂ had been reached. These two low

plateaus were reached between 500 B.C. and 900 B.C. The society of Josephus did not experience longevity in any way remotely similar to that of earlier times.

Josephus recognized, and no doubt respected, the reluctant and cynical opinions of those who tended to disregard the ancient accounts due to the great lifespans, never experienced in their later times. Nevertheless, Josephus came down hard in favor of those ancient accounts of longevity for some intriguing reasons. We quote:

Now when Noah had lived 350 years after the Flood, and all the time happily, he died, having the number of 950 years, *but let no one, upon comparing the lives of the ancients with our lives and with the few years which we now live, think that what we have said of them is false or make the shortness of our lives at present an argument that neither did they attain so long a duration of life . . .*³⁰ (Italics ours.)

Josephus seems to have been a judge, or a Levite, before the Jewish revolt of 66 A.D. He became a military general, then a refugee, and finally a historian. Observe how he anchored his defense for his decided opinion favoring ancient longevity. His mind-set was not so much canonical or theological, but rather was historical and linguistic. He relied in part on the Jewish writings but also in part on then extant sources that were from various languages and various provinces (or today, various countries.) Again we quote:

Now I have for *witnesses* to what I have said all those that have written Antiquities, both among the Greeks and barbarians, for even Manetho, who wrote the Egyptian history, and Berosus, who collected the Chaldean monuments, and Mochus, and Hestiaeus, and beside these, Hieronymus, the Egyptian, and those who composed the Phoenician history, agree with what I here say: Hesiod also and Hecataeus, Hellanicus, and Acusilaus, and besides Ephorus and Nicolaus relate that the ancients lived a thousand years; but as to these matters, let every one look upon them as he thinks fit.³¹ (Italics ours.)

Josephus well understood the natural human tendency to doubt or disbelieve something one has not seen, experienced or heard about from a reliable immediate source; or the "show me" outlook. This of course is particularly so when a story is far beyond the scope of human experience, such as living 10 to 15 times longer than most contemporaries.

However, Josephus and his colleagues had read widely throughout the antiquities of the Mediterranean world, at that time under Rome. His mind-set was based in part on the collage of ancient international sources and their unanimity. There were no contradictions. The ancient longevity accounts with which he was acquainted extended far beyond the borders of his native Palestine. His sources came from no less than three continents. Such sources, when in unison, to Josephus far outweighed the contemporary rationalizations and cynics, however reasonable and well-intentioned. His sources came from areas which today include Africa, Asia and Europe, three continents.

Africa was represented by the Egyptian historians, Hieronymus and Manetho. Neither of these, certainly,

wrote in Hebrew or Aramaic. Africa (Egypt) also in another perspective, is represented by Moses, and perhaps by Joseph if he is indeed the author/patron of *The Book of Job*. Joseph was not a native Egyptian, but an immigrant; but Moses, author of the Book of Genesis as well as the other four books comprising the Pentateuch, was born and raised in Africa; ancient Egyptian was his native language.

Asia was represented by a variety of historians from no less than four countries, nationalities and original languages, although the historians wrote in Greek. Chaldean sources are represented by Berosus, a Babylonian priest of the 3rd century B.C., who wrote the history of Babylonia in Greek. Syria is represented in Nicolas of Damascus, the oldest continuously occupied city on earth. Nicolas, a historian of the 1st century B.C., was a friend of Emperor Augustus and Herod the Great.

A minimum of two unnamed Phoenician (Punic) historians are cited, likely drawing from ancient Punic sources. Palestine is represented by the ancient Jewish prophets and priests, who drew so heavily from the African, Moses, who led the Israelites out of Africa and back to Israel. The Book of Job is also a literary heritage of Palestine. These are a minimum of four Asian sources, two Egyptian sources and two who were Egyptianized Semites, a total of eight sources.

Europe is represented by five or six different Greeks including Hesiod of the 8th century B.C. Augustine considered Homer to be yet another ancient source attesting to ancient longevity. Thus one can sum up a total of 14 or 15 ancient sources, coming from three continents and at least 6 different ancient languages. Of these ancient sources familiar to Josephus other than the Biblical sources, only a few fragments and a few manuscripts survive. This may be one reason why modern academia is less impressed with this ancient tradition than was Josephus.

AUGUSTINE. Augustine, (354-430) A.D.) like Josephus, considered the accounts of ancient longevity to be valid, however surprising and however far beyond the experience of his era. As in Josephus' day, there were cynics and doubters who suggested the counting was done by months or whatever.

Augustine's mind-set was different from that of Josephus. While Josephus thought in Aramaic, Hebrew, and perhaps Greek, Augustine thought in Latin; and his thinking was more canonical, or theological compared with Josephus, whose thinking was more historical. Thus Augustine's confidence in the ancient Hebrew records was an issue of creed and faith. Note Augustine's different rationale in his discussion of the ancient lifespans:

"... observed how prolonged were the lives of men, unless some skeptic take exception to this very length of years which our authors ascribe to the antediluvians and deny that this is credible. And so, too, they do not believe that the size of men's bodies was larger then than now ...

But the large size of the primitive human body is often proved to the incredulous by the exposure of *sepulchres*, either through the wear of time or the violence of torrents or some accident, in which

bones of incredible size have been found or have rolled out ...

Homer in his poems often lamented the same decline; and this he does not laugh at as a poetical figment, but in his character of a recorder of natural wonders accepts it as historically true. But, as I have said, the bones which are from time to time discovered prove the size of the bodies of the ancients, *and will do so to future ages*, for they are slow to decay. But the length of an antediluvian's life cannot now be proved by any such monumental evidence.³² (Italics ours.)

Did Augustine actually see gigantic mammal bones and mistake them for human bones? Such a mistake is possible, though we think not probable. Certain 17th century pre-geologists found ancient gigantic mammoth bones and thought they had found the remains of some of Hannibal's elephants. However, note that Augustine did say giant bones were found in ancient sepulchres, among other places. In sepulchres is indeed where one would expect to find human bones.

Secondly, observe that Augustine seemed to forecast or predict that the very size of these ancient bones would convince some future generation of whatever era that ancient gigantism, if not ancient longevity, would be proved. Augustine linked gigantism with longevity for the ancients. This essay will briefly discuss gigantism also.

Gigantism

Table 2 indicated that it took longer for ancients to come to sexual/skeletal maturation than medieval or modern men. The logic therefore is that if the ancients (including animals) took longer to arrive at skeletal maturation, while growth rates were more or less constant and the same as now, they would be larger. They grew not faster but for a longer period of time.

Table 3 illustrates world gigantism as it occurred before the Pleistocene age, or in our view, the pre-flood era. Gigantism occurred on an intercontinental and on an inter-species basis. Six-foot beavers are found, as are fifty-one foot crocodiles, nineteen-foot mammoths (at the shoulders) and birds with wingspans varying up to seventy feet in length. Mostly, for mammals, their size in terms of height or length, was 30% to 40% greater than in today's zoological world.

Figure 3 illustrates an easily-documented but little known fact, which is, that after the Pleistocene or the ice age, all around the world, simultaneously, there is found a successive abatement or decline in animal size. For instance, there is found a bison sequence in North America. The ancient *Bison latifrons*, stood 7½ feet tall at the shoulder. Successively smaller sizes follow, modern bisons being between 4½ and 5 feet tall at the shoulder.

There is a moa sequence in New Zealand. These birds diminish from an ancient size of 12 feet tall down step by step to 3 feet, and then extinction. In the Caribbean region, in the Pleistocene, there is a sloth sequence from 20 feet long successively down to 10 feet long. In Palestine, Figure 3 cites the successive decline in size of seven mammals. Figure 3, illustrating decline in size of

Table 3: World gigantism as shown by various fossil animals. The use of terms such as "Pleistocene" does not imply that the author subscribes to the uniformitarian ages associated with those names.

Order	Latin Name	Era Found In	Size	Size of Modern Relative
Class Mammalia				
Infraclass Marsupials				
Macropodidae	Palorchestes	Pleistocene	11½ ft.	Kangaroo
Diprotodontidae	Phascolonus	Pleistocene	5 ft.	Vombatis platyrhinus (wombat—3 ft.)
Infraclass Higher Mammals (Eutheria of Placentalia)				
Edentates	Megatherium	Pleistocene	20 ft.	Sloth
Edentates	Glyptodont	Pleistocene	12 ft.	Armadillo—3 to 4 ft.
Hyracoidea	Phiohyrax	Pleistocene	5 ft.	Hyrax
Rodentia	Trogontherium cuvieri	Pleistocene	6 ft. long	Beaver
Artiodactyla	Gigantocamelus	Pleistocene	11 ft	One-humped camel
Cervidae	Giant deer	Pleistocene	Height 10 ft.; antler spread 12 ft.	Deer
Artiodactyla	Bison latifrons	Pleistocene	10 ft. horn spread;	American bison—horn spread 2 ft;
Carnivores Felidae	Panther leo spelaea	Pleistocene	7½ ft. at shoulders 1/3 to 1/2 times larger than modern relative	height at shoulders 4 ft. Lion
	Panthera cristata	Pleistocene	"	Panther
	Panthera tigris	Pleistocene	"	Asiatic tiger
	Panthera atrox	Pleistocene	"	Jaguar
	Puma concolor	Pleistocene	"	Puma
Hyaenidae	Crocuta crocuta spelaea	Pleistocene	"	Cave hyena
Ursidae	Ursus spelaeus	Pleistocene	"	Cave bear
Class Aves (Birds)				
Aseriformes	Cnemiorhis	Pleistocene	3 ft.	Goose
Sphenisciformes	Pachydyptes	Miocene	5 ft.	Emperor penguin—3 ft.
Falconiformes	Teratornis merriami	Pleistocene	17 ft. wing span	California condor
Struthioniformes	Aepyornis maximus	Pleistocene	10 ft.	Ostrich—6½ ft.
Dinornithiformes	Diornis giganteus	Pleistocene	11½ ft.	Moa—3 ft. (subrecent)
Class Reptilia				
Chelonia	Miolania	Pleistocene	14 ft. length	Turtles
Squamata	Palaeophis	Lower & middle Eocene	20 ft.	Sea snake
Crocodylia	Deninsuchus	Tertiary	51 ft.	Cavial
Saurischin	Magalania priscus	Pleistocene	23 ft.	Giant Monitor—11 ft.

animals after the flood/ice age, should be compared to Figure 2, illustrating decline in lifespan after the flood/ice age, and also compared to Figure 1, illustrating our theory of decline in atmospheric richness of CO₂ after the flood/ice age.

The traditional explanations for this decline in ancient size have centered around either (1) a sudden shift in genetic pools favoring smallness, or (2) the hunter hypothesis. The hunter hypothesis, that hunters killed the larger animals and left the smaller, is weak. For one thing, what hunter would want to attack a 7½ foot high (at the shoulders) buffalo if smaller game were available? And if he did, and were successful, how would he carry the carcass back to camp? Clearly ancient hunters would have tended to do the opposite, and spare the large animals. A change in the richness in CO₂

or any other atmospheric constituent other than water vapor has not been considered by geologists heretofore, for whatever reason. Undoubtedly an adoption of a uniformitarian philosophy of earth history is part of the reason.

In East Asia, Franz Weidenrath, who dug and researched in the region in the 1930's, before the Japanese invasion, came to some interesting conclusions. For instance, ancient man in Asia was much larger than at present, up to 9½ feet tall. In post-ice-age times the size declines gradually to that of the modern Asian.³³

This information further strengthens the thought which Augustine had, that gigantism and longevity were correlated. Indeed, there are one or two indications in Genesis of early gigantism. For instance, in Genesis 6:4 the Bible speaks of there being giants in the

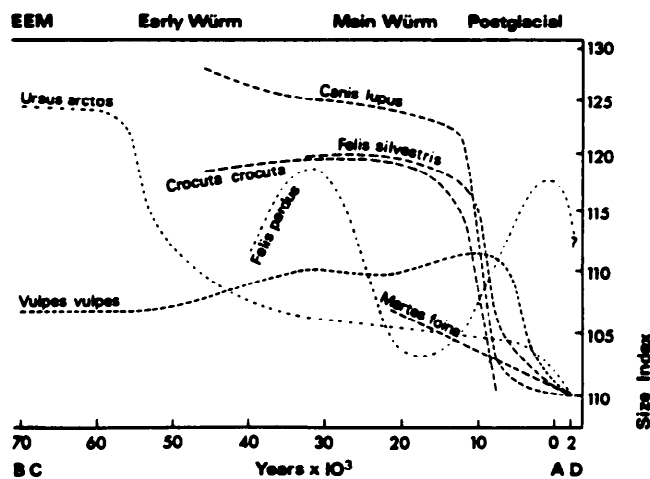


Figure 3. This shows how the sizes of many animals has decreased from what it was formerly. In Creationist terms, the left will indicate antediluvian times, but not 70,000 B.C. Then comes the flood and ice age; and it can be seen that present sizes are considerably less than those which were formerly common, and can be told from fossils.

After Patten, Donald W., and Phillip A. Patten, 1979. A comprehensive theory on aging, gigantism, and longevity. *Catastrophism and Ancient History II* (1):13-60. See p. 21.

world in those days, the context being disputed to be sure. In Genesis 7, the Bible speaks of the decks of the ark being 15 cubits high, similar to a modern gymnasium ceiling. Somebody must have been "thinking big". And in the Greek ancient mythology, the tradition of the titans again bears a similarity.

The Bible and Paleoclimatology

In Genesis and Job, where strong and repeated indications of ancient longevity are found, one can also see evidence of an ancient climate which was not so arid and not so extreme in temperature as today. One example, circa 1900 B.C. occurs in the Book of Genesis, where an observation of hydrology and floral density is discussed:

... And Lot lifted up his eyes, and beheld all of the plain of Jordan, that it was well-watered everywhere, before the Lord destroyed Sodom and Gomorrah, even as the garden of the Lord, like the land of Egypt, as thou comest to Zoar. Gen. 12:10.

This reference alone is not strong, but it will be coupled with brief bits of other data. Today, the Jordan Valley and the Dead Sea region (where Sodom and Gomorrah were located) are among the drier of the regions on earth. Here an annual rainfall of 2 to 4 inches occurs.³⁴ The rainfall is somewhat greater on the adjacent hills and mountains, but there it is still scant. And today, in this region which includes the lowest place on the surface of the earth (the Dead Sea), there is an evaporation potential exceeding 80 inches per year.³⁵

The region of northwestern Arabia, opposite the Sinai Peninsula, is where it is presumed Job lived. Today this area is similarly arid and a desert. But some floral observations occur in the Book of Job as to the vegetation there circa 1660 B.C. A semi-humid backdrop is seen in a variety of ways.

Snow is mentioned 5 times. River/rivers are mention-

ed 4 times, and water/waters are mentioned 28 times. Flora references include vineyards, green trees, shady trees, wheat and barley. Job's herds of over 10,000 animals, and later of over 20,000 livestock (asses, camels, oxen and sheep) all indicate a more humid, grassland type climate. Some additional irrigation may have been needed for the oxen, and was no doubt derived from a then-existent river.

Time and space forbid much discussion of parallel drying, termed dessication, in North America, where Lake Lahontan once covered over 100,000 square miles in Nevada and Utah. Today its remainder, Great Salt Lake, is but a puddle in size compared to its former extent.

In Inner Eurasia, the Caspian Sea formerly was so large that it merged with both the Aral Sea and the Black Sea, farther to the east and west respectively. Today the Caspian Sea has withered to a point where it no longer has outlet drainage to the Black Sea, and no longer has incoming water from the Aral region. The Gobi Desert of North China is another example; formerly it was not merely semi-humid, but was also somewhat thickly forested.³⁶

The subject of the ice age keeps arising in one way or another. It is important to point out, without going into a detailed explanation, our view that the flood and the ice age are one and the same catastrophe. Briefly, it is viewed as a certain kind of astronomical catastrophe. A small icy body approached within 15,000 miles of earth's core, 11,000 miles from the earth's surface. Here, due to tidal stresses, it broke up.

Some of the ice fragments enter the earth's atmosphere like meteors, vaporized like meteors, and their water vapor promptly recondensed as a global, sudden, intense rain. Other ice particles began to revolve around the earth like the icy rings of Saturn; but shortly they became influenced by the earth's geomagnetic field, which was strengthened by the flyby condition. The ice in rings, redeployed by the geomagnetic field, gradually and slowly settled in over the earth's magnetic polar areas. This may well have occurred in a period of 30 to 50 days. Hence the ice age was sudden; and its source of frozen waters was not evaporated ocean water, its source was ice from the distant realms of the solar system, where icy comets are occasionally observed today.^{37,38}

Trapping of Infra-Red Radiation, and CO₂

The earth receives the sun's radiation in a wide variety of wave-lengths from the very short X-rays and ultraviolet rays, to medium wave-length perceived by the human eye, (3000 to 8000 Angstroms) to the longer wave-lengths of infra-red and radio. The earth also radiates heat into deep space, in order to maintain a balance. But the heat that the earth re-radiates is in the deep (i.e., long) infra-red spectrum.

This is precisely where carbon dioxide is remarkably efficient at radiation capture. Thus a 1/2% (5000 ppm) richness of CO₂ in the atmosphere would capture much of the reradiation from the earth's surface continents and oceans. This characteristic of CO₂ is the basis for the earth's ancient greenhouse effect, whereby the

earth's climate was moderated from pole to pole, and the polar areas were both frost-free and humid.

A fossil forest 100 miles from the South Pole, which Byrd discovered in 1933, suggests this. So also do fossil redwood trees found in Alaska, Iceland, Spitzbergen, Greenland, Siberia and Europe. Redwood trees require a humid climate wherein the daily temperature range is small and the annual temperature range is also small. This is precisely what enriched CO₂ would achieve. In fact, fossil redwoods in Colorado are found having rings three times as far apart as modern California redwoods. Faster growth rates and photosynthesis come to mind. This also reflects an enriched CO₂ in the atmosphere, allowing plants to thrive both from greater CO₂ availability and greater H₂O availability. Evaporation rates were much lower at that time, and the effect of nocturnal dewpoint probably was profound.

A Glimpse Into the 21st Century

Perhaps laboratory testing of animals under appropriate conditions will indicate that indeed enriched CO₂ will result in delayed sexual/skeletal maturation and enhanced size. Perhaps similar experimentation will produce artificially extended lifespans for cats, mice, lemmings or some other appropriate test animal.

What kind of testing should be considered? Among the testing should be the following:

1. Differing levels of CO₂ including hypocapnia, control and hypercapnia atmospheres. An ideal mix would include 100 and 200 ppM (hypocapnia testing), 330 ppM (the control) and 500 ppM, 1000 ppM, 2000 ppM, 4000 ppM, 8000 ppM, 16,000 ppM and 32,000 ppM or similar ranges.
2. Differing types of animals should be considered for testing including mammals, insects (arthropods), mollusks, reptiles, birds and fish. Perhaps a komodo dragon would revert to the ancient dinosaur dimension under appropriate conditions, and wouldn't that by itself make a zoo famous?
3. A hypercapnic zoo, while admittedly expensive, would be an international center of scientific as well as public interest.

If testing results, carefully planned, monitored and recorded, would prove that man's lifespan under conditions of 500 ppM to 900 ppM could be extended like Job's to 120 years, or even 210 years, there would be an immediate demand of industry for practical application to such theoretical scientific achievement.

Hypercapnic bedrooms, at first, then hypercapnic homes, office buildings and cars would have a prompt and massive demand. Architecture for the 21st century, and especially the air circulation phase of architecture, would be revolutionized, at the least, strongly affected.

Insurance companies writing term life insurance would be good investments. Actuarial tables would be revolutionized when and where hypercapnic environments were installed.

Radical environmentalists who oppose the utilization of coal, natural gas and petroleum might become reversed on this particular issue. Under current conditions, atmospheric CO₂, already risen to 330 ppM, is expected to rise to 385 ppM by the year 2000, by

Macha.³⁹ Keeling and Bacastow expect more.

What would happen if the natural environment (not an artificial environment like a hypercapnic home or office building) could be enriched by intentionally adding CO₂ at rates far above the current experience? There is a snowball effect, however poorly understood. It is a chicken-and-egg proposition. When the atmosphere is enriched in CO₂, it becomes warmer, especially in polar regions. A warmer atmosphere will reduce the cooling of polar waters, which will in the long run increase the average temperature of ocean waters, top to bottom (and not just surface temperatures). A warming of the oceans will cause them to evaporate a portion of their CO₂, which will in turn further add to a greenhouse effect. It could be like a snowball beginning to roll downhill.

In such an event, what would happen to the world's fauna? In the fossil record, mammals mostly were 30% to 40% larger in height/length than in the contemporary scene. But with birds, they were in many cases 3 to 6 times larger than contemporary birds. And with reptiles, the 3 to 6 times factor is also suspected. Remember the 51 foot fossil crocodile. Remember the tyrannosaurus, of which the komodo dragon is a miniaturization. One fossil dinosaur recently discovered in Colorado could look over a 5-story building.

And what would happen to the world's flora? Obviously if there were more CO₂ available for photosynthesis, and there were more H₂O available due to a reduced evaporation level, plants would thrive and compete vigorously. Tundras and taigas of Canada, Alaska and Siberia would disappear as forest would replace them. Deserts of Africa, Asia, Australia and the Americas might also experience a rejuvenation, not unlike the climatic scenario gleaned from the Book of Job.

Climatology, paleoclimatology, and futuroclimatology are very complex matters. There is frankly nobody alive today who can predict with confidence what would happen to the wind systems and the rainfall regimes of North Africa or the Gobi Desert. But we will adventurously assert there would be more humidity, more nocturnal dew, less evaporation, reduced wind velocities, reduced daily temperature ranges and reduced seasonal temperature ranges. We also suspect there would be a change in the direction of the prevailing winds.⁴⁰

Close

The subject of ancient longevity and enriched CO₂ is in fact a part or a segment of a vaster and more exciting mosaic of topics. These topics include:

- anthropology and Gigantopithecus
- atmospheres and ancient CO₂ levels
- archaeology and ancient planet observations
- Biblical accounts of longevity and vigor
- climatology and Hadley cell/Rossby cell circulations
- Chinese accounts of ancient gigantism/longevity
- Greek accounts of ancient titans and Babylonian longevity stories
- greenhouse effects and re-radiation trapping at enriched levels

glaciology and icy ring fragmentation and deposition
laboratory experimentation for hypercapnia and
hypocapnia

lakes and interior seas (such as the Dead) and ancient
shorelines

medicine and the hypothalamic dysregulation theory
for aging

medicine, neuro-endocrinology and hypothalamic
regulation

oceans and ancient drowned continental shelves

oceans and solubility charts for CO₂, N₂ and O₂

Pleistocene and pre-pleistocene fossil dimensions

photosynthesis and effects of enriched CO₂⁴¹

carbon-14 dating and adjustments for enriched CO₂⁴²

Augustine, some 15 centuries ago, predicted that
gigantism (if not longevity also) would be understood by
some future age, and wrote with rare insight the follow-
ing:

But, as I have said, the bones which are from time
to time discovered prove the size of the bodies of the
ancients, and will do so to future ages . . . But the
length of an antediluvian's life cannot now be proved
by any such monumental evidence.⁴³

Augustine felt that ancient gigantism and ancient
longevity were intertwined. He felt that some future
generation would put the pieces all together. When (if
ever) will that generation arise?

And if Augustine was a kind of dreamer, so were
Isaiah and Ezekiel. The subject was regional clima-
tology, and the new heavens and the new earth in
Isaiah's eyes. He forecast a coming age when the desert
would blossom as the rose, and when the parched
ground would become a spring and indeed, a time when
mankind would tend to outlive his furniture (Isaiah
35:1, 2, 65:20).

And Ezekiel forecast a coming day when the orchards
of Palestine would be ubiquitous, and there would be so
much fresh water that the Dead Sea would become en-
freshened. And even more amazing and exciting, that
dreamer maintained that an enfreshened "Dead" Sea,
more of an Edenic Sea, would be a channel or water-
way for anadromous (migratory) fish, such as Pacific
Northwest salmon, migrating and returning to their
spawning grounds (Ezek. 47:10-11). What dreamers
these three were!

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- ²Weber, Max, 1958. The Protestant ethic and the spirit of capitalism. Trans. Talcott Parsons. Chas. Scribner's Sons, New York P. 249. "The favourite science of all Puritan, Baptist or Pietist Christianity was thus physics, and next to it all those other natural sciences which used a similar method, especially mathematics. It was hoped from the empirical knowledge of the divine laws of nature to ascend to a grasp of the essence of the world, which on account of the fragmentary nature of the divine revelation, a Calvinistic idea, could never be attained by the method of metaphysical speculation."
- ³Merton, Robert, 1970. Science, technology and society in seventeenth-century England. Howard Fertig, New York.
- ⁴Needham, Joseph, 1969, The grand titration. Allen and Unwin, London.
- ⁵When the Royal Society was formed in 1662 in London for the purpose of scientific inquiry, approximately 65% of the founding members were Puritans. Isaac Newton is the greatest example of Puritan scientists who were also interested in theological laws of God. Science followed Newton, and world scientific leadership came to London in the aftermath.
- ⁶Clark, Robert E.D., 1972. Science and Christianity: a partnership. Pacific Press, Mountain View, California.
- ⁷Flavius Josephus, The antiquities of the Jews, Chapter 3, pp. 9. "But let no one upon comparing the lives of the ancients with our lives, and with the few years which we now live, think that what we have said of them is false; . . . and *because their food was then fitter for the prolongation of life*, might well live so great a number of years." (Italics ours.)
- ⁸Ekdahl, Carl A., and Charles D. Keeling, 1973. Atmospheric carbon dioxide and radiocarbon in the natural carbon cycle: quantitative deductions from records at Mauna Loa Observatory and at the South Pole. U.S. Atomic Energy Commission. Carbon and the biosphere. "The concentration of atmospheric CO₂ in the Northern Hemisphere increased by 6.8 ppm from 1959 to 1969, according to a long series of measurements at the Mauna Loa Observatory. Hawaii. In the same period the Southern Hemisphere concentration increased by 6.7 ppm, according to an even longer series of measurements of South Polar air. These increases, when averaged, correspond to 2.34 percent of the presumed preindustrial CO₂ concentration of 290 ppm and imply that approximately 49 percent of the contemporary production of CO₂ from combustion of fossil fuel and kilning of limestone remained airborne."
- ⁹Patten, Donald W., 1966. The Biblical Flood and the ice epoch. Pacific Meridian Publishing Co., Seattle.
- ¹⁰Yuan-Hui Li and Tien-Fung Tsui, 1979. The solubility of CO₂ in water and in sea water. *Journal of Geophysical Research*, 2403-2407, 20 June 1979.
- ¹¹Cross, M. Grant, 1972. Oceanography: a view of the Earth. Prentice-Hall, Englewood Cliffs, New Jersey. P. 195. "The average temperature of the entire ocean is 3.5 ° C, in contrast with the average ocean surface temperature of about 17.5 ° C".
- ¹²Sokoloff, Louis, 1960. Effects of carbon dioxide on cerebral circulation in normal man. *Anesthesiology*. Volume 21.
- ¹³Patten, Donald W., and Phillip A. Patten, 1979. A comprehensive theory on aging, gigantism and longevity. *Catastrophism and Ancient History* II(1):13-60 and 65-68. Copies are available from the authors, at Pacific Meridian Publishing Co., Seattle, as long as they last.
- ¹⁴Nahas, Gabriel, and Karl E. Schaefer, 1974. Carbon dioxide and metabolic regulation. Springer-Verlag, New York, P. 182. "Concerning the nervous centers of the brain, CO₂ at concentrations of 5 percent to 7 percent increases the cerebral circulation and the oxygenation of the cortex provides an excitation of the subcortical formation, particularly of the *hypothalamus*, of the reticular activator system, while it depresses, in a general way, the activity of the cerebral cortex . . . On monkeys, the inhalation of 10 percent, 15 percent and 30 percent CO₂ diminished the threshold of the electrical stimulation of the *hypothalamus* and of the reticular substance." (Italics ours.)
- ¹⁵We ran a computer search for CO₂ research on newly born animals in July 1979, for the last 5 years of scientific research at the University of Washington Health Sciences Library. Of the many experiments done with CO₂ on man and various animals, we could find no experimentation recorded on the issue that concerned us, which is long term exposure to enriched CO₂ for newly born, or newly hatched animals. Further, one researcher indicated that to his knowledge this kind of CO₂ experimentation had never been done. This is a slightly stronger statement than saying we found nothing. We may have missed something, either beyond the last 5 years, or in another language than English. The kind of experimentation we would like to see is described in more detail in our essay cited in reference 13, pp. 57-60.
- ¹⁶Marvin Arnold Luckerman is a Docent at the Skirball Museum of Hebrew Union College, Los Angeles and he is also executive editor of *Catastrophism and Ancient History*.
- ¹⁷Some scholars suspect that it is from Eber that the term "Hebrew" was derived.
- ¹⁸*The Book of Jasher*. New York: Hermon Press, 1972. Chapter VI vs. 19b and 20, p. 16. This is not the Book of Jasher mentioned in the Book of Joshua.
- ¹⁹Ginzberg, Louis, 1978. The legends of the Jews, Vol. 1. Philadelphia: Jewish Publication Society of America, p. 172.
- ²⁰To the extent that Figure 1 describing the decline in atmospheric CO₂ is true, that is to the extent that the assumptions and the conclu-

sions are good therein, this figure indicates that atmospheric CO₂ was dropping during Peleg's 239 years, and during Joktan's parallel lifetime, from 3100 ppM down to 1600 ppM. And the decline continued after their deaths though at an even slower rate. This was the 5th post-flood generation.

²¹According to Figure 1, atmospheric CO₂ was abating from approximately 2000 ppM down to 1500 ppM. A strict chronology would dictate that Peleg's dates from the flood were 101 to 340 and Sarah's dates were 270-397. Their lives overlapped, as did so many of those in the early post-flood generations.

²²Heilman, Joan Rattner, 1980. Menopause: myths are yielding to new scientific research. *Science Digest* 87(3):66-67.

"The usual age for menopause is between 45 and 55. But about 8 out of every 100 women have it before 40. Five per cent continue menstruating after the age of 53 . . ."

²³Assuming (1) the hypothalamic dysregulation theory for aging is valid, assuming (2) aging occurs more slowly with enriched CO₂, and assuming (3) each woman begins the child-bearing period with precisely 512 ova, or eggs, this leads directly to a suspicion that during Sarah's era, the menstrual period was between 40 and 50 days, probably over 45, compared to the current 28.

This aspect of our theory, like several other aspects such as delayed skeletal maturation, delayed sexual maturation and delayed senescence, should be testable under appropriate laboratory conditions. Results should apply to women as well as to such female mammals as mice, cats, rabbits, etc.

²⁴According to Figure 1, the richness in atmospheric CO₂ was dropping during Job's lifetime (1733 B.C.-1523) from approximately 950 ppM down to 600 ppM.

²⁵Patten, Donald W., 1973. The long day of Joshua and six other catastrophes. Pacific Meridian Publishing Co., Seattle. Pp. 200-208. A method of dating is developed which involves cyclic astronomical catastrophes for that era.

²⁶The Book of Job is a form of drama, and may well have been originally presented at the theatre. Dramatic presentations and theatre are products of cities and civilization, with actors, writers, prop crews, audience and theatre facility. Talmudic sources sketch some of the travels of Eliphaz, shuttling in and out of Arabia and Egypt. By this time, Eliphaz' first cousin, Joseph, was premier of Egypt. Egyptian civilization fits the requirements for theatre and dramatic presentation. Joseph is seen as having a taste for the dramatic in Genesis 46 and 47. It is herein proposed that Joseph was either the author or the patron of the Book of Job, and Egypt was the locale of the original presentations.

²⁷Caleb's approximate dates are 1485 B.C.-?. During his first 85 years, if Figure 1 is correct, atmospheric CO₂ had diminished from about 500 ppM down to 450 ppM. This compares to our pre-industrial level of 280 to 290 ppM and the current (1980) level of 330 ppM. Caleb would seem to be aging at a rate of 30% to 35% more slowly than modern American men; the atmosphere in his era was enriched in CO₂ between 35% and 45% more than the current scene.

²⁸Attributed to Caleb as recorded in the Bible, Joshua 14:10-11 is the following example of vigor:

"And now, behold, the Lord hath kept me alive, as he said, these forty and five years, even since the Lord spake this word unto Moses, while the children of Israel wandered in the wilderness: and now, lo, I am this day fourscore and five years old. As yet I am as strong this day as I was in the day that Moses sent me: as my strength was then even so is my strength now, for war, both to go out, and to come in."

²⁹Moses (circa 1525-1405 B.C.) lived to be 120, as compared to Joshua's 110. Moses was in approximately the 19th generation after the flood; Joshua in the 20th. During his lifetime Figure 1 suggests atmospheric CO₂ dropped from about 600 ppM down to 450 ppM. Ages and lifespans were continuing to decline, although the rate was flattening.

³⁰Josephus, *loc. cit.*

³¹*Ibid.*

³²St. Augustine, The City of God. Book XV, Chapter IX.

³³Weidenreich, Franz. 1944. Giant early man from Java and South China. *Anthropological Papers of the American Museum of Natural History*. Volume 40.

p. 12. "The latest finds in Java also prove that the pygmy types cannot be considered as immediate progenitors of modern man. On the contrary, the newest discoveries reveal that the most primitive hominids now known were gigantic forms which surpassed all anthropoids and hominids, living and fossil, in size and robustness of mandibles and teeth.

p. 108. The following list is given for the sizes of mandibles from

Gigantopithecus, clearly a hominid in Weidenreich's view, down to modern man.

Fossil Man	Height of the Mandible Root
Gigantopithecus	23.7mm
Meganthropus	20.6mm
Pithecanthropus	15.0mm
Sinanthropus	15.5 mm
Heidelberg Man	14.5mm
Modern Man	12.9mm

"The Gigantopithecus mandible is, therefore, 75 per cent higher and 100 per cent thicker than the average mandible for modern man." Weidenreich viewed these fossil men as being dated within the traditionally-accepted evolutionary framework, over the last 100,000 years. We, as catastrophists, and not as uniformitarians, insist this traditional time framework needs severe condensing or collapsing.

Weidenreich did question the evolutionary premise of that time that modern man arose from smaller forms. And he did question an additional premise that modern man arose from inner Asia and migrated from a nuclear region outward into the periphery of Asia.

³⁴Atlas of Israel, 1970. Elsevier, Amsterdam, Section IV.

³⁵*Ibid.*

³⁶Kang-chih Chang, 1977. The archaeology of ancient China. Yale University Press, New Haven, Pp. 32-34.

"The decline of the moist climatic conditions in North China was accompanied by the disappearance of a thick vegetational cover in areas that are now barren and semiarid, as indicated by a black-earth horizon at some localities in the north . . .

This black-earth layer, marking the transition from the semiarid loess stage of the terminal Pleistocene to the semiarid condition of the present day, probably represents an ancient forest cover. The existence of a thick forest in the river basins of North China and on the Manchurian plains is further indicated by such cultural remains from prehistoric sites as an abundance of charcoal and woodworking implements (ax, adz, chisel, etc.), and by the frequency of bones of wild game. Some of these bones are definitely from forest-dwelling animals such as tigers and deer.

Of even greater importance is the fact that there were, in the woods of that time, certain faunal and floral forms indicating a climate warmer than that of present-day North China. At the Upper Case of Chou-d'outein, which dates from the terminal Pleistocene, there appeared such warm-climate species as *Cynailurus* cf. *Jabatus* and *Paguma larvata*. According to the reports of some early post-glacial geological deposits and Neolithic and early Bronze Age archaeological sites, there is evidence of the following "warm" species:

Bamboo rat	Water buffalo	Squirrel
Elephant	Water deer	Warmth-loving
Rhinoceros	Pere David's deer	mollusks
Bison	Menzies' deer	Rice
Tapir	Porcupine	Bamboo

³⁷Reference 9, chapter VI. The flood/ice age is viewed as being sudden (coming in a day), short (ten to fifty weeks), recent (circa 2500 B.C.), tidal (including a fly-by by a planet as well as an icy fragmentation), and astronomical.

³⁸*Op. cit.*, Vol. I, p. 126.

That the flood was an astronomical catastrophe is attested in Talmudic material. That it was a complex astronomical catastrophe involving not one but two planetary bodies is also attested in Talmudic material. If such is to be taken in any literal sense, it would suggest a binary system intertangled with the Earth-moon system. The account reads as follows:

"The flood was produced by a union of the male waters, which are above the firmament, and the female waters issuing from the earth. The upper waters rushed through the space left when God removed two stars out of the constellation Pleiades.

Afterward, to put a stop to the flood, God had to transfer two stars from the constellation of the Bear to the constellation of the Pleiades . . . There were other changes among the celestial spheres during the year of the flood." (Italics ours.)

The upper waters are believed to be the vaporization of meteoritic ice entering the earth's atmosphere, part of the fragmentation of an icy visitor. The lower waters are the earth's oceans in heavy tidal surges.

³⁹Macha, Lester, "Prediction of CO₂ in the Atmosphere", *Carbon and the Biosphere*. pp. 25-26. He reports:

"When this fossil-fuel CO₂ is added to the atmosphere via the model, we obtain a prediction of the changes in CO₂ content from 1860 to 2000. This prediction appears in Fig. 4, using the Mauna Loa con-

centration of about 322 ppM in 1970 as the base. The concentration of CO₂ will be about 385 ppM in the year 2000 and was about 290 ppM at the beginning of the industrial area (*sic*).

In the same volume, p. 86, Bacastow and Keeling suggest something considerably more radical. "On the assumption that industrial CO₂ production continues to increase at the rate of the past 20 years and that the ultimate increase in biomass of the land biota is no more than twice the present biomass, the atmospheric CO₂ concentration will reach a value six to eight times the preindustrial value in 100 years.

*Fermor, John H., 1978. Paleoclimatology and infra-red radiation traps: Earth's antediluvian climate. *Symposium on Creation VI*, pp. 15-27. Pacific Meridian Publishing CO., Seattle.

There would be a disintegration of what is known as Rossby cell circulation for planetary wind systems. This applies especially to the midlatitudes where westerly wind systems prevail, and bring as the case may be, rains or lack thereof.

The Rossby cell which predominates above the Tropics of Cancer and Capricorn would be replaced by a Hadley cell circulation. This system today is typical of the tropics, and is characterized by trade

winds, which are easterly and more gentle than the typical midlatitude wind system which is westerly and more blustery.

A Hadley-type cell circulation for winds would extend from the equator to both poles. This is our analysis of climatic change.

⁴¹When the atmospheric CO₂ concentration was increased by 27% (from 315 ppM to 400 ppM), there was an increase of 7 to 7% in net photosynthesis using the partial stomatal closure model. Simulations of plants that do not close stomata in response to CO₂ gave a 21% increase. Furthermore, increases in diffuse radiation which may accompany climatic changes often gave larger predicted net photosynthesis rates. See Ekdahl and Keeling, "Atmospheric Carbon Dioxide and Radiocarbon", *Carbon and the Biosphere*.

⁴²Carbon-14 dating scenarios require an adjustment to be made for the recent industrial enriching of CO₂ in the atmosphere; otherwise there would be a built-in error. This adjustment is known as the Suess effect. The Suess effect also needs analysis and application for the era prior to 1000 B.C. when, if Figure 1 is a reasonable approximation, the ratio of C-14 to C-12 was also diluted, and very much diluted.

⁴³St. Augustine, *loc. cit.*

LANGUAGE WAS CREATED, NOT EVOLVED

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During the preparation of a graduate thesis in the area of comparative linguistics, the author found that practically all linguistic theory is based on the evolutionary hypothesis. But there is no sound reason for basing it thus; it is merely a presupposition. The Biblical teaching, that language was brought into being fully developed at the Creation, and that it was miraculously diversified at the time of the Tower of Babel, is in better accord with the facts.

Historically, the controversy between the creationist and the evolutionist explanation of origins has focused in the biological and geological realms of science. This is understandable, since it is here that the two theories come into the sharpest contrast, and it is here that the interpretation of the data has been most disputed. As a result, however, other areas also affected by the differing presuppositions of the two theories have been neglected, and some virtually ignored. One such area would seem to be that of linguistics.

For most people, language is a given, something taken for granted. To a certain extent, this is not invalid, since one of the first rules a beginning language student must learn is not to ask why a language does something, but to accept the arbitrariness of it, and to learn it as it is. Even in one's native language, 'rules of grammar' are but a systematic observation of how specific groups of fluent speakers of that language handle the normal exigencies of verbal expression.

Yet, for all of the 'rules' (at times to the consternation of grammarians), language is not a constant. It changes through both temporal and geographical dislocation. It does not take much reflection to observe how rapidly and drastically it can change. The literary specimens of *Beowulf* and Chaucer contrasted with modern English serve as excellent examples with the English language. Perhaps less dramatic, but equally clear are the works of Shakespeare or even the King James translation of the Bible. Even more recent is the development of a technical 'jargon' during the technological explosion of the

past several decades, much of which has been assimilated into general usage.

It has not been questioned, however, whether or not this observed change is 'evolution.' Of course, someone with evolutionary presuppositions would reply in the affirmative. Unfortunately, there has been either no reply, or merely a tacit acquiescence from the creationists. This silence apparently stems from several factors.

One such factor would seem to be a dichotomy between linguistic and scientific studies. Since linguistic studies fall under the broad category of the 'liberal arts,' while, as noted above, the evolutionary controversy has focused in the 'hard sciences,' it is hardly surprising that there might be a lack of personnel trained in linguistics who were also adequately trained in the overall creation/evolution issue to apply investigative principles in this area. On the other hand, those who are in the heart of the debate normally don't deal with language except in a secondary or practical sense.

A second factor would seem to be the fact that the field of linguistics developed amidst the swelling popularity of the evolutionary hypothesis. Comparative linguistics can be traced no further than Franz Bobb's *On the Conjugation System of Sanskrit Compared With That of the Greek, Latin, Persian, and Germanic Languages*, published in 1816.¹ However, it was not until the second half of the nineteenth century with such men as Saussure and von Humboldt that it became an integrated science.

The discovery that modern languages could be traced back to and could be shown to have developed from earlier languages which may or may not be defunct pro-

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foundly influenced the thinking of nineteenth century scholars. It is therefore perhaps not surprising that early linguists embraced the Darwinian hypothesis so ardently. The key to historical linguistics is change. The goal is to trace the changes back historically, and thus to discover and demonstrate common ancestry, ultimately to arrive at the 'original language' of mankind. Of course, this ultimate goal is not to be realized for several reasons, not the least of which is that the linguist leaves the realm of history when written sources are lost. For example, the modern romance languages (French, Spanish, Italian, etc.) can be traced back to Latin. The northern European or Germanic languages can be traced back to non-written primitive Germanic. Because of common peculiarities, these, along with Sanskrit, Greek, the Slavic languages, and several others, can be grouped under a common reconstructed ancestor, 'Indo-European.' At this point, all reconstruction must stop because of the pre-historicity of this reconstructed 'language.'

Because of the overwhelming evidence of change, including up to 4000 or more years of written documentation, it was assumed, if not from the start, then shortly thereafter, that this was the 'evolution' of language. More than this, however, the concept was woven into the fabric of the evolutionary theory. Ernst Haeckel, one of the foremost early proponents of evolution stated it thusly:

August Schleicher, of Jena, in particular, has proved that the historical development of language takes place under the same phylogenetic laws as the evolution of other physiological faculties and their organs. Romanes (1893) has expanded this proof, and amply demonstrated that human speech, also, differs from that of brute only in *degree* of development, not in essence and kind.²

Additionally, the evolution of language was considered a verification of the overall theory of evolution. This theory necessitated a growing linguistic ability in 'man,' a growth that correlated with the more basic idea of mental development.

Darwin stated it as:

... we may confidently believe that the continued use and advancement of this power (speech) would have reacted on the mind itself, by enabling and encouraging it to carry on long trains of thought. A complex train of thought can no more be carried on without the aid of words, whether spoken or silent, than a long calculation without the use of figures or algebra.³

Haeckel was more explicit:

The higher grade of development of ideas, of intellect and reason, which raises man so much above the brute, is intimately connected with the rise of language. Still here also, we have to recognize a long chain of evolution which stretches unbroken from the lowest to the highest stages.⁴

While it may not be surprising that the proponents of the evolutionary hypothesis so quickly embraced this concept, it is somewhat surprising to note the extent to which this theory developed into a presupposition underlying linguistics. For example, Paul A. Gaeng in

his *Introduction to the Principles of Language* cites eight different theories which seek to explain the origin of language. All are based upon the evolutionary hypothesis.⁵

Even more surprising is the extent to which scholars in the area of biblical languages have acquiesced to or even embraced this hypothesis. For example, A.T. Robertson, the great Greek scholar noted in his comprehensive Grammar, "There is, besides, no evidence that primitive man could produce speech at will."⁶ Again, the three compilers of one of the standard Hebrew lexicons, Francis Brown, S.R. Driver, and Charles A. Briggs, all expressed explicit evolutionary views in their other writings.⁷

It is at this point that the question must be raised as to whether the evolutionary hypothesis is indeed a valid working hypothesis for linguistic theory? It is the suggestion of this writer that not only does the evolutionary hypothesis fail to explain the phenomenon of language, but that it also fails to explain the *observed* data of linguistic change, and furthermore fails to explain some of the basic consequences of linguistic theory. It is further his contention that the Biblical view of creation does in fact explain all three areas.

The Phenomenon of Language

As noted above, there are at least eight evolutionary theories related to the appearance of language. The one common factor is the supposition that basic verbal communication 'evolved' from the basic signs or sounds of a limited non-verbal communications system such as is observed among 'primitive' peoples and some of the higher animals. This suggests either a spontaneous irruption of language and the accompanying mental skills, or that a self-aware, intelligent group of men consciously developed a system to communicate with one another. The former view is that taken by the classical evolutionists, such as Darwin and Haeckel as noted in their statements quoted above. The latter is the view apparently favored by modern linguists. For example, Gaeng states: "In any event, man had to have certain biological capabilities and a psychic constitution before he could use language."⁸

This perspective has been borne out by recent ape-language studies which have indicated a far greater gap between man and even the highest animals than many had deemed possible. For example, after five years of work with a chimpanzee named Nim Chimpsy, Herbert S. Terrace discovered:

... after analyzing videotapes of his 'conversations' with his teachers, I discovered that the sequences of words that looked like sentences were subtle imitations of the teacher's sequences. I could find no evidence confirming an ape's grammatical competence, either in my own data or those of others, that could not be explained by simpler processes.⁹

The essence of this and two other articles on animal communications in the same issue is that while certain animals can learn a large number of symbols, what has been taken as verbal communication is in reality a "subtle non-verbal communication."¹⁰

While these observations are problematic for the

evolutionary view of language, they are strongly supportive of the Biblical view of language which is set forth in Genesis 1, 2, and 11. From these passages, several principles are to be noted.

First, Genesis 2:16-17 suggests that language was originally given by God to man in order to enable man to understand the responsibilities which were his as the steward God created him to be. Additionally, Genesis 1:27-30 and Genesis 2:22-24 suggest the secondary role of communication between the members of the human race in order to fulfill the stewardship responsibilities outlined. Thirdly, in Genesis 2:19, it is suggested that it is an indication of his stewardship position over the animals. Note especially that the very first requirement of man demanded an abstract reasoning ability.

Beyond this question of the origin of language in concept is the question of the origin of languages in their plurality. This is especially problematic when all of the diversity must be explained only by geographic separation. Consequently, linguists are torn between monogenesis and polygenesis. That is, they debate whether all the languages originated in one 'evolution' from non-language which diverged into the many languages known historically, or that several irruptions of basic language occurred in different geographic locations. The proponents of the former view look at the overall pattern of linguistic similarity. The proponents of the latter view look at the very vivid distinctions which divide language families. Again, the evolutionary hypothesis is hard pressed to explain why, on solely natural grounds, with such overall unity in the concepts of human language, there are such sharp dichotomies between the language families.

The Biblical view is that after the creation, there was only one language with a common vocabulary as noted in Genesis 11:1. However, man utilized this commonality of language to violate one of the basic prerequisites of his stewardship—to fill and subdue the earth. Consequently, they began to build a city and a tower, "lest they be scattered over the face of the whole earth." This was part of the reason that the same God who had given man language originally then produced differing language families (Genesis 11:7). The result is succinctly noted in Genesis 11:8 as the fact that they were scattered over the face of all the earth. Thus, the Biblical view of creation explains not only the unity, but the diversity of language.

The Observed Data of Linguistic Change

If the evolutionary view of language development is correct, then language began as a 'non-language,' then became a prehistoric 'pre-language' consisting of signs and appropriate onomatopoeia, which transcended into concrete terms denoting specific reference to observable realities, i.e. physical, sensational, or emotional phenomena, finally developing into abstract terms, or terms characterized by disassociation with observable realities. If this is so, then it must follow that language itself has developed, or become more complex.

What has not been explored in this context is, how does one denote degrees of complexity in language? Bodmer suggests four elements which are useful in trac-

ing history and genealogy, and which consequently may be useful in determining the degree of development.¹¹ These are: 1) similarity of vocabulary, 2) accidentence, 3) syntax, and 4) phonetics. However, of these only accidentence and syntax are useful for the purpose of determining the degree of development.

Vocabulary is not useful for this purpose because of the high flexibility and virtual randomness of borrowing, coinage of new words, and the deletion of old words for seemingly inexplicable reasons. This is even more compelling in a non-written language, for in a written language, an 'obsolete' term may lurk for decades or even centuries in an obscure written passage and remain in that language field as long as that written passage remains in existence.

Phonetics is more ordered, with sounds and sound changes seeming to follow regular patterns. However, there is yet insufficient study to establish in more than very general terms what these patterns of change are, let alone to establish any fixed criteria for the dating of development, or to develop any comprehensive theory.

Consequently, only accidentence and syntax are instrumental in determining the degree of development of a specific language. Surprisingly, the evidence of these two seems to run counter to the expected pattern.

For example, in the use of accidentence, very simply stated, it is deemed that a language with a greater degree of flexion in person, tense, number, comparison, gender, case, mood, and voice is older. That is, the greater the decay or loss of flexions, the more recent or 'more highly evolved' is the language. Bodmer cites on one hand that "noun flexion is *always* a reliable index of linguistic progress (*italics added*)," and again cites the relative 'primitiveness' of the verb in both Celtic and Sanskrit, solely because of the great degree of flexion.¹² As in illustration, compare Spanish, French, and Latin. The former two both derive from the latter, yet while Latin has three genders (Masculine, Feminine, and Neuter), the others have only two (Masculine and Feminine). Additionally, while Latin has flexion for six cases (Nominative, Genitive, Dative, Accusative, Ablative, and Vocative), both Spanish and French have none. Similar data could be noted for the verbal systems.

In the case of syntax, generally the rule is, the greater the flexibility in word placement in a sentence, the older the language. This seems to reflect an inverse relationship to accidentence. For example, the placement of the direct object is fairly rigid in English, while it is much more open in German and Latin because of the case endings which indicate the Accusative case.

Generally speaking, this is the opposite of what one should expect in an evolutionary system of language development, especially in the area of accidentence. There, one would expect an increase in flexion as language grew from imprecise semi-verbal communication to a complex system of verbal communication capable of reduction to writing. However, this is precisely the phenomena one would expect in light of a Biblical view of creation. Here, the languages as given by God would reflect the best features available for carrying out the missions for which language was given. In a corrupt,

fallen world, however, they would also tend to degenerate, as has been noted historically.

The Basic Consequences of Language Theory

There are most likely several consequences that may be derived from the basic language theory one holds. Some, such as the question of verbal roots in the Semitic languages, most notably Hebrew, are specific and thus do not fall within the confines of this article. More general is the question of concreteness versus abstraction. If one accepts the evolutionary hypothesis, the natural consequence is the development of language from inarticulate sounds, with the corollary that abstract thinking is necessarily based on advanced language development predicated by high intellectual and reasoning ability.¹³

Beyond the theological problems created by this view, there are also language problems. For example, it seems to follow in that view, that primary language usage was concrete rather than abstract. That is, primitive language in its essence was developed to communicate only on a very pragmatic specific level.¹⁴ As man's language grew, his intellectual and reasoning ability grew, leading to thought which was more abstract, and consequent language expansion to accommodate this.

Admittedly, the terms 'concrete' and 'abstract' are nebulous and open to varying interpretations. Barr correctly notes "'abstract' is far from clear or suitable as a term in linguistic description." He then notes the school, which would seem to define the 'concrete' as that which is very specific, such as 'red cow' or 'white cow,' and 'abstract' as that which is more generalized, such as the concept of 'cow.' He states "the idea of the extreme concreteness of the languages of 'primitive' peoples has been much criticized," and even has had its existence questioned, yet also notes that it is common to never-the-less "point to an extreme degree of 'concreteness'" in these languages.¹⁵

Bloomfield suggests that the form relates to 'abstractness' as part of an "elaborate part of speech system."¹⁶ It would appear that this makes abstraction a question of morphology.

It is suggested that the former school tends to eradicate the distinctions between 'concreteness' and 'specificity,' while the latter would seem to divide between abstract terminology and abstract thought. Consequently, the following definitions are suggested for concrete and abstract:

Concrete: characterized by immediate association with realities, whether physical, sensational, or emotional.

Abstract: characterized by disassociation with realities, whether physical, sensational, or emotional.¹⁷

Thus, the view which would seem to typically characterize the evolutionary hypothesis is that ultimately the original meaning of *all* of man's vocabulary was concrete, or tied to a readily perceptible reality. Abstract usage then followed later. This creates problems for the theoretical linguist, in that it does not really answer the question of the origin of language. Cassirer realizes this when he states:

So the question of the origin of language tends always to become—even for the thinkers who have taken it most profoundly and struggled hardest with it—a veritable monkey puzzle. All the energy devoted to it seems only to lead us about in a circle and finally leave us at the point from which we started.¹⁸

The problem which he notes repeatedly, and which seems to lead him to this conclusion, would appear to be that man, somehow, seems to possess an intuitive apprehension of the abstract.

As noted above, this is in very close harmony with the Genesis view of language, especially as related in Genesis 1 and 2. Here, it is presupposed that man, created in the image of God, was rational from the beginning.

With this perspective, it is no problem to contemplate that man from the beginning possessed an abstract reasoning ability. In conjunction with this ability, it would be expected that his language would contain abstract terminology, also from the beginning. Thus it could be maintained that neither concrete nor abstract are necessarily prior, but, rather, that both stem from the origin of man.

This is not to say that within a given historical period specific usages might not be utilized to illuminate nuances of the abstract semantic field. The problem occurs when, from etymological reasoning, an *a priori* implication is generated that the abstract derived from and thus is necessarily contingent upon the concrete. This would appear to be what Bloomfield had in mind when he stated: "The surface study of semantic change indicates that refined and abstract meanings largely grow out of more concrete meanings."¹⁹

Thus, the viewpoint of language development one adopts is determinative of how one views the original meanings of words. If one accepts the evolutionary hypothesis, when he is looking at the history of usage of a particular word, the minimal effect would seem to be that he would tend to opt for the 'concrete' rather than the 'abstract' in the case of a toss-up. This would tend to produce a stilted view of language, especially in the area of historical linguistics. This would also tend to affect one's research in any area involving precise fields of meaning where the word history is deemed to be of value in determining that field.

Conclusion

It is the contention of this writer that as reflected above, the Biblical view of creation provides the only valid basis for historical linguistics. Furthermore, he contends that this understanding further substantiates scientifically the validity of Biblical creationism, and consequently, the invalidity of the evolutionary hypothesis. It is his hope that other scholars will investigate this hitherto neglected area of study, not only in the area of historical linguistics, but also, if this is a valid perception, in other areas of cultural anthropology.

(Continued on page 59)

THE EXPANDING UNIVERSE THEORY IS INTERNALLY INCONSISTENT

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Free photons must lose energy if the Big Bang is the origin of an expanding universe. Free photons must not lose energy if the universe is expanding. This inconsistency in photon behavior disproves the Big Bang expanding universe theory that claims the universe is billions of years old. The evidence alleged to support the Big Bang expanding universe theory is in better agreement with a vast recently created universe than with an expanding universe billions of years old.

I. INTRODUCTION

"The heavens declare the glory of God."¹ That glory is an infinite, working, beautiful complexity characteristic of the Creator. What glory of God could there be in a universe created by the Big Bang billions of years ago so violently that the fragments are still expanding away from the explosion? None.

This article shows that there never was a Big Bang, and that the universe is not expanding. Section II outlines the two primary evidences claimed to prove the expanding universe theory. The two evidences are the recession of the distant galaxies and the 3° K background radiation. In Section III the two evolutionary interpretations of the evidences are shown to be mutually contradictory. Particular attention is given to the behavior of free photons traveling through intergalactic space. Section IV concludes that, because of internal inconsistencies, the Big Bang and the expanding universe cannot be true. Rather, God, the divine Artisan, created a magnificent universe filled with galaxies and light.

II. EVOLUTIONARY ASTROPHYSICS

Evolutionary astrophysicists claim the universe began with a huge explosion called the Big Bang.² This Big Bang is said to have occurred about 15 billion years ago. They claim all matter (the galaxies) in the universe is still expanding away from the explosion.

Neither the Big Bang nor the motion of the distant galaxies has even been observed directly.³ What indirect observation is made to infer the Big Bang, and what indirect observation is made to infer the expansion of the universe?

The Red Shift May Indicate an Expanding Universe

The motion of the distant galaxies away from us is indicated by their red shift. The greater the distance to a galaxy is, the more the galactic light is shifted toward the red end of the spectrum.

The red shift that we observe on earth is usually explained as a Doppler shift that occurred at the distant galaxy. The Doppler shift follows from wave theory but can be expressed in terms of photon energies. As a galaxy moving away from us emits a photon, the energy of the photon is less than it would have been if the galaxy were stationary. The fractional wave length $\Delta\lambda/\lambda$ or energy shift $\Delta E/E$ equals the fraction of the speed v of the galaxy compared to the speed c of light,

or

$$\frac{\Delta E_{\text{photon}}}{E_{\text{photon}}} = \frac{\Delta\lambda}{\lambda} = \frac{v}{c} \quad (1)$$

Equation (1) can be solved for the recessional speed v of the galaxy, when the Doppler shift $\Delta\lambda/\lambda$ is known.

Equation (1) gives the shift $\Delta\lambda/\lambda$ in the light emitted by the galaxy. It will be the same as the shift $\Delta\lambda/\lambda$ observed by us on the earth only if the wave length or energy of the photon remains unchanged as the galactic photon travels its vast distance through space. Astrophysicists assume nothing at all happens to this photon on its long journey, so that the total shift, $\Delta\lambda/\lambda$ observed here is due only to recessional motion of the galaxy. It is very important in this paper to understand that this assumption must be made to relate observed red shifts to recessional galactic speeds.

When galactic distances r and galactic recessional Doppler-shift velocities v are compared, on the average, it is said, v is proportional to r (This has been questioned, though.)

$$v = Hr \quad (2)$$

The constant of proportionality H is called the Hubble constant. The presently accepted value for H equals 15 km per sec/million light-years.⁴

A simple example will illustrate the Hubble law expressed by equation (2). If all the red shift observed from a galaxy 100 million light years distant is due to the galaxy's recessional velocity, the galaxy is moving away from us at a velocity of 15 km per sec (about 10 miles per second). A galaxy 200 million light years distant would be moving away from us at a velocity of 30 km per second, etc. Interpreted this way, the observed red shifts attributed to Doppler shift, and Hubble's law picture an expanding universe. Extrapolating all the galaxies backward in time, makes it appear that they all started out at the same place at the same time about 15 billion years ago.⁵

The concept of an expanding universe hinges on the astrophysicists' assumption that no change occurs to the galaxies' photons on their long, undisturbed trip from the galaxies to us.

The 3° K Background Radiation May be Remnant of the Big Bang

The Big Bang is the name given to the ultra-high temperature, ultra-dense explosion that astrophysicists say began the universe about 15 billion years ago. After the initial explosion, the high-temperature light (radiation) that filled the universe began to expand along with the rest of the universe.

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After the Big Bang, the residual radiation is assumed not to interact any more with the matter in the universe. It is like the light from a firecracker bang. After the bang, the light freely travels through space, but it no longer interacts with the material of the firecracker. The way to detect the firecracker bang would be to detect some of the initial radiation that has spread out through the universe.

What kind of photon should we search for to prove the firecracker exploded? We should search for photons of orange light. The firecracker's brief glow was orange, so its orange-light photons are spreading out through space. The density of the orange-light photons is continually decreasing, but the photons are still orange-light photons. The number of photons and the energy of each photon would be constant as the firecracker's photons travel outward. That is what we would expect.

What kind of photons should we search for if we want to detect the Big Bang which ended at a temperature of $3,000^\circ\text{K}$? We would hunt for a very low-density collection of high-temperature photons, by analogy with the firecracker example. This phenomenon is what we should get, if the universe were not expanding, say astrophysicists. However, Big Bang theorists claim that the photons left over from the Big Bang are becoming lengthened in wave length and lowered in energy, because the universe is expanding.⁷

If R is a distance which increases with the size of the universe, say the distance to a remote galaxy, then the wave length of a Big Bang photon has increased by a factor proportional to R , $\lambda \propto R$, for light from that galaxy. Some details of this relation are presented in the Appendix.

If the universe expanded and doubled in size, the Big Bang photons would double their wave length; they would each have only half their original energy ($E = hc/\lambda$). These photons are supposed to suffer their energy reduction only because of the expansion of the universe. They are free photons. They do not interact with anything. They travel undisturbed through space, unaffected by anything, except the expansion of the universe.

We can now answer the question, "What kind of photons should we hunt for to detect the Big Bang?" If the universe is expanding as the galaxies seem to indicate, then the original photons from the Big Bang have been greatly reduced in energy. If the universe has expanded by a factor of 1,000 since the Big Bang, and if the temperature of the Big Bang photons (i.e. of the distribution: a single photon has no temperature) after they ceased to interact with matter was $3,000^\circ\text{K}$, then the average Big Bang photon now would be at a temperature of $3,000^\circ\text{K} \div 1,000 = 3^\circ\text{K}$.⁸ If the universe is expanding, we should hunt for radiation characteristic of only 3 degrees above absolute zero. This radiation is called the 3°K background radiation.

Penzias and Wilson⁹ detected radiation characteristic of about 3°K from all parts of the universe accessible to them in 1965. They received the Nobel Prize in physics for their work. Evolutionary astrophysicists have claimed the radiation Penzias and Wilson detected was the expanded remains of the Big Bang glow.¹⁰ Drs. Slusher,

Barnes, and I have showed in a previous article that this 3°K radiation was actually the result of the galaxy's absorbing some of its own radiation and heating itself in the few thousand years since Creation.¹¹ However, let us assume for the moment that the Big Bang explanation is correct so that we can explore the principle behind the Big Bang expanding universe.

Photons May Evolve

The Big Bang produced a concentrated field of high-temperature photons. These photons have traveled for billions of years since the Big Bang. During that time, they have traveled unaffected by anything except the expansion of the universe. The expansion of the universe by itself caused these free photons slowly to decrease in energy in proportion to the expansion of the universe. These free Big Bang photons *must* slowly decrease in energy according to evolutionary astrophysicists, so that the 3°K photons detected now can be identified with the original high energy Big Bang photons. The following principle must hold true, if the 3°K photons are remnants of the Big Bang.

Principle: Photons from the Big Bang traveling freely through space without interactions lose energy, because the universe expands.

Can this principle be restricted to only Big Bang photons? If a Big Bang photon of energy 1 eV. and a photon from another source but of identical energy 1 eV. travel side by side, is there some reason that the Big Bang's photon would slowly lose energy while the other photon would remain at constant energy? Each of the photons is identical. Neither photon "remembers" where it came from. A photon of given energy, direction, and polarization is identical to any other photon of that same energy, direction, and polarization. If one freely traveling photon loses energy slowly when the universe expands, all photons traveling freely *must* do likewise. This reasoning requires us to generalize the photon principle stated earlier. The restriction that it applies only to Big Bang photons must be dropped, because the expansion of the universe, if it occurs, is common to everything.

Free Photon Evolutionary Principle: Any photon traveling freely through space without interactions slowly loses energy as the universe expands according to $E \propto 1/R$.

The reader is reminded that all material discussed in this section presupposes that the Big Bang and the expanding universe are true. The purpose was to extract the behavior required of photons traveling the vast distances from the galaxies, or the vast times since the Big Bang. In the next section, the Big Bang expanding universe will be shown to be self-contradictory.

The reader may already see the contradiction. Free photons traveling for vast times *must* remain at *constant* energy for the observed red shifts to be Doppler shifts meaning the distant galaxies are really expanding away from us. Conversely, free photons traveling for vast times *must decrease* in energy, so that the 3°K radiation detected can be identified as the cooled remnant of the Big Bang that is supposed to have begun the explosion.

III. THE BIG BANG AND THE EXPANDING UNIVERSE

Light from an Example Galaxy is Twice Red Shifted

Suppose a galaxy was 100 million light years away from us 100 million years ago. Then we are just now observing the light it emitted 100 million years ago. The Hubble law can be used to determine the velocity of this galaxy away from us when it emitted its light. Since $v = Hr = (1.5 \times 10^4 \text{ m per sec/million light years}) \cdot (100 \text{ million light years})$, then $v = 1.5 \times 10^6 \text{ m per sec}$. The photons emitted by this galaxy should be Doppler shifted relative to us by the factor of $v/c = (1.5 \times 10^6 \text{ m per sec}) / (3 \times 10^8 \text{ m per sec}) = 0.005 = 1/2\%$.

These photons travel undisturbed through space to us. However, they, like all photons, are affected by the expansion of the universe as they travel. The wave length of a photon traveling through space undisturbed except for the expansion of the universe should increase. The wave length λ is related to the radius R of a point in the expanding universe by $\lambda = (\text{constant}) \times R$.¹² As the universe expands by a certain factor, the photon's wave length increases by the same factor.

What fraction has the universe expanded during the 100 million years the galaxy's light traveled toward us? The answer is once again found in the Hubble constant H . For any distant object, $H = v/r = (\text{rate of change of } r)/r$. H is the rate of fractional increase in the universe. The fractional increase in the universe in 100 million years is H times 100 million years. When $H = 1.5 \times 10^4$ meters per second/million light years is converted into appropriate units for this problem, one gets $H = 5.0 \times 10^{-5}$ per million years.

In the 100 million years since the galaxy emitted its light, the universe has expanded by the fraction $Ht = (5.0 \times 10^{-5} \text{ per million years}) \times (100 \text{ million years}) = 0.5\%$. All free photons have increased their wave lengths by this same factor. The photons arrive here with a wave length 1/2% greater than when the galaxy emitted them, because of the expansion of the universe during the travel time.

Wait a minute! The 1/2% lengthening of the wave length due to the expansion of the universe was previously attributed to the Doppler shift. If the 1/2% lengthening of the wave length is entirely due to the expansion of the universe, the Doppler shift must be zero. The distant galaxies are all stationary. They are not receding. The observed shifts may indicate great distances, but they do not indicate recessional speeds.

The Appendix proves in general that the red shift a photon experiences enroute equals the red shift attributed to the Doppler effect. If all of a red shift is needed to indicate distance, zero is left for Doppler shifts.

The Expanding Universe is Self-contradictory

We have arrived at a result that is most embarrassing to evolutionary astrophysics. We have found that if the universe did begin with the Big Bang billions of years ago, and if the background radiation is the remnant of the Big Bang, then the fragments (galaxies) of the Big Bang are *not* moving away from the explosion. The galaxies are not moving away from one another. The universe is *not* expanding.

If the universe is not expanding, then the light from the Big Bang should not have cooled down at all, since it is cooled only by the expansion of the universe. It should still exist at its original temperature. Furthermore, if the universe is not expanding, then light from the distant galaxies cannot be increased in wave length at all. Wave lengths of free photons increase due only to galactic Doppler shift and the expansion of the universe, but neither of these is happening. The entire Big Bang theory is internally inconsistent.

IV. CONCLUSION

A photon's energy loss is counted twice in the big Bang expanding universe theory. In the Big Bang theory free photons must lose most of their original energy as they travel for vast times. In the expanding universe theory, free photons must lose any energy as they travel for vast times. A free photon cannot do both at the same time.

If a free photon loses energy, the Big Bang theory may be correct, but the universe is not expanding. However, if the universe is not expanding, free photons do not lose energy, because any photon energy loss is due to the expansion of the universe.

If a free photon does not lose energy, the universe may be expanding, but the Big Bang theory cannot be correct. However, if the universe is expanding, then in the remote past it was a dense, hot mass. There must have been a Big Bang.

If either the Big Bang or the expanding universe is true, the other cannot be true. Yet, they are both parts of the same evolutionary scheme. Both must be true for either to be true. Therefore, the Big Bang expanding universe theory is false.

The universe has been in existence for only thousands of years since God created it. The 3° K background radiation is the blackbody temperature of the galaxy heating itself during those thousands of years. It is not the expanded remnant of the Big Bang. The reddening of galactic light indicates distance only. It is not caused by a Doppler shift of an expanding universe. The great distances indicated by galactic reddening point to the infinite complexity of God. "The heavens declare the glory of God."¹³

V. ACKNOWLEDGEMENT

I gratefully acknowledge the assistance of my wife, Anita, for proofreading this article, and for the suggestions she offered.

APPENDIX

This Appendix shows that the fractional increase in wave length $\Delta\lambda/\lambda$ caused by the recession of the distant galaxies equals the fractional wave length increase produced by the expansion of the universe. Both effects will be assumed to be real effects, so that the shifts $\Delta\lambda/\lambda$ they would produce can be determined. The body of the article shows that neither effect actually does occur in nature.

The Recession of the Galaxies Would Increase Photon Wave Lengths

A distant galaxy is supposed to be moving radially away from us with a speed v proportional to its distance r . The constant of proportionality is Hubble's constant, H . Thus, $v = Hr$. The fraction $\Delta\lambda/\lambda$ by which the galactic light is Doppler-shifted equals the fraction v/c of the galaxy's speed relative to the speed of light.

When $v = Hr$ is substituted into $\Delta\lambda/\lambda = v/c$, the result is

$$\Delta\lambda/\lambda = Hr/c \text{ (Doppler shift alone)} \quad (\text{A1})$$

The Expansion of the Universe Could Increase Photon Wave Lengths

The number of Big Bang photons in the universe has to be constant after the Big Bang. Big Bang theorists assume the Big Bang photons do not interact with the matter of the universe after the Big Bang.¹⁴

The photon distribution is supposed to be given by the blackbody radiation laws at all times during the expansion of the universe after the Big Bang.¹⁵ The energy density $E/V \propto T^4$, where T is the absolute temperature of the photons. The average energy per photon $E_p = hf = hc/\lambda$ is proportional to the photon temperature T , so that $T \propto 1/\lambda$. The photon energy density is then $E/V \propto \lambda^{-4}$.

The number density of photons N/V is found by solving the equation (energy density) = (number density) $\times$ (energy per photon). The result is $N/V \propto \lambda^{-3}$. The total number N of Big Bang photons within a sphere of radius R centered at the location of the Big Bang is the number density N/V times the volume of the sphere, $4\pi R^3/3$, or $N \propto (R/\lambda)^3$.

The number of photons within this sphere is assumed to be constant as the expanding universe expands. Thus, during the expansion of the universe, Big Bang photons increase in wave length so that $N \propto (R/\lambda)^3$ remains constant. If R/λ remains constant, then

$$\Delta\lambda/\lambda = \Delta R/R \quad (\text{A2})$$

The fraction by which the universe has expanded during the travel time of the photon is found from the Hubble law.

$$\begin{aligned} v &= Hr \\ \frac{\Delta r}{\Delta t} &= Hr \\ \frac{\Delta r}{r} &= H \cdot \Delta t \end{aligned} \quad (\text{A3})$$

Photons from a galaxy a distance r from us at the time of emission travel for $\Delta t = r/c$ to reach us. Thus, if that galaxy were *stationary*, the rest of the universe expanding around it, there would be no Doppler effect, but during their travel to us photons would lose energy because of the expansion of the universe. When equations (A2), (A3), and $\Delta t = r/c$ are combined,

$$\frac{\Delta\lambda}{\lambda} = \frac{Hr}{c} \text{ (Expansion of universe alone)} \quad (\text{A4})$$

The fractional change in wave length due to Doppler shift alone given by equation (A1) equals the fractional change in wave length due to the expansion of the universe alone given by equation (A4).

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Language was Created, Not Evolved (Continued from page 55)

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A BIBLICAL APPROACH TO DATING THE EARTH: A CASE FOR THE USE OF GENESIS 5 AND 11 AS AN EXACT CHRONOLOGY

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A method is proposed by which the Bible can be used to pinpoint the exact date of Creation. Arguments for gaps in the Genesis genealogies are refuted, and nine evidences for a tight chronology are proposed.

The Framework of Biblical Chronology

Genesis 1:1 declares that the heavens and the earth were created "in the beginning." "Beginning" is a word of time and it tells us that there *was* a beginning, a time that we could assign a date to if we had sufficient information. Since Gen. 1:1 does not contain a date, many have assumed that it cannot be determined from the Bible. But they have given up the quest too soon; just because that information is not contained in Gen. 1:1 does not mean it is not contained *elsewhere* in the Bible.

There are three questions that must be raised and answered in the process of developing a Biblical chronology for the age of man and the earth:

1. What is the relationship between "the beginning" (Gen. 1:1) and the rest of the creation week of Gen. 1:2-31? If there is a gap between the two, then the earth cannot be dated Biblically, as that gap could (and in practice *does*) extend to billions of years. If there is no gap between Gen. 1:1 and the rest of the chapter, then "the beginning" would be a part of the first day, and vice versa, and not some amorphous part of the dark and distant past. By the nature of the question, we are dealing with an either/or situation: either there *is* a gap or there *is not*; there is no third possibility. This involves a discussion of the validity of the so-called "gap theory," also called the "ruin-reconstruction theory." If it can be determined that there is no gap,¹ then we are able to proceed to the second phase of our investigation, namely:

2. What is the length of the days in the creation week of Genesis 1:1-31? There are three basic approaches:

A. **Non-day theories.** One form of this would be the "Framework Hypothesis," in which it is alleged that, like Hebrew poetry, the creation episode is artificially divided up into two sets of three "days" apiece: the first day is a literary parallel to the fourth day, the second to the fifth, and the third to the sixth. Two points of refutation will suffice here. First, there are not six days in the creation week, but seven. What is the parallel to the seventh day? Second, Hebrew poetry exhibits some definite literary patterns that do not appear in Genesis 1, which is a straight-forward and chronological historical narrative.²

The Revelation-Day theory assumes God's working through long evolutionary processes. He merely appeared to Moses (or to whoever compiled the JEPD documents³) on six successive days and revealed a little more about the creative (?) process each day. Of course one would never notice this devious interpretation from reading the Biblical text. Exodus 20:11 clearly refutes

this theory: "In *six days* the Lord *made* heaven and earth . . ." i.e., they were created, not revealed or written in six days.

B. **The Day-Age theory.** Each "day" is claimed to be an eon of time, of indeterminate length, and the sequence in Genesis 1 is alleged to correspond to the sequence of "historical geology" (a euphemism for evolutionary paleontology) presented in the so-called "geologic column." The day-age theory is held by theistic evolutionists (alias "progressive creationists") as an attempt to convert Genesis 1 into what is essentially an evolutionary scenario.⁴

C. **The 24 Hour Day theory.** In either the non-day or day-age theories, the evolutionary scenario is assumed to be generally correct. The date of the earth will be determined by radiometric and other uniformitarian techniques and the Bible generally ignored for any but the most recent historical data. However, if it can be established that there is no time gap between Gen. 1:1 and 1:2, and if the word "day" can be assumed to mean just what it does in ordinary usage, then the entire creation scenario from start to finish would have been completed in a period of about 6 × 24 or 144 hours.⁵ Since Adam was created on the sixth day, the age of the earth is the B.C. date of Adam plus six days. Six days is a negligible period and therefore the age of the earth, the universe, and man can be considered to be essentially identical.

This leads to the final phase of our investigation, i.e., can the time be determined between Adam and the first O.T. character to whom we can assign a B.C. calendar date? This involves a discussion of:

3. The genealogies of Genesis 5 and 11. Gen. 5 contains a list of characters from Adam to Noah (10 generations) and Gen. 11 lists the characters from Noah's son Shem to Abram (10 generations). If the time from Adam to Noah and from Shem to Abraham can be determined from those genealogies, and the B.C. calendar date of Abraham determined, then the simple addition of the three figures will give us the date of the beginning. What are the issues at stake?

A. What is the date of Abraham? First, he can be placed at about 2000 B.C. archeologically. That is, the cities to which he travelled, the kings to whom he spoke, and other details pertaining to his life fit the time period of about 2000 B.C. Second, Abraham's date can be determined rather exactly by working from a number of chronological landmarks in the O.T. One starting point is Solomon's death at 931 B.C., which is a date so well verified that it faces no serious opposition. I Kings 6:1 tells us that Solomon built the Temple 480 years after the Exodus, placing the Exodus in 1446 B.C. Israel was in Egypt 430 years, taking us back to 1876 B.C. Jacob

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was 130 at that date, so he was born in 2006 B.C. Isaac was 60 when Jacob was born, and Abraham was 100 at the birth of Isaac, taking us back to 2166 for the birth of Abraham.⁶ For the sake of this introduction we will round this date off to 2000 B.C.

B. Are there gaps or missing persons from the genealogies? If there are, how many are there and how much of a difference, if any, does it make?

C. If there are no gaps in the genealogies, then the time between Abraham (2000 B.C.) and the Flood is

about 350 years (2350 B.C.) and the time between the Flood and Adam is about 1650 years, which gives us a rough date of 2000 B.C. (Abraham) + 350 years (Gen. 11) + 1650 years (Gen. 5) = 4000 B.C. for the date of Adam and the earth.

To summarize, the framework of Biblical chronology can be diagrammed as in Figure 1.

The development of the discussion could go either way: (1) Working from Abraham (2000 B.C.) back to the Creation (Gen. 1:1), or (2) Working from the Creation to Abraham, using an A.C. (After Creation) calendar referenced to the year 0 and then taking whatever A.C. date Abraham turns out to be and adding it to his known B.C. date. This is the way in which we will proceed.

The Construction of the Genealogies of Genesis 5 and 11

Gen. 5:3-5 is typical of the way in which the genealogies are presented:

"And Adam lived 130 years and begat . . . Seth. And the days of Adam after he had begotten Seth were 800 years and he begat sons and daughters. And all the days that Adam lived were 930 years and he died."

There are three significant figures given in this formula:

A. The age of the father at the birth of this particular son.

B. The time the father lived after the birth of that particular son.

C. The total years of his life.

Figure C is a useful figure to show the increased longevity of people before the Flood, presumably because of different atmospheric conditions resulting from the pre-Flood canopy.

Figure B is the difference between figures C and A. It is of no computational significance, but was probably inserted as a hedge against anyone trying to allegorize the figures. It is difficult to allegorize such a tightly interlocking mathematical formula.

Figure A is the one most relevant to this phase of our study. It shows how old the father was when this par-

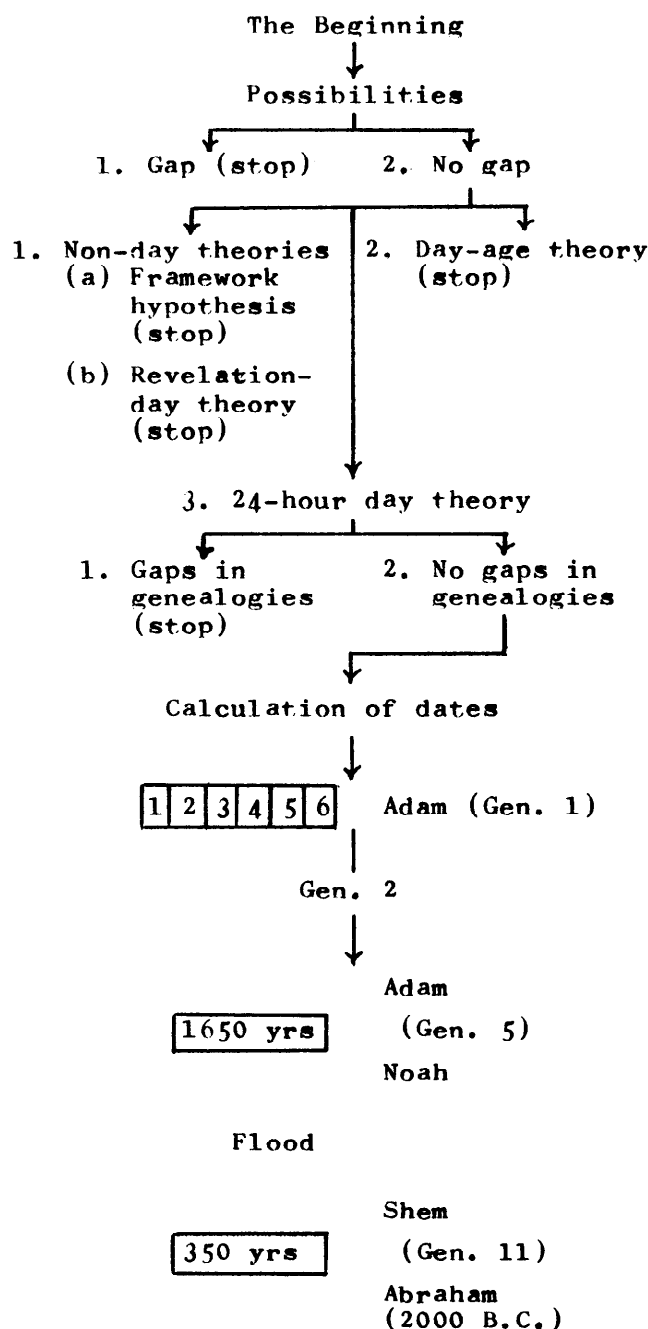


Figure 1. This is a sort of flow chart, showing the steps by which one may establish, first the possibility of a Biblical chronology, and then the chronology itself.

Table 1

Name	Year of Birth, A.C.*	Age at Birth of Designated Son
Adam	0†	130 ⁷
Seth	130	105
Enos ⁸	235	90
Cainan	325	70
Mahalaleel	395	65
Jared	460	162
Enoch	622	65
Methuselah	687	187
Lamech	874	182
Noah	1056	502

* A.C. means after Creation.

† In Adam's case, of Creation.

Table 2

Year A.C.	Birth of	Interval
0	Adam*	130
130	Seth	105
235	Enos	90
325	Cainan	etc.

*Again, in Adam's case, Creation.

ticular son was born. This is not necessarily the firstborn (although some may well be the firstborn) but the one designated by God to be a link in the human chain between Adam and Christ. We know that Adam and Eve had at least two children—Cain and Abel—prior to the birth of Seth (Gen. 4:1-2) and since there was a sizeable population for Cain to fear, they probably had numerous other sons and daughters prior to this time (Gen. 4:14-15).

Genesis 5 lists individuals and chronological details as shown in Table 1.

Therefore, a chronology working forward from the date of the Creation could be diagrammed something as shown in Table 2.

Noah was born in the year 1056 A.C., and was 600 years old when the Flood started, (Gen. 7:6, 11) therefore, the date of the onset of the Flood was 1656 A.C.

Genesis 11 continues the genealogy from Shem to Abraham, as shown in Table 3.

Genesis 11, like Gen. 5, gives figure A and figure B, but omits figure C, the age at death. Why? Because the pattern has been set in Gen. 5, and can be expected to follow suit unless specific instructions should be given to the contrary. This is related to the principle of first reference and is a very important hermeneutical concept. God is saying, in effect: "You can add A+B for yourself; why should I have to do it for you?"

The time between the Flood and the birth of Abraham adds up to 352 years. The exact mathematics, therefore, is as shown in Table 4.

The thing to be determined next is, are there gaps in these genealogies?

Table 3

Name	Year of Birth, A.C.	Age at Birth of Son
Shem	1558	100
Arphaxad	1658	35
Salah	1693	30
Eber	1723	34
Peleg	1757	30
Reu	1787	32
Serug	1819	30
Nahor	1849	29
Terah	1878	130
Abraham	2008 ^a	100

Table 4

Birth of Abraham	2166 B.C. ¹⁰
+ years Abraham to Flood	352
= date of Flood	2518 B.C.
+ years Flood to Adam	1656
= Adam's date.	4174 B.C.

Arguments for Gaps, with Refutations

1. There are archeological dates for civilizations much older than 2500 B.C.

Answer: These dates beyond 2000 B.C. are highly suspect because of their reliance upon:

A. Carbon¹⁴ dating. The system is of questionable accuracy beyond 2000 B.C. because of the extremely rapid buildup of C¹⁴ immediately following the collapse of the canopy. There are too many discrepancies in objects radiocarbon-dated prior to 1000 B.C. for the system to carry the kind of weight that has been given to it.

B. Layers of culture dug up from ancient sites. Dating civilizations by the shape of pottery and its patterns is very subjective.

C. Ancient records of doubtful accuracy. A cornerstone in dating ancient Egypt is the chronology of Manetho, an Egyptian historian (c. 285 B.C.). Not only are there discrepancies in his king lists, but it appears now that many of his 30 kings were co-regents i.e., they reigned at the same time in different parts of Egypt.

D. Uniformitarian presuppositions. Archeology is a field dominated by liberals working under evolutionary assumptions and denying, of course, the Flood.¹¹

2. Geological indications of an ice-age require a date for the Flood considerably older than 2500 B.C.

Answer: When one allows questionable archeological or geological "data" to take priority over inspired (and therefore inerrant) Biblical data, it indicates that his allegiance is to the wrong sources. Facts are facts; but it is not the facts themselves that are the problem—it is the *interpretation* of those facts that causes the problems.

Creationists are not agreed over whether the post-Flood ice-age was of long duration, short, or non-existent. Many of the phenomena appealed to as proof for glacier action can better be explained by the rapidly moving waters of the Flood.¹²

3. The Hebrew usage of the terms "father" and "son" is broader than ours and can be used to span many generations. For example, in Matt. 1:1 Jesus is called the "son of" David even though 1000 years separate them, and the same with David and Abraham.

Answer: This argument overlooks the obvious: the terms "father" and "son" are also used to indicate direct father-son relationships.

4. The term "begat" (*yalad*) sometimes refers to ancestral relationships. In Matt. 1:8 we read that "Joram begat Uzziah" but 3 generations are omitted.

Answer: These exceptions are rare. Furthermore, the Hebrew is a very descriptive language to express various kinds of action. The voice in which the word "begat" appears in Gen. 5 and 11 is the *hiphil*. This is the form used to express a direct cause-and-effect rela-

tionship and means that the father and son are *directly* related, i.e., that one is the direct cause of the other. In other words, it talks of a normal father-son relationship.

5. Genesis 5 and 11 contain 10 names apiece. Matthew 1 contains three sections of 14 names apiece, and omits 3 names¹³ from the second section, allegedly in order to balance out the pattern. Therefore Genesis also omits names from its list and it is an artificial rather than a natural framework.

Answer: First, the charge overlooks the possibility that the genealogies of Genesis 5 and 11 may have 10 names apiece simply because there are *in fact* 10 generations in each list. Because another list omits names does not *ipso facto* mean that they are omitted here.

Second, the omission of the names of Ahaziah, Joash, and Amaziah from the ancestry of Christ in Matthew 1:8 may have been for theological reasons. The sorry story of their lives is recorded in 2 Chronicles 22-25. Ahaziah "walked in the ways of the house of Ahab, for his mother was his counselor to do wickedly. Therefore he did evil in the sight of the Lord like the house of Ahab" (2 Chron. 22:3-4; 2 Kings 8:24-26). Joash did not remove the high places and allowed people to openly worship Baal (2 Kings 12:3). Amaziah likewise retained the high places (2 Kings 14:4), did not have a pure heart before God (2 Chron. 25:2), and worshipped the gods of the Edomites (2 Chron. 25:14-15). So it may be for theological reasons that these three were omitted from Matthew's list, and not because he was constructing his list to fit some sort of framework.

Another possibility is that Ahaziah, Joash, and Amaziah were bypassed by some legal quirk such as levirate marriage or some other genealogical peculiarity. The discussion could easily become bogged down here in technicalities (1 Tim. 1:4 is appropriate here); but because of the next point there is no need to belabor the matter.

Third, the genealogies of Genesis and Matthew are not *quite* parallel: Genesis has dates and Matthew does not, and that is an extremely significant difference.

For example, Adam lived 130 years and begat Seth (Gen. 5:3). In other words Seth was born 130 years after the creation (A.C.). We know from Gen. 4:1-2, 26 that Seth was not the firstborn of Adam. It does not matter chronologically when Cain and Abel were born nor how many other sons and daughters Adam and Eve had (5:4). The next major character is Enos, the son of Seth. Whether he was born first or last is irrelevant; he was born when Seth was 105, or on 235 A.C. Diagrammatically it is shown in Figure 2.

Now that the diagram is before us, it is easy to see that:

1. The position of the child in the family does not change the date.
2. The number of siblings in the family does not change the date.
3. The relationship between the people does not change the date.

Let us assume, for the moment, that Adam was really the grandfather of Seth, as claimed by "gappists." However many hypothetical generations there might be between Adam and Seth, Seth was born on year 130

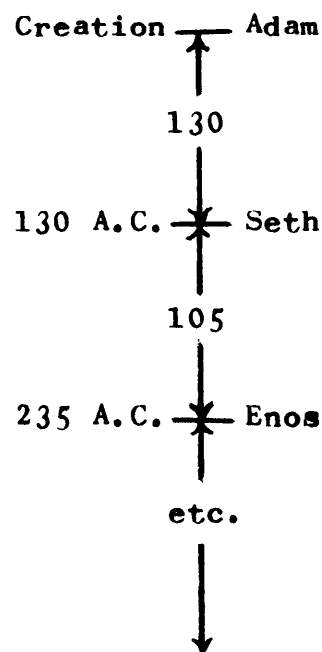


Figure 2. This illustrates the fact that such questions as whether a named descendant is firstborn are irrelevant in the establishment of a chronology.

A.C. (There comes a point after a few inserted generations, however, where the parents would be having children at absurdly low ages.) It is likewise in the time between Seth and Enos: regardless of the relationship between the two, Enos was born on year 235 A.C. And so it goes for the rest of the names recorded in Genesis 5 and 11.

6. The number of years are not totalled.

Answer: So what? God expects us to use the intelligence He gave us and add it up ourselves. We are nowhere told that Jesus' ministry was 3½ years, but by diligently comparing the 4 Gospels, it can be shown to be true. Revelation 13:18 reads, "Here is wisdom. Let him who has understanding count the number of the beast, for it is the number of a man, and his number is 666." Why didn't God tell us the name of the Antichrist? Because He expects us to keep alert, to know what is going on in the world, and to figure it out for ourselves. So it is here in the genealogies: we are given the raw data for making our calculations and God is not going to do for us what He expects us to do for ourselves. It would certainly have made things easier for us, but because the total is not there does not mean it cannot be determined.

Table 5

Number	Hebrew	LXX	Luke 3:35-36
12	Arphaxad	Arphaxad	Arphaxad
13	Salah	Cainan	Cainan
14	Eber	Salah	Salah
15	Peleg	Eber	Eber
16	etc.	etc.	etc.

7. The Septuagint (LXX)¹⁴ of Genesis 11:12-13 and Luke 3:36 contains an extra name, Cainan, that does not appear in the Hebrew text of Gen. 11. The relevant sections of the genealogies compare as shown in Table 5. Therefore, we are told, the extra Cainan represents the tip of the iceberg, that many additional characters can probably be inserted into the genealogy, and that it is therefore "impossible to fix the date of the Flood"¹⁵ and the Creation.

Answer: This is the most complex aspect of the whole genealogy question. The following need to be considered:

First, it involves the acceptance of an entirely different text for the O.T. The LXX does not merely contain an extra name that has been omitted from the Hebrew Masoretic Text—it contains an entirely different set of numbers associated with each name. Every single age at which the father begat his son has been raised from 50 to 150 years. The result is that the LXX of Gen. 5 contains 586 more years than the Hebrew from Creation to the Flood, and Gen. 11 contains an additional 880 years between the Flood and Abraham, so that the entire genealogy from Adam to Abraham contains 1466 more years than the Hebrew O.T.

Second, there is evidence of deliberate alteration of the Hebrew text in order to obtain the great ages reflected in the LXX. The Egyptian chronology of Manetho was published shortly before the LXX project, and it is entirely possible that the LXX translators (who were Jews residing in the palace of King Ptolemy Philadelphus II of Egypt during the project) were under pressure to make the Biblical ages of the Flood and Creation correspond a little more closely to the inflated ages of Manetho's king lists. The fact that every single age has been tampered with is evidence that it was deliberate and not the result of accidental copying errors.

Third, there is evidence that suggests the second Cainan was inserted as a "red flag" to indicate that the LXX translators were forced to produce the translation they did. For example, during the Vietnam war the Viet Cong released a propaganda film taken of one of the high ranking prisoners-of-war, Adm. Jeremiah Denton. During the film he issued the expected statements praising the Viet Cong but, unbeknownst to the enemy, he blinked his eyes in Morse Code, repeatedly spelling out the word "torture." It was thus revealed to the outside world that he was being tortured and forced to make statements praising his captors. Similarly, "code-words" were written by the Iranian hostages so that innocuous-appearing statements would be allowed to pass the censors, while allowing the truth about the barbarous conditions under which they were being held to be recognized by family members familiar with the "in house" language.¹⁶

The name "Cainan" in the Hebrew is an extension of the name "Cain." "Cain" in Hebrew has the idea of "acquisition"—the LXX translators' way of indicating that this particular name, in this particular place was "acquired," or superfluous. There is also a subtle play on words in the Greek. The LXX word would be spelled *Kainan*, which could be a pun on *kainos*, which has the

Table 6

Name	Birth of son	Years lived after	Total age
Arphaxad	135	400	535
Cainan	130	330	460
Salah	130	330	460
Reu	134	270	404

idea of "unknown, strange, unheard of", or *kenos*, which means "empty".¹⁷

A further indication that the extra Cainan of the LXX is superfluous is seen in the dates assigned to him and Salah, as shown in Table 6.

The probability of these two successive characters having identical statistics is extremely small. Because of the collapse of the canopy, lifespans were decreasing exponentially, which means that Salah's statistics should have been significantly lower than those of Cainan or, conversely, Cainan's should have been higher than Salah's.

Fourth, the problem of the inclusion of the second Cainan in Luke involves the complex field of textual (i.e., manuscript) criticism. Many manuscripts include the name, but there are many which omit it. The key one that omits it is Codex Beza (D), which is one of the 5 or 6 most important N.T. manuscripts. Furthermore, many of the early church Fathers also omit it in their commentaries on the subject. It is omitted by Josephus, Philo, John of Antioch, and Eusebius. Origen retains the name, but in his copy of the LXX he marked it with an obelisk as his way of indicating an unauthorized reading. Since the church Fathers must be given equal weight with manuscripts on individual readings, their omission of the name must be taken seriously.

I believe what happened was something like this: the original Luke did not have the second Cainan either because Luke used the Hebrew O.T. list or he used the LXX list but the Holy Spirit, during the inspiration process, told him to omit the name. The original Gospel of Luke was copied several times, and eventually someone noticed that a name seemed to be "missing" from Luke 3:36. He consulted the LXX, which was held in high regard by the early Christians since they spoke only Greek and no Hebrew, concluded that some scribe had accidentally "omitted" the name, and took it upon

Table 7

Genesis 10:22-24	
Masoretic (Hebrew) Text,	1 Chronicles 1:17
Samaritan Pentateuch	Masoretic Text, LXX
Shem	Shem
Arphaxad	Arphaxad
Salah	Salah
Eber	Eber

himself to "correct" the text. His manuscript was copied over and over and the spurious addition was multiplied.¹⁸

Fifth, there are several other Scripture passages that list the characters of Genesis 11 and the second Cainan is found in none of them. This is shown in Table 7. Notice how the LXX is inconsistent within itself as it omits the second Cainan in I Chron. 1:17.

The 5 Books of Moses were the only Scriptures accepted by the Samaritans. The Samaritan Pentateuch is not a reliable copy, and it seems to have been altered to suit the Samaritans' peculiar religion; but it is still an ancient testimony of some value. We can see a possible reason why the LXX translators included an extra Cainan, but there is no conceivable theological reason why the Samaritans would have wanted to delete his name from their Bibles. The Samaritan Pentateuch therefore stands as an ancient testimony against the inclusion of the second Cainan. It is also omitted in all other ancient versions including the Targum, the Aramaic translation of the O.T.

Conclusion: Since the Septuagint gives evidence of deliberate and systematic tampering in Genesis 5 and 11, and since the best archeological findings consistently support the historical accuracy of the Hebrew text, it is my conclusion that the second Cainan in Genesis 11 is superfluous and that his name was accidentally added to later copies of Luke.

Additional Arguments for a Tight Chronology in Genesis 5 and 11, Positively Stated

8. The numbers. Some commentators have nothing more profound to say about these genealogies than that they show the inevitability of death, or that they are intended to show no more than the Messianic line. How shallow! Yes, they show these things also, but what are numbers for except to show dates? If Moses was interested only in listing the ancestry of Christ, he could have done that in 2-3 verses per chapter and spared us the tedium of having to plow through dozens of unnecessary numbers. According to 2 Tim. 3:16, all Scripture is profitable for *doctrine* i.e., teaching, and one of the doctrines taught in these chapters is chronology.

Furthermore, the tightly-interlocking nature of the numbers precludes their expansion, no matter how many extra "Cainans" are slipped in.

9. There are numerous cross checks on the genealogies to indicate that no names have been left out of the sequence:

a. Adam as the first man. Genesis 5:1-2 says that Adam was the first man that God created and hence is first in the genealogy. This is so clear from Genesis 2, 3, 4, I Cor. 15:45, I Tim. 2:13 and other places that it hardly needs elaboration.

b. Seth as an immediate descendant from Adam. Genesis 5:3-4 says that Adam lived 130 years and begat Seth. Could that be understood to mean that Adam was the great great grandfather of Seth, as "gap theory" people claim? No. Gen. 4:25 clearly states that Seth was born to Adam and Eve as a replacement for Abel, who was murdered by Cain (Gen. 4:1-8). Obviously this refers to direct parentage.

c. Enos as the immediate descendant of Seth. Genesis 5:6 says that Seth lived 105 years and begat Enos. Gen. 4:26 speaks of the birth of Enos to Seth in the same context and in the same way as the previous verse speaks of the birth of Seth from Adam. Therefore this also refers to direct parentage. So far there are no gaps between the first three people.

d. Enoch as the seventh from Adam. Jude 14 refers to Enoch¹⁹ who was the seventh from Adam (inclusive reckoning). The first 7 names in Genesis 5 are: (1) Adam, (2) Seth, (3) Enos, (4) Cainan, (5) Mahalaleel, (6) Jared, (7) *Enoch* . . .

e. The death of Methuselah coincides with the date of the Flood. By listing the ages of the fathers when they bore the son listed, and adding the dates, we arrive at date of 1656 A.C. for the Flood. Approaching the genealogy of Gen. 5 from a different direction, and plotting the A.C. year for the death of these men, we notice that nobody in Genesis 5 (except Noah's family, of course) lives beyond 1656 A.C. One character lives to exactly 1656 A.C.—Methuselah. His main claim to fame is the fact that he lived to be 969 years old, but he is useful for more than an interesting Sunday School statistic. His name was prophetic and means in the Hebrew, "When he dies, judgment shall come." So rather than being killed *by* the Flood, he appears to have been a harbinger of it, i.e., his death was to be a last testimony to a wicked world that judgment would come. If these were open-ended genealogies, carelessly constructed, we would expect someone anachronistically to "survive" the Flood without being on the Ark. Indeed, one of the copies of the LXX (the Vatican, Codex B) has Methuselah surviving the Flood by 14 years. Augustine was so committed to the LXX that he claimed that God raptured Methuselah to heaven for the year of the Flood and then lowered him down again! Many scholars today have a similarly misguided allegiance to the LXX.

f. Shem, Ham and Japheth as immediate descendants of Noah. That these three were the immediate children of Noah is clear from Genesis 5:32; 6:10; 6:18; 9:8; 9:18-27; 10:1-32, and 11:10. Gen. 6:18 says that only Noah's immediate family would board the Ark, while I Peter 3:20 and 2 Peter 2:5 confirm the fact that only 8 people were saved through the Flood.

g. Abram as the immediate descendant of Terah. This can be seen by the numerous terms of family relationship given to Terah, Abram, Nahor, Haran, Lot, Sarai, and Milcah in Genesis 11:26-12:5 and again later in Genesis 24:15, 24, and 47.

h. The relationship of all the above is confirmed by genealogies in I Chronicles 1 and Luke 3.

On the basis of all the above cross-checks, what further need have we of witnesses that there are neither missing characters nor gaps in the genealogies of Genesis 5 and 11?²⁰

Conclusion

Since there is no gap between Genesis 1:1 and 1:2²¹, "the beginning" is a part of the first day and vice versa. Since the days are normal 24 hour days, the time between the creation of the earth and the creation of

Adam is 6 literal days. Since there are no gaps in the genealogies of Genesis 5 (Adam to Noah) or Genesis 11 (Shem to Abram), we have a continuous line of datable history from the Creation to Patriarchal times or, conversely, from O.T. times back to the Creation.

Scholars will vary slightly on the exact date for the birth of Abraham due to the complexity of reconstructing certain events relative to the Exodus, i.e., whether they were concurrent with or consecutive to it. Remember, however, that the dates for the Flood and the Creation will vary *as a fixed unit* from Abraham, and that we are dealing with a variation of less than 1% out of 6000 years. On the basis of the Masoretic (Hebrew) Text of the O.T., the three key dates in question are: Abraham, 2166 B.C.; the Flood, 2518 B.C.; Adam, 4174 B.C.; the Creation, 4174 B.C. plus six days!

References

- ¹Fields, Weston W., 1976. Unformed and unfilled. Presbyterian and Reformed, Nutley, N.J. This is the most scholarly and complete refutation of the gap theory currently available. See also Whitcomb, John C., 1972. *The Early Earth*. Baker Book House, Grand Rapids. Pp. 115-131.
- ²Kaiser, Walter, 1970. The literary form of Genesis 1-11. (In) *New perspectives on the Old Testament*, ed. J. Barton Payne. Word, Waco, Texas. Pp. 48-65.
- ³I say this tongue in cheek, of course. My point here is that those who hold to evolutionary forms of origins frequently hold to evolutionary forms of literary criticism as well. Here is a case in which error begets additional error.
- ⁴Niessen, Richard, 1980. Theistic evolution and the day-age theory. *Acts and Facts* 9(3); Impact Section. Institute for Creation Research, San Diego.
- ⁵Since the Earth's rotation is slowing down by about one (1) second per year, the length of the day at Creation would have been less, not more, than now. If the deceleration is constant, the difference for a 6,000-year-old Earth would be about 1.6 hours, which is negligible for the present discussion. However, any old-Earth model could encounter a serious problem here.
- ⁶Merrill, Eugene H., 1980. Fixed dates in patriarchal chronology. *Bibliotheca Sacra* 137 (July-September):241-251.
- ⁷This is reckoned from the date of his creation, i.e., the number is the total number of calendar years for which he had been on the Earth up to the time concerned. Therefore the date of the Fall is irrelevant; nor does it matter how old Adam *appeared* to be at the time of his creation. So Creation with apparent age is not a point at issue here.
- ⁸The spellings used here for these names are those from the A.V.

Variations will be found in other versions, because of differences in transliterating from Hebrew to English. For instance, Enos in the A.V. is Enosh in the N.A.S.V.; Cainan in the A.V. is Kenan in the N.A.S.V., etc.

- ⁹There are differences of opinion on this date, because the text can be taken in different ways. "And Terah lived seventy years and begat Abram, Nahor, and Haran" (Gen. 11:26.) Gen. 11:32 & 12:4 and Acts 7:4 seem to indicate that Terah was 130 when Abram was born. The reason Abram is listed first may be, not because he was the oldest, but because he was the one of historical and theological importance. See also Reference 6, p. 242.
- ¹⁰Reference 6, pp. 242 & 248.
- ¹¹Watson, David C.C., 1976. *The great brain robbery*. Moody Press, Chicago. Pp. 80 & 81.
- ¹²Rehwinkel, Alfred, 1951. *The Flood*. Concordia Publishing House, St. Louis. Pp. 298-341.
- ¹³Ahaziah, Joash, and Amaziah. (Mt. 1:8; cf. 1 Chron. 3:11-12.)
- ¹⁴A translation of the O.T. from Hebrew to Greek about 285 B.C. Abbreviated LXX after the seventy translators who, according to tradition and the pseudepigraphical Letter of Aristeas, worked on the project.
- ¹⁵Whitcomb, John C., and Henry M. Morris, 1963. *The Genesis Flood*. The Presbyterian and Reformed Publishing Co., Philadelphia. P. 475.
- ¹⁶Certainly in modern times Creationist authors have had to include evolutionary terms in which they do not believe, e.g., the uniformitarian names for geological strata, in order to have their work published in the uniformitarian journals.
- ¹⁷Arndt, W.F., and F.W. Gingrich, 1957. *A Greek-English lexicon of the New Testament and other early Christian literature*. University of Chicago Press. Pp. 395- & 428.
- ²⁸The doctrine of inspiration is usually considered to apply only to the original (autographed) manuscripts, which are no longer available. So the possibility of human errors, and even deliberate alterations, in the copying, must be considered. It is not denied, of course, that God may exercise some providential care over the transmission of Scripture.
- ¹⁹This is Enoch, son of Jared, who was raptured in Gen. 5:24, not Enoch, son of Cain, in Gen., 4:17. The latter would have been only the third from Adam.
- ²⁰Several scholarly theses have been written on the subject, including: Clark, H. David, 1967. *The genealogies of Genesis five and eleven*. Th.D. Dissertation, Dallas Theological Seminary; Fetter, C. Robert, 1956. A critical investigation of "The second Cainan" in Luke 3:36. B.D. Thesis, Grace Theological Seminary; and Mills, Montague Stephen, 1978. *A comparison of the Genesis and Lukan genealogies: the case for Cainan*. Th.M. Thesis, Dallas Theological Seminary.
- Mills believed that the second Cainan in Gen. 11 of the LXX was a real person; but he argued for only an extremely limited expansion of the genealogies. This work may serve as a counter to those who want to use Cainan as an excuse for inserting thousands of years.
- ²¹Niessen, Richard, 1982. Is the gap theory a Biblical option? *Bible-Science Newsletter* 20(6):

QUOTABLE QUOTE

It is a perversion of language to assign any law, as the efficient, operative, cause of anything. A law presupposes an agent; for it is only the mode, according to which an agent proceeds: it implies a power; for it is the order, according to which that power acts. Without this agent, without this power, which are both distinct from itself, the law does nothing; is nothing.

Wm. Paley, in his *Natural Theology*, Chapter I, item VII.

QUOTABLE QUOTE

"... my friend Heraclitus, who had a ... suit ... first showed the judges that his cause was just, and then at the finish cried, 'I will not entreat you: nor do I care what sentence you pass. It is you who are on your trial, not I!'—And so he ended the case".

Epictetus. This is included in *The Golden Sayings of Epictetus*, Macmillan and Co., Ltd., London, 1935.

Might this quotation not be aptly applied to many of the Creation lawsuits?

REALITY: REAL OR CONVENTIONAL?

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The process of constructing reality, that is what passes for reality, is explored, the work of Berger and Luckmann¹ serving as a framework. It is concluded that once a structure of belief is internalized, it is very resistant to change, regardless of the empirical evidence for or against that structure. The same problem is found with patterns of belief in science.

One involved in research, publication and public discussion about the theory of evolution often notes that dissonant information does not seem to affect the essential evolutionary belief structure of most persons. While presenting a position paper to a school district in an affluent suburb of Toledo, the writer was struck with the fact that most persons on the curriculum committee did not, either because they did not have the knowledge or preferred not to discuss the issue, try to deal directly with the empirical evidence presented. Most could not answer or explain the objections to evolution which were discussed, and preferred to argue against a more balanced treatment of origins by defensive rationalization or private "logic" (not empirical data) against either irrelevant issues, or the two-model approach in general. Presentation of such arguments as the absence of vestigial and nascent organs, the inadequacy of the fossil record, the difficulties in classical natural selection to account for new species, the absence of transitional forms (in both living forms and in the now "nearly complete" fossil record) and the inadequacy of mutations to explain the origin of new organs and structures had little effect on the position of most participants. One biology teacher remarked that she was aware of these difficulties and, although she still classified herself as an evolutionist, preferred completely to avoid discussion of evolution in her classes and elsewhere. If the subject was alluded to, she stated that she stressed in her biology classes that evolution was a theory, even though she herself did not believe it was a theory but rather a fact.

The Social Construction of Reality

This and similar experiences caused the author to explore the question: "why do people hold on to certain beliefs in the face of large amounts of contrary empirical evidence?" Much has been written on this topic, especially relative to why people tenaciously hold on to empirically discredited belief structures such as astrology, reincarnation, and homeopathy (a 19th century medical theory based on the belief that the smaller a dose of a drug, the more effective it is in treating an illness, and that "like is treated by like", i.e., cancer is treated by giving the person a drug that causes cancer, heart disease a drug that causes heart problems, etc.) in spite of the overwhelming empirical evidence against these belief structures or sets of beliefs or philosophies. There are specific reasons why certain belief structures are accepted. For instance in astrology, we tend to

remember the predictions which come true, or we psychologically "fit" our personality to an astrology reading. Moreover, there are general reasons why people tend to hold onto out-moded beliefs and world-views. The research has found that one learns belief structures and a personal social construction of reality which, in turn, influence one's entire view of the world (or one's world-view). The social construction of reality means that it is very difficult accurately to define many aspects of reality; and these gaps must be filled in for a rational, unified explanation of some aspect of reality to exist. This results in a view of some aspect of reality which is based on some facts, but by necessity ignores others; and once the belief system is developed, it colors how the world and both facts that agree and disagree are interpreted. Once a belief structure is developed, some facts or data are overstressed, others modified, and still others discarded or ignored.

Berger and Luckmann¹ have delineated the process by which reality is (as they call it) socially constructed as follows:

1. **Externalization** occurs when people, or societies, produce cultural products, such as ideas, books, movies, cliches, words, etc.; and in time these cultural products, especially values and systems of belief such as "science," define reality. People "produce" their own reality, then these constructs define and shape true reality. If evolution is pictured as an historical reality in most movies, books, magazines, plays, TV programs, cartoons, and in conversation, school and elsewhere, it will be viewed by most people as historical reality, regardless of whether it is true or false.
2. **Objectivization** occurs when these external products take on a reality of their own, i.e., they become independent of the people who originate them. One begins to see the external world in a certain way, usually not realizing that the cultural-products that cause one to take on a certain world view are all products of a person's or group of people's conclusions, ideas, value structures, etc., and are not necessarily accurate pictures of outside reality. As Berger, *et al.*, conclude, people deal with these cultural products as if the reality they convey had an objective physical existence like land or water. These ideas thus become another part of a person's view of reality which is taken for granted and which, once internalized, influence one's view of the rest of the world. Dissonant ideas are altered or rationalized so as to fit into one's view of reality; and one's view of reality is usually not changed unless one is exposed to a tremendous amount of dissonant information from sources which are seen as valid and which challenge one's previous view or position. For this to happen, one must usual-

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ly seek out this information on one's own with somewhat of an "open mind." Even then it usually takes a long time, often several years, significantly to alter one's world view in some area. So such changes are not very common.

3. **Internalization** occurs when people learn and accept (or internalize and believe) the supposedly objective facts about reality and make them part of their own world view. People who are socialized in similar subcultures, socio-economic classes, etc., share similar perceptions of reality. Further, most people rarely question either the origin of their view of the world or the process by which they adopted these beliefs in the first place. They usually have no reason to question their world view, and avoid situations which force them to question it.

These considerations form the basis for such clichés as "one sees the world through rose-colored (or some other colored) glasses" and "truth (or beauty, or some other quality) is in the eye of the beholder"; all of which emphasize the fact that a person's individual view of the world is extremely important in both understanding and interpreting outside "reality." People are socialized to accept a certain view of reality. The type and effectiveness of this socialization depends upon their environment, intelligence, and curiosity in examining the view of reality presented to them, and the amount of reading, discussing, etc. about this topic in which they engage. Many people assume that their own view of reality is the same as or similar to everyone else's. This, though, is often not the case; but, as Robertson states; "the 'reality' that we encounter is merely the interpretation we place on the evidence of our sense, and people in different cultures may interpret that reality very differently."²

The Process of Socialization

Actually, there are marked differences in the social construction of reality between not only cultures, but between individuals as well. One's view of reality is heavily influenced by the socialization to which one is exposed. Socialization is both an overt and covert attempt to influence one's belief structure, norms, values, folkways, mores, and ethnic or individual social construction of reality. Socialization and indoctrination are very similar, except that indoctrination is probably more directed and deliberate. Also, one who has learned values, etc. that we disagree with, we often would label "indoctrinated," and one who has not learned behavior that we feel is important, such as conforming to the laws of the land, we would label "unsocialized" or "not-socialized" (or asocial). Schools are probably one of the most important socializing institutions; and according to Robertson "... the schools in every society also engage in outright indoctrination in values. We may find this fact more readily apparent in societies other than our own—until we consider the content of civics classes or the daily ritual of the Pledge of Allegiance."³ Of course, schools indoctrinate those under their influence in many other areas, including values towards life, moral values, and especially in the area of values and beliefs regarding origins. Indoctrina-

tion occurs not only through school activities and rituals, but also through school textbooks, library books, and the school's "hidden curriculum" or the information conveyed indirectly in class discussions, lectures by teachers and the school textbooks. For example, most textbooks, except those on biology, do not implicitly teach the evolution of man; but evolutionary ideas are often alluded to, or implicitly taught indirectly. When psychology books refer to "man's animal past" or sociology books to the value that "all values are relative, and there are no absolutes" a certain point of view and information regarding man's past are conveyed to the student.

Another factor which reinforces these belief structures is what Irvin Jenis calls *group-think* or a decision-making process in which persons tend to ignore information or alternatives that they feel, correctly or incorrectly, do not agree with the group's assumption. Thus, if one believes that the group believes that evolution is empirically supported, this will mitigate against acceptance of criticism. This is partly why Lamarkian and Lysenkoian biology persisted for so long in spite of the wealth of empirical evidence against each theory.

The famous study by Theodore Newcomb in 1958 at Bennington College found that the longer the students stayed at the college, the more liberal they became, and when they left the college, the longer they lived in the real world the more conservative they became (although few became as conservative as they were before they entered college).

Once a person has been socialized to believe a certain position, it is very hard for that person objectively to evaluate other positions. Their position is reality, and other positions, if they are aware of them, are wrong, foolish, or ununderstandable. As Robertson noted "if members of a society believe that the earth is flat, that Jupiter rules the heavens, that illness is caused by witches or that there are such things as x-rays, then the supposed flatness of the earth, the rule of Jupiter, the presence of witches, and the existence of x-rays will be come as much as part of reality to people in that society as any other feature of their world."⁴ Thus, how one views the world and what one accepts as real is to some degree influenced by the indoctrination one has been exposed to—and once one develops a particular world view, it is very resistant to change. Most people generally resist changing their view, especially if it has been held for a long time and the person has been exposed to consistent indoctrination for many years. Even a large amount of empirical evidence is resisted.

This mechanism is operative in all of us—no one is exempt. The most we can do is be aware of it and try to investigate a matter thoroughly before we arrive at a conclusion—and be keenly aware of the fact that our defenses will mitigate for rejecting without careful examination a new hypothesis if it is contrary to our basic belief structure. Knowledge of this process should caution us to withhold judgment until we have thoroughly examined a matter. And this probably means withholding judgment on many if not most, matters. Few of us can be thoroughly read in more than one or two areas.

The author's own first reaction to information which

(Continued on page 35)

PANORAMA OF SCIENCE

Hoyle Provides Evidence for Creation

It is not often that Creationists can find support from the words of such an ardent evolutionist as Sir Fred Hoyle, but a brief report in the British journal, *Nature*, makes this possible.¹ Sir Fred Hoyle is one of the originators of the steady-state theory of the origin of the Universe, which states that matter is continuously created out of nothing at the center of the universe to replace that which is lost by expansion. Recently, he has come up with a theory on the origin of life which says that life on earth was seeded by colliding comets.²

The report in *Nature* was Sir Fred Hoyle's response to the question of why he disbelieves conventional views of the evolution of the Universe and life, including the big bang theory and the significance of the microwave background radiation. His remarks were candid and very interesting. He used arguments that creationists have used for a long time. Specifically, he pointed out that ten billion years is not enough time for life to evolve on the earth. His conclusion is based on the mathematical improbability of evolving the information in two thousand genes. Even at that he understates the case by not using all components of a cell. Nevertheless, his calculations demonstrate the exceedingly high improbability of such evolution occurring. He thus concludes: "The chance that higher life forms might have emerged in this way is comparable with the chance that 'a tornado sweeping through a junk-yard might assemble a Boeing 747 from the materials therein'". Thus, he uses a standard Creationist argument to dismiss by probability all ideas of chemical evolution in a soupy sea or any other place on earth.

Sir Fred Hoyle agrees that his steady-state theory is not now tenable, but he feels the big bang is "similarly not tenable because of the way in which it implies the degradation of information". Let's hear it for the second law of thermodynamics and hope he got his point across. He concludes by stating that he is at a loss to understand "biologists' widespread compulsion to deny what seems to me to be obvious".

With such understanding of the problems involved in the evolutionary origin of the Universe and life, one would think Sir Fred Hoyle might be open to creation. However, this is not the case, but instead he has added his own brand of evolutionary speculation. Some of the public have received his new ideas, but most astronomers haven't. In a book review of Hoyle and Wickramasinghe's book, *Lifecloud: The Origin of the Universe*, Colin Pillinger accuses the authors of selecting their evidence and elevating speculation to fact.³ Fred Whipple states what is likely the consensus of opinion on Hoyle's theory: "... I am charmed but not impressed by the picture of life forms developing in 'warm little ponds', protected in their icy igloos from the cruel cold and near vacuum of open space, and falling to primitive Earth at speeds exceeding eleven kilometers per second."⁴

—Contributed by Michael J. Oard

Diamonds in the News

Introduction

Diamonds! Everyone is captivated by the extreme properties of these brilliant jewels. They are extreme in their *physical* properties. Diamond's covalent carbon bonds result in the greatest hardness of any natural material. They also resist acids and have a very high melting point (3500 °C). The word diamond itself comes from the Greek term *adamas*, unconquerable. The index of refraction is higher for diamond than for any other transparent material: $n = 2.42$. This means that light travels through diamond at only 1.24×10^8 meters/second, 41% that of the speed of light in a vacuum. Diamonds are extreme in their *formation*. They apparently crystallize in the earth's upper mantle (150 kilometers deep), and then are carried to the surface by molten kimberlite, or "blue ground", which hardens into vertical pipes. One of the largest man-made holes on earth is a mined-out kimberlite pipe 2 kilometers in circumference and 1067 meters deep located in South Africa. Diamonds are extreme in their *value*. A quality one carat crystal (0.2 grams) easily brings \$20,000 in 1980 dollars. The largest rough-weight diamond ever found, the 3106 carat (0.621 kilogram) Cullinan of Africa, is beyond appraisal. This item describes two current studies of diamonds which are of particular interest to creationists.

Diamonds in the Ground

There is a common assumption that all discovered diamonds must have formed eons ago. This "diamonds are forever" assumption is readily seen in standard reference books. *Compton's Picture Encyclopedia* (1968) says that "diamonds were probably formed millions of years ago in molten lava." The *Academic American Encyclopedia* (1980) explains that "alluvial (diamond) deposits were formed by the erosion of diamond pipes over millions of years." *World Book* (1981) claims that "scientists believe diamonds were formed millions of years ago when carbon was subjected to great heat and pressure." It is fitting that these encyclopedia articles on *diamonds* are located close to the discussion of *dinosaurs*, where the same long-age estimates are made!

Recent work by British scientists has challenged the ancient age of certain diamonds.⁵ The researchers have analyzed diamonds for nitrogen impurity; they usually contain about one nitrogen atom for every thousand carbon atoms. If the nitrogen atoms are isolated from one another, they absorb visible light and give the diamond a brown color. However, when bonded together, nitrogen atoms instead absorb ultra-violet light and re-emit it in the visible range, thus giving the diamond an enhanced clear brilliance.

Nitrogen atoms tend to migrate through the crystal and aggregate together at high temperatures. One study showed that 75% of the nitrogen aggregated when subjected to 2000K for 30 minutes. It would be expected

that diamonds found at the earth's surface would always be of the aggregated non-brown variety. After all, the diamonds "must" be trapped within the high pressure pipes for eons. However, natural brown diamonds *are* occasionally found with only isolated nitrogen atoms. The British researchers conclude from this that such diamonds "must have been ejected to the surface of the earth within 50 years of their growth—a very short time scale geologically." In other words, these diamonds must have been *rapidly* brought to the earth's surface by tectonic activity in the past. Once again, earth's materials have shown themselves to be the product of catastrophism.

Incidentally, the minerals gold, bdellium and onyx are mentioned in Genesis 2:12 as existing in the land of Havilah. The word diamond first appears in Exodus 28:18, one of the gemstones to be placed in the breastplate of the Aaronic priests. Whether this term refers to diamond as we know it is uncertain. The first description of what we know as diamond was given by the Roman Pliny in 77 A.D. If the early Scripture references *are* describing literal diamonds as we know them, as they well could be, then diamonds have indeed been present for man to enjoy since the creation.

Diamonds in the Sky

Not all diamonds come from the upper mantle of the earth. They are occasionally found in meteorites which bombard the earth's surface. Furthermore, the majority of solar system diamonds *may* be located within the large outer planets. It has been suggested that Uranus and Neptune may have vast shells of diamond deep in their interiors.⁶ In laboratory experiments, methane (CH₄) has been subjected to pressures of a million earth atmospheres and temperatures of 4000K. Similar conditions are thought to exist in the inner CH₄ layers of the planets. The experimental result was that the CH₄ dissociated into its component atoms of hydrogen and carbon. The carbon furthermore was compressed into synthetic diamond crystals. If this reaction is indeed duplicated on Uranus and Neptune, then subsurface "acres of diamonds" may literally exist there! This possibility adds to recent Voyager pictures of the solar system in declaring that each planet uniquely shows the Creator's infinite handiwork.

—Contributed by Don B. DeYoung

Effect of Drought on the Finches of a Galapagos Island

Many articles have been written about the finches on the Galapagos Islands. In this one the biologists Peter Boag and Peter Grant of McGill University in Montreal, Canada carefully record the changes effected by a severe drought on a population of finches on Daphne Major, a 99 acre island of the Galapagos group.⁷ The species which they studied was *Geospiza fortis*, which also occurs on many of the other islands such as Abingdon, James, Jarvis, and Seymour. Their study was conducted from July 1975 until June of 1978.

Each of 1500 birds was color-banded. Continuous records were kept of these banded birds and the rainfall. Each year during the breeding season the nestlings were

banded and their histories recorded. Three times a year or before, during, and after the breeding season the following data were collected (1) Number of seeds of each plant species in 50 randomly chosen 1m² quadrants, (2) standardized visual census of finches over the entire island (3) minimum of 100 point records of feeding behavior.

Now during the early 1970's normal rainfall occurred and a large finch population with abundant food supplies existed. From December until June of 1976 and 1978, 127 and 137 mm of rainfall occurred, enough for abundant production of plant, seeds, insects and finches. However, in 1977 on 24 mm of rain fell. *Geospiza fortis* did not breed at all and suffered an 85% decline in population. This correlated with a reduction in seed abundance, the main food eaten in a dry season.

Between June of 1976 and March of 1978 mortality and possibly emigration was non-random in respect to age, sex, and phenotype. Only one of 388 *G. fortis* nestlings banded in 1976 survived to 1978. The equal sex ratio occurring in 1976 was down to 6 males to 1 female. Of particular importance to the authors was the fact that the birds surviving into 1978 were significantly larger than those which disappeared. Small seeds decline in abundance faster than large ones, resulting in a sharp increase in the average size and hardness of the seeds. In May of 1976 only 17% of the feeding was on medium and large seeds. The large birds ate larger seeds than the smaller birds. So the authors suggest that the smaller birds disappeared because they could not find enough food. 198 birds found eating seeds with a size-hardness index of less than one were significantly smaller than 121 birds eating seeds with a hardness index of 1-8.7.

In 1977 the larger birds fed heavily on seeds extracted by them from the hard pericarps of *Tribulus cistoides*, a food item ignored by almost all birds in earlier years. Many finches failed to molt as the conditions gradually deteriorated. The small birds fed heavily on *Chamaesyce* species which have small seeds in 1977, and so their plumage was matted with latex of this *Euphorbia* plant (plant family *Euphorbiaceae*).

The dependence of these birds on the declining food supply ended late in 1977 when the *Opuntia* cactus began to bloom, and its pollen and nectar became a food source.

Now the authors infer effective natural selection since 76% of the variation in 7 morphological measurements is heritable. Obviously the larger surviving birds had larger beaks and so were able to break the seed pods and eat the larger seeds of such plants as *Tribulus* for example. Their detailed analysis includes only the adult finches measured before the 1977 dry season in 1976 as compared to the 1978 survivors, a sub-set of the 1976 individuals. The females suffered a stronger selective mortality than the males, though the larger individuals with the larger beaks survived best in both sexes.

Analysis—The authors have made a very clear case for intense selection during the drought in 1977. However they have not shown what happened later in 1979 and 1980 when presumably normal rainfall occurred. They evidently believe that since 76% of variation such as size of the beak is heritable that *all* of the

surviving birds will have offspring of large size with large beaks. In most animals and plants also such characteristics are quantitative as regards their inheritance. Accordingly after only one selection many of the offspring of the selected birds will have smaller bodies and beaks, and without continuous selection of the largest birds the population on Daphne Major island would soon be back to the same range of variability which existed in 1976. Furthermore, just as the authors admit possible emigration as being one of the causes of the decrease in the smaller birds, so also immigration from the other islands not affected by the drought would tend to equalize the population. For as mentioned above the species of finch studied by Boag and Grant occurs on almost all of the other islands, many of which are quite close.

In order to develop a race of finches in which all of the individuals had significantly larger beaks, a series of droughts would have to occur. No such successive severe droughts have even been reported for these islands as far as I can determine.

The case reported by Boag and Grant is in many respects similar to the one which Howe and I observed in plants which we reported in considerable detail in 1974.⁸ Here also a great profusion of plants of various species showing great variability occurred during the year when we first studied the populations, a spring which followed a season of very heavy rainfall. But later when we observed the same plots after a very dry year we found that the variability was greatly reduced and many types observed at first were simply eliminated. Later when another season of high rainfall occurred, though not at or near the same locations as the first ones which we studied.

So far as can be observed it does not seem that selection under natural conditions ever establishes any true-breeding races of plants or animals; and so it is not a factor in the occurrence even of varieties let alone species.

Did Dinosaurs Survive the Flood?

In the February issue of Scientific American a most interesting article entitled simply "Pterosaurs" caught my attention.⁹ Mainly I guess it was because it showed a picture of one of these flying reptiles as it glided to the sea in search for fish. This picture reminded me of pictures of flying dragons. This reptile closely related to the dinosaurs and presumed to have originated like them from the thecodonts during the Triassic period had a wing span of up to seven meters. It is called Pteranodon. A related species called Quetzalcoatlus was even larger and had a wing span of 11 to 12 meters! Both arose abruptly in the late Jurassic and had *no obvious antecedents*. This is fairly typical and emphasized the failure of the fossil record to show any evidence of Darwinian evolution by natural selection, a theory which obviously demands many intermediate forms.

Now the pterosaurs resembled both birds and bats in their overall structure and proportion. Wann Langston Jr. claims that this is not surprising since the *design* of any vertebrate animal that flies is subject to the same

aerodynamic constraints. It is interesting that Langston uses the word "design" for surely a design implies a Designer. Both birds and Pterosaurs have hollow bones. In both the fusion of bones limited the flexibility of the trunk. There are few movable joints, especially in the wings and ankles, places where the stress is great. Pteranodon had a long crest on its head which in some species doubled its length. Its function is not clear though it may have served as an air brake for landing, when it was turned sideways to the direction of flight.

In birds the second and to some extent the third finger support the wing. In the pterosaurs the fourth finger does the supporting and in bats the second, third, fourth and fifth are all involved. The first three fingers served as the hand of the pterosaur. There is a joint at the base of the fourth finger which allowed the wings to be folded out of the way when it walked.

This Pterosaurs evidently had very slender legs with four long toes, and one shorter one. There is considerable speculation as to whether these slender legs could have enabled this flying dragon to walk very easily. Some investigators speculate that they launched themselves by jumping off of cliffs and gliding by taking advantage of strong thermal updrafts. It seems unlikely that Quetzalcoatlus could have run on its legs and flapped its wings enough to launch itself. Others believe that if it merely stood up on its legs and caught an appropriate breeze, a single flap of the wings and a kick of the legs may have been enough for a takeoff. In any event they evidently got along very well; and since remains of them are found far from any cliffs, no doubt they did manage to get airborne without aid of cliffs.

Since fish skeletons were found in the rib cage, quite evidently Pteranodon ate fish. It is suggested that it glided slowly just above the surface of the water and dipped its beak into the water to pluck out the fish. Others believe that it actually landed on the water in order to catch the fish.

Now of course according to the usual geological concepts these flying dragons died out over 60,000,000 years ago. From the viewpoint of Flood geology of course they may well have all been killed by this universal catastrophe, along with the related dinosaurs. But there is a remarkable number and variation of myths in which flying dragons and indeed very large creatures remarkably similar to dinosaurs are described and illustrated. Thus there is a large book called "Python"¹⁰ in which these various myths are classified and discussed in great detail. As the author Joseph Fontenrose says in his introduction "Mankind's myths, legends, and folktales are filled with tales of gods and heroes who encounter and defeat dragons, monsters, demons and giants. The Hittites, Canaanites, Babylonians, and Egyptians had important myths of combat between god and dragon or similar monstrous enemy." He shows a number of illustrations which look remarkably similar to Pteranodon. Thus on page 147 his Figure 17 entitled "God fighting Zu" shows a scaly creature with two large wings attached to the body to above the front hands. The head is shaped somewhat like a boar. Though the feet have only two front and one back toe this is not too far a departure from Pteranodon's four long toes and the one smaller one.

Also there are many illustrations of battles between huge dinosaur types of creatures and various heroes. The shapes of these vary greatly; for as Fontenrose says these myths as the years went by tended to vary greatly both as to details and names of the gods who rescued man from these monsters. Quite evidently these myths reflect the dread people felt when confronted by such creature. Imagine being confronted by a flying creature with a wing spread of 36 feet!

No one has suggested, as far as I know, that flying reptiles may still exist. But there is some evidence that, in remote places, there may be living terrestrial or semi-aquatic dinosaur-like creatures.

In the December 23rd edition of the San Francisco Chronicle a U.P. and A.P. report on the sighting of a living dinosaur is most interesting. An aerospace engineer named Herman Regusters and his wife Kia reported seeing the brontosaurus-like animal five times while they both were rowing in a small boat on Lake Tele in the Congo. They only were able to take one picture, which Regusters told skeptical reporters was being processed at a private lab and not yet available. They also claim to have a 20-second tape recording of a "huge roaring trumpeting noise" that was heard frequently at the lake.

The Reguster's expedition reached Lake Tele after a difficult five-day trip through swampland and waist-high water. The south Pasadena couple financed the expedition with \$40,000.00 of their own money plus loans from friends.

Mrs. Regusters described the creature as having a long, thick neck, red in color and like that of a large serpent. They estimate that the body was longer than that of two hippopotami.

The expedition included a former superintendent for the department of Game and Wildlife in Ghana, a Congolese game warden, and a director of parks. "Everyone on the expedition at some time or other had a chance to see this animal," said Regusters.

For several hundred years the lake has been the source of reports about a huge creature known to natives as mokele-mbembe.

Roy Mackal, a University of Chicago biologist, criticized his former partner as not being qualified to make the search. Mackal recently returned from a dinosaur hunt in the same area, and said that although he had not seen the creature himself, he is "more convinced now than ever" of its existence.

The above report, while it certainly does not prove that dinosaurs are still alive, at least makes us realize that areas of the world still exist which have not been sufficiently explored to rule out the possibility of their continued existence. I plan to follow up on this report and contact Mr. Regusters as to whether he was able to get the picture processed clearly enough to show any details. In many respects the most interesting part of this story is that the former partner Roy Mackal, though very critical of his former partner, is nevertheless convinced that dinosaurs do exist in this lake.

Last two items contributed by Walter E. Lammerts

Calendar Specified by Festivals?

Elsewhere in this issue of the *Quarterly* Ben Uri has suggested that certain features of the Tabernacle could have served as a standard of length for the Hebrews; and maybe other standards were incorporated therein. One wonders, is it possible that the calendar might have been specified in an analogous way, in terms of festivals?

The present Jewish calendar, for ritual use, is a lunar one. To keep it approximately in step with the seasons, a month is occasionally intercalated. This seems to be done more or less according to Meton's cycle. This is a cycle of nineteen years, into which seven extra months are intercalated. Meton worked in the fifth century B.C.; but his cycle may not have been entirely new then.

In ancient time the Hebrews seem to have used a lunar calendar, which was kept approximately in step with the seasons somehow; but the exact arrangement seems to have been forgotten.

A thought comes to mind: is it possible that there was a cycle of forty-nine years, into which eighteen extra months were intercalated? The solar year is stated to be equal to 365.2421988 days, the lunar month to 29.530589. Thus forty-nine years would be very nearly equal to 606 months.

If this be so, then the calendar could have been tied in, in ways not now exactly known, to the sabbath years, and the Jubilee.

The answer to this question could have a bearing on ancient history. For in the Law a calendar is assumed. Is it not likely that it would be the one which the Hebrews had known in Egypt; and thus, likely, the same (more or less) as the Egyptian calendar of the time of the Exodus?

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BOOK REVIEWS

The Waters Above: Earth's pre-Flood Vapor Canopy, by Joseph C. Dillow, 1981. Moody Press, Chicago. 426 pages, \$12.95.

Reviewed by Michael J. Oard*

This review has really grown into a critique; but I soon realized that in order to do the book justice, a more substantial article was needed. The book is long, 426 pages of text, and is quite detailed in some sections. I feel the evidence I have seen so far from a number of creationist writers favors a pre-flood vapor canopy and Mr. Dillow has the best model by far. However, I am not committed to the theory and have tried to be as open-minded as possible in this critique.

The vapor canopy appeals to most creationists because it can potentially solve a number of Bible-Science problems. For instance, it would solve the problem of where the rain for Noah's flood originated and why we find tropical and subtropical fossils at high latitudes. However, most canopy models have been either too qualitative or too speculative. *The Waters Above: Earth's Pre-Flood Vapor Canopy*, by Joseph Dillow is an excellent quantitative analysis of the scriptural, mythological, and scientific evidence for a pre-flood vapor canopy.

The first chapter is an introduction on the interaction of science with the Bible. He points out that the Bible is a "textbook of modern science" because it provides a creationist's foundation for the past. He then goes on to lay down eight principles to follow in order to extract scientifically meaningful knowledge from the Bible. The main scriptural evidence for a "water heaven" presented in chapter two comes from Gen. 1:6-8, where God lifts water above the atmosphere on the second day of creation, and from Gen. 7:11, 12, which implies there must have been a pre-flood source of water to produce forty days of heavy rain. Since water is a major atmospheric constituent of volcanic eruptions, it has been argued that the world-wide eruption of the "fountains of the great deep" during the flood would produce the rain.¹ However, Mr. Dillow, in one of his many quantitative arguments, shows that "it is unlikely that volcanic activity could contribute more than 0.1% of the total water needed." Circumstantial Biblical evidence for a vapor canopy is discussed in chapter three. The specific verses analyzed are Gen. 1:3; Gen. 2:5, 6; Gen. 8:22; Gen. 9:13; and Gen. 9:21. The author objectively admits these verses can be interpreted in other ways. He justifies his interpretation from the more solid evidence of the previous chapter. As a meteorologist it is easy for me to understand how a vapor canopy could produce light global surface winds, a world-wide uniform climate, no rain, no rainbows, extreme stability, small seasonal and diurnal temperature changes, and a diurnal mist regime. Chapter four is a survey of possible references to a vapor canopy in ancient mythology. They are interesting, but compared to flood traditions, there are much fewer of them.

Chapter five defines his vapor canopy model and lists

ten geophysical predictions or postdictions expected from it. His first prediction of a greenhouse effect has substantial geological evidence. (There is the possibility this evidence was transported to higher latitudes during the flood.²) This is very difficult to explain by uniformitarianism, the difficulty of which was recently shown by a Cretaceous climate simulation experiment.³ It was shown that relatively warm temperatures could not have existed at higher latitudes, unless some very large warming mechanism existed. Other predictions which have impressive scientific evidence are: 1) a sudden and permanent temperature drop in the polar regions, 2) the high present-day concentration of He_3 , and 3) greater atmospheric pressure from an analysis of the flight dynamics of the giant flying reptile Pteranodon. In analyzing this last prediction there seems to be some confusion on the definition of partial pressure. The partial pressure is just the pressure of the gas if alone. However, the author multiplies the partial pressure by 2.18, the surface pressure of his model in atmospheres. It would be difficult scientifically to prove the prediction of shielding from cosmic radiation. However, pre-flood longevity from scripture could possibly be one indication of this. Several of his predictions are not unique to a vapor canopy. The prediction of a global flood is not necessarily a consequence of a collapsed vapor canopy. Volcanic ash mixed with glacial ice, another prediction, is a post-flood phenomenon that indicates volcanism either during the flood (the fountains of the great deep) or after the flood.⁴ The prediction of residual water vapor left in the stratosphere could not be used to prove the past existence of a vapor canopy. Mechanisms have been discovered that inject water vapor into the stratosphere from the troposphere, for example in large thunderstorms.

Chapter six is a needed quantitative critique of various other canopy models, which other authors have already dealt with to some extent.⁵ Unless miracles are invoked, these canopy models have severe scientific problems. Perhaps the biggest problem is the heat involved as the canopy precipitates to the earth, which is also a problem in Dillow's model. In critiquing cloud models the author assumes clouds cool the surface. This is not necessarily the case. There are two opposing effects on the surface radiation balance caused by clouds: 1) cooling due to the reflection of solar radiation back to space, and 2) warming due to the absorption and re-radiation of infrared radiation back to the ground. There are many variables that determine the net result, for instance surface albedo and the temperature, amount, latitude and optical properties of the clouds. Current opinion is divided.⁶

Chapter seven is a quantitative derivation of his atmospheric vapor canopy model. The author has selected a vapor canopy of forty feet of precipitable water for his model. This is wise since it avoids several problems inherent in models with much more water, and yet it allows an average rainfall rate of forty days of 0.5 in/hr. This is quite heavy; the National Weather Service threshold for heavy rainfall is 0.3 in/hr. Using the incomplete theory of radiative transfer in clear skies

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the author calculates a very hot and improbable temperature profile. However, when cloud processes are introduced, the profile becomes more realistic. A surface temperature of 68° F. is calculated with a strong temperature inversion above until the base of the water vapor canopy, which has a temperature of about 220° F. From the base of the canopy the temperature slowly decreases with height and is unstable enough to allow convection to occur. There is no doubt that this temperature profile would strongly inhibit eddy diffusion and rapid mixing of air and water vapor.

The author's analysis is on the right track. However, there are a number of shortcomings, besides several minor typographical errors, which makes the model tentative at this point. (Mr. Dillow is currently working on a more sophisticated model, which I will be anxiously awaiting.) The author seems to neglect scattering of solar radiation (unless it is indirectly included in the spectral albedo of the surface.) The present atmosphere scatters between 6 and 7% of the incoming solar radiation back to space.⁷ In the vapor canopy model it would probably be higher because of more molecules. This would alleviate some of the high heat problems in the model. The Emden model of radiative transfer assumes no solar absorption of by water vapor.^{8,9} This is good for the present atmosphere; but such transfer would be significant for a vapor canopy, causing more heating in the canopy and less at the ground. Broadening of absorption lines may also be important in his model.

Cloud processes complicate the situation enormously. The author apparently did not take into account the need for high supersaturations to form clouds in the absence of CCN (cloud condensation nuclei),¹⁰ which practically all originate at the surface of the earth and would have no way to reach the vapor canopy. From the continuity equation, updrafts must be balanced by downdrafts, which would tend to dissipate the clouds. A 100% cloud cover would be difficult to maintain. Therefore, a more sophisticated model should probably be a partly cloudy model with more meteorological processes.

A question often raised against the vapor canopy theory is that it would rapidly mix with the atmosphere by molecular diffusion. Mr. Dillow applies Fick's law of diffusion for the vapor only and discovers that only a small amount of vapor would diffuse into the top of the atmosphere during the time between Adam and the flood. Only one minor shortcoming was found in this otherwise excellent scientific analysis. The calculation would have been better if air were allowed to diffuse upward, which couldn't help but hasten the mixing process. However, the effect would be small and should not alter his main conclusion.

In chapter eight, the author deals with several scientific problems, the largest of which is the heat load. If all the heat from the condensation and precipitation of the canopy were added to the lower atmosphere, the temperature would be raised 2,100° C. The author introduces "extensive volcanism in the year preceding the deluge" in order to add volcanic dust to the vapor canopy and hence cool it as it slowly condenses. This is an ingenious idea and would provide a warning sign to the ante-diluvians which is characteristic of God's mer-

cy. I would be concerned that the volcanism could easily cause instabilities in the vapor canopy that would cause it to precipitate rapidly. A second way to remove the heat is to transport it to the oceans in the rain. It surely would be a hot rain, but it would add a lot of heat to the atmosphere through conduction. The problem is only partially solved and needs more work.

Chapter nine deals with the problems of seeing stars through the vapor canopy (Gen. 1:14-18), much of which was published in the *Creation Research Society Quarterly*.¹¹ Calculating the attenuation of starlight by Rayleigh scattering, the author concludes that it would have been possible to see 255 stars at one time in the pre-flood world. The attenuation by absorption was assumed small and neglected; but in forty feet of precipitable water it isn't negligible.¹² However, the absorption would occur in certain bands, allowing starlight to pass through the other bands. Thus, some stars would still be seen, but fewer than 255.

Chapters ten through twelve is a one hundred and ten page treatise on the demise of the mammoths and other animals in the high latitudes of the Northern Hemisphere. The author has gathered much information to show that the mammoths of Siberia were not adapted to cold temperatures, died of suffocation, were quick frozen by temperatures below -150° F., and have remained frozen till this day. Even though the author makes a good case, I am a little perplexed about these data. For one thing, only a few mammoths have been extensively analyzed; and this was done long ago (except for the baby mammoth Dima) by the Russians and published in the Russian language. Harold Clark has also expressed his reservations on this evidence.¹³ I would like to see more recent data, especially on the contents of the stomach and mouth, using a larger sample of mammoths before I would feel comfortable with the author's conclusion.

In chapter twelve the author presents his quick-freeze mechanism for the mammoths. This chapter is poorly done, and frankly, I was disappointed. During pre-flood volcanism low pressure centers would develop as a result of mountain uplift and violent rainfall. From Poisson's equation, the author calculates that a drop in the surface pressure from 2.18 atm. to 1.18 atm. from a local demise of the vapor canopy will lower the surface temperature to -40° F. in the center of the storm. The air continues to cool in violent updrafts where -185° F. is reached at about 0.18 atm. Water vapor entrained into the updraft would provide moisture for extensive hail, which falls to the ground, and cools it to -185° F. There are a number of scientific difficulties with this mechanism. First, uplifting mountains will cause warmer surface temperatures since there is a strong inversion. Second, volcanic activity would heat the air within the low. Third, condensation and precipitation of the vapor canopy would add a considerable amount of heat to the low center, which would be well mixed vertically due to convection and conduction. Fourth, warm air from the surroundings should completely entrain the low center, despite the Coriolis force which would cause only limited turning of the air in a small low center. Fifth, it is obvious the decrease in pressure would not be an adiabatic expansion due to all the

heating effects. Therefore, Poisson equation could not be used. Sixth, I am afraid the flood would begin immediately because these local, large, instabilities would surely cause the whole atmosphere to adjust quickly and begin the global flood. The above problems are insurmountable from my perspective. If there was local pre-flood volcanism, the surface pressure would not drop much below 2.18 atm. because of atmospheric adjustment and the storm would be a warm-core low and not a mammoth-freezing cold-core low.

This book on the whole is very well done. It needs polishing in some areas, and chapter twelve should be extensively revised or abandoned. The biggest asset of the book is its extensive quantitative documentation, which is much needed in Creationist research. The hardbound price of \$12.95 is very reasonable. *The Waters Above: Earth's Pre-Flood Vapor Canopy*, is a welcome addition to the Creationist literature.

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Metals in Biochemistry by P.M. Harrison and R.J. Hoare: Chapman and Hall 1980, 78 pgs.

Reviewed by Emmett L. Williams*

This book is part of the Chapman and Hall Outline Series in Biology. A very sketchy presentation of the known functions of metals in living organisms is given. It becomes readily apparent when reading the monograph that very little accurate scientific information on the topic is available. The complexities of living organisms often defy satisfactory scientific explanations and interpretations.

The evolution of metals is attempted in the first chapter. The authors envision the supposed process by a succession of chemical crises (pg. 12). When a metal was needed in the imagined process, naturally it evolved to fill the need!

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A creationist would be impressed with the design and teleology of living organisms when reading the chapter on metal metabolism. A book reviewer suffering from a broken leg was intensely interested in the discussion of calcium and bone formation (p. 21).

Suggestions for further reading are listed at the end of the book. This is probably the most valuable portion of the monograph since most of the topics are too detailed to cover in outline form. However, one point is evident to this reviewer. The field of biochemistry offers tremendous opportunities for creationist interpretations and possible research efforts. Is this yet another discipline where the fields are white unto harvest but the laborers are few?

Saga America, by Barry Fell, 1980. Times Books, New York, 407 pages. \$15.

Reviewed by Erich A. von Fange*

During the past two decades a number of authors have demurred from the prevailing view that there were no Europeans in America before Columbus. In so doing these writers have compiled a most fascinating array of evidences that America indeed played host to visitors from across both oceans in ancient times. Among the scholars and other writers who have given us books of great interest are Charles Boland, John Cohane, Cyrus Gordon, Charles Hapgood, Pierre Honore, Constance Irwin, Henriette Mertz, Salvatore Trento, and Alexander von Wuthenau—to name just a few.

While some and perhaps many finds of artifacts, carvings, and the like are hard to verify, one must conclude that there is more than a little fire from so much smoke. The newer books on this interesting subject are far more sophisticated than naive 19th century attempts to identify the Ten Lost Tribes with the American Indian. Archeologists and anthropologists, betraying their own fear of water and despite abundant evidence to the contrary, clutch fervently to the Bering Strait bridge as the only source of peopling the Americas before Columbus.

To the above list of writers we add Barry Fell who has produced a sequel to *America B.C.* which he calls *Saga America*. With many photos, maps, and drawings Fell documents widespread travel across both oceans to the Americas by Libyan, Carthaginian, Celtic, Greek, Roman, Viking, and Chinese ships. This controversial book will provide the reader a rich feast of astonishing evidences to consider and judge. The book is highly recommended to those who tire of conventional historians who do not dare to consider the kind of evidence which Fell and others bring forth.

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Thermodynamics and the Development of Order, Dr. Emmett L. Williams, Editor, Monograph Series: No. 1, Creation Research Society Books, 5093 WilliamSPORT Drive, Norcross, Georgia 30071.

Reviewed by T.G. Barnes*

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There is perhaps no more convincing scientific support for the creation position than the laws of thermodynamics. Whether one be an evolutionist or a creationist his first logical step must be to postulate a beginning. Science can not provide the ultimate beginning. That is beyond the domain of science. The initial state must be postulated. The only initial state, which when followed by processes that obey the laws of thermodynamics could yield the universe which we observe, is a created state. Subsequent to that initial state all the processes of nature are governed by the laws of thermodynamics and those processes run in the opposite direction from any presumed evolutionary process.

Since this is such a strong case against the evolution hypothesis, why don't more scientists subscribe to the creation hypothesis? There are three reasons: 1) Not many scientists really understand the laws of thermodynamics. This is one of the most complex fields of science. 2) Not many of them ever do a logical analysis that begins at the beginning. 3) Some reject the logical conclusion solely because it is not palatable to their philosophy.

One great need is to educate our people in the science of thermodynamics and to motivate logical analysis that begins with first principles. That is the reason the Creation Research Society has published as its first monograph: *Thermodynamics and the Development of Order*. It is the work of seven highly qualified scientists who know how to write and whose background in science encompasses a very broad spectrum. The project was under the direction of Dr. Emmett L. Williams, Vice-President of the Society. He served as the Editor and authored numerous portions of the book.

There is something worthwhile for everyone in this book. It begins with a brief but excellent history of the formation of the laws of thermodynamics, which is perhaps the most fascinating development in all science. It is better than a detective story and spans more than three centuries, involving some of the best works of a number of scientists. The reader will learn something about the *Zeroth* and the *Third Law of Thermodynamics* as well as the more commonly known *First* and *Second Laws*. George Mulfinger authored this section.

The book contains simple clarifications of the language employed in thermodynamics. For example, a primitive notion of the running down, or degradation process, involved in the Second Law is something everyone has some "feel" for; but there are pitfalls when one tries to put it into words unless there is some additional clarification. Examples are given which show the need for more than just saying that the direction of the process is from order toward disorder. Pictorial illustrations are given as to what is meant by order and uniformity and natural processes when associated with the Second Law. Harold Armstrong authored this section.

The scope of thermodynamics is so great, encompassing much more than is implied in the words thermal and dynamics, that no one scientist excels in all the different facets of the subject. Each of the seven authors for this book made a contribution in an area in which he is particularly qualified. In spite of this diversity of con-

tent there is continuity in the book. The book points to the marvelous order that does exist in nature. It then exposes the insurmountable problems inherent in the proposed evolutionary mechanisms for the development of order.

Dr. David Boylan notes that the "explanations advanced for the 'first cause' in the development of order in the universe or in living systems depend heavily upon the philosophy of the interpreter." Those who reject the supernatural explanation of origins espouse mechanisms based on natural processes. He then exposes insurmountable problems with those mechanisms. In some instances a quote from the scientist makes it self-evident that it is a "grasping for straws". For example this quote from Dr. Wald: "Given so much time, the impossible becomes possible, the possible probable, and the probable virtually certain . . ."

He includes the following quote from Dr. Brillouin who acknowledges that the known naturalistic laws can not supply the mechanism, but his hope is in some as yet undiscovered "life force".

"... Consider a living organism; it has special properties which enable it to resist destruction, to heal its wounds, and to cure occasional sickness. This is very strange behavior, and nothing similar can be observed about inert matter. Is such behavior an exception to the second principle? It appears so, at least superficially, and we must be prepared to accept a "life principle" that would allow for some exceptions to the second principle."

Dr. Boyland explains why "crystallization does not qualify as an energy source for financing life processes." He discusses in some detail the presumed chemical evolution from hydrogen to life, exposing the problems.

His final conclusion is "that neither the initiation of the universe nor the development of the complexity of the living system can be explained in terms of natural processes . . ." "On the other hand, an explanation based on a fully developed universe with life in all its complex forms as a direct creative process of supernatural origin clearly fits in the observable data, and does no violence to the interpretation of current experiments or experiments on the origin of life and biological processes in general."

Dr. Emmett Williams examines the evolutionary concept of *fluctuations as a mechanism of ordering*. This mechanism has been "heralded as the possible driving force for evolution." Ilya Prigogine was awarded a Noel Prize in 1977 for his work on this subject. It "falls within the domain of irreversible thermodynamics." Dr. Williams notes that the assumed initial state is one of nonequilibrium. He considers this to be an unrealistic dodge. "Evolutionists need preexisting order to provide any hope of success in their hypothesized process since equilibrium is one of maximum disorder." "... a nonequilibrium state is no proper place to start any molecules-to-man scheme; since the biggest problem has been avoided, getting the system out of the equilibrium state while all known natural 'forces' want to maintain that condition."

A quote from Prigogine acknowledges that the subject of origins is beyond the scope of his concept.

"This picture of selection through 'survival of the fittest' already implies the existence of self-maintaining and self-reproducing systems. Strictly speaking therefore, it is not a theory of the origin of life."

Dr. Williams states "When the work is carefully investigated it is found that it is not a proper basis for evolution."

Dr. Duane Gish lays bare the immensity of the problems in the evolutionary scenario in which "matter started on this planet in the form of simple gases which transformed themselves by spontaneous, naturally occurring processes into the immensely complex entity called a living cell—all of this in spite of a universal natural tendency to go in exactly the opposite direction." He turns the evolutionists' own works against them by quotes from their publications to make his point. He drives home his case with memorable down-to-earth expressions such as: "of course a living cell is more than just a bag of chemicals."

In regard to a *necessary* ordering force he states: "It is immediately obvious to anyone who is willing to give the problem careful consideration, unburdened by any philosophical necessities, that if life has indeed evolved, there must have been some extremely powerful organizing force or principle at work. Something had to be imposed upon the system to overcome the overwhelming, all pervasive natural tendency for every part of the system every moment to go in exactly the opposite direction. It is incumbent upon those who suggest that life on the earth arose spontaneously through abiogenesis to demonstrate what that powerful organizing principle could have been."

Dr. Gish goes into some technical detail related to the "kinetics of ordering", the "energy needed in molecular origins", "DNA and RNA formation", "the oxygen-ozone problem", "crystallization and origins", and "chemical natural selection".

His conclusion relative to a mechanism for the evolution of life: "After a careful search of much of the literature on this subject, however, I have failed utterly to find it." "Suggestions have been many—crystallization, open systems with flow-through of energy, differential rates of movement toward disorder, irreversible thermodynamics with sudden movements far from equilibrium, epicycles with 'autocatalytic' molecules. All fail close scrutiny. As far as scientists have been able to determine so far, no such mechanism exists."

The book contains a section entitled "Thermodynamics and the Creation Model", with a proposal for a new creationist discipline written by Ralph E. Ancil and a creation model for natural processes written by Dr. Emmett L. Williams.

The final section of the book is entitled Philosophical Perspectives and contains a chapter on Thermodynamics and Biblical Theology written by Dr. Henry M. Morris. It begins with the position statement:

"Instead of the many scientific mistakes and anachronisms alleged by its enemies, the Bible actually contains a remarkable number of passages with modern insight."

The emphasis in this chapter is on the Biblical and theological aspects rather than the science. However the importance of the first and second laws is reemphasized. The first *theological implication* is clearly seen in the following excerpt:

"The first law unequivocally stipulates that the universe could not have begun itself! The second law says there must have been a creation, but the first law says the universe could not create itself.

The only way out of this impasse is to recognize that 'in the beginning God created the heaven and the earth.' Genesis 1:1 is the most profoundly scientific statement ever written, with all the systems and processes of the cosmos uniting in asserting its truth."

One might ask how could a scientist escape that conclusion? Dr. Morris' answer is: "... one can escape this conclusion only by appealing to evolutionary metaphysics."

"It is one thing, however, to repudiate Scripture with philosophy, and quite another to reject science at the same time. In a science-oriented society, this can only be done by so masking the metaphysics as to make it *appear* scientific. This is exactly what evolutionary 'cosmogonists' have essayed to do with their 'steady-state' and 'big bang' cosmogonies."

"Evolutionary metaphysicians may enjoy playing semantic games in order to escape from the conclusion of primeval *creative supernatural processes* but all they have in their place are *imaginary anti-natural processes!*"

Twenty Biblical references to the first law are cited and fourteen Biblical references to the second law are cited. Additional theological considerations are discussed.

The editor and authors are to be commended for the job that has been done. It is a fine book and will be a worthwhile addition to anyone's library.

Time Upside Down, by Erich Von Fange, 1981. Price \$3.50 per copy.

Reviewed by W.H. Rusch, Sr.*

This booklet is the first of a new series entitled Surprises in Genesis Series published by Dr. Erich von Fange, 460 Pine Brae Dr., Ann Arbor, MI 48105.

Fully to appreciate this work, it is necessary to know that Dr. von Fange, who has a Ph.D. in psychology, has been doing some wide reading in diverse journals and magazines. Whenever he has encountered some reference to any of the following topics; he has clipped these and put them into an extensive data retrieval filing system that he adapted. Now, after some 25 years of compiling, he has put this material together, complete with thorough documentation. This book is the first of the products of this undertaking.

Time Upside Down consists of two parts. The first part, which consists of 9 pages, is headed *Once Upon a Time*. This deals with the subject of time generally, especially as it bears on the first chapters of Genesis.

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The topics dealt with in the second part of this work are titled as follows:

1. Introduction
2. Surtsey Island Shouldn't Be
3. Upside Down Formations That Can't Be
4. Bristlecone Pines Tell on C-14
5. Odd Things In Wrong Places
6. Llamas and Elephants—Village Pets
7. Footprints Tell Tales
8. What Ailed Old Neanderthal Man?
9. Conclusion

One is quite astonished as one reads this material. A quite different picture is presented of ancient times, compared to that presented in conventional texts in these disciplines; for example, the finding of points in China identical to the Folsom point that occurs in New Mexico. To find the same point in such widely separated areas, is rather remarkable. However, there is also the time factor, since the American points are dated at 10,000 B.P. (before present) while the Chinese points are dated 2,000 B.P.

Another example, quoting from page 26; *Perhaps the most prodigious lava flow in the history of the world occurred in the Pacific Northwest. The lava spread over an estimated 200,000 square miles in depths up to 5,000 feet. In 1972, a competent geologist stated that the eruptions took place a mere fifteen million years ago. Much of Washington, Oregon, Idaho and portions of neighboring states was covered. The immense age of the deposit can easily be imagined by the fact that the Snake River has cut canyons through the deposit to depths of 3,000 feet.*

Still, there are several curious things about this lava flow. Many competent observers have commented on the remarkable freshness of the deposit, as though the eruptions took place in very recent times. A startling find was made in 1889, near Nampa, Idaho. While workers were boring an artesian well, a small figurine of baked clay was extracted from a depth of 320 feet. Above the figurine the drill, inside a 6 inch tubing, had cut through fifteen feet of basal lava. The find has never been challenged except on ground of theory. The conclusion is unmistakable. Before the lava flowed, sophisticated humans lived in the area.

It is a real experience to encounter data that supports a side other than that based on evolutionary theory. Unfortunately such data are usually discarded under the assumption that since they don't fit the framework of modern evolutionary theory, they must be spurious in some fashion. Therefore such information usually doesn't find its way into general texts as far as matters historical and archeological are concerned. It should be remembered that all of the material in this work is documented and therefore can be checked through to the original source by the reader. It is true that facts like these have been referred to in previous works, but since the necessary documentation has been lacking, such data could never really be used by the serious student.

I certainly recommend this book to anyone interested in the subject of time. Certainly he or she will find plenty of new material of great interest and help.

NOTICE OF BOOKS

So You're an Evolutionist, published by the Creation Science Association of Canada, P.O. Box 34006, Vancouver, British Columbia, Canada.

This booklet is addressed to the person (and there are many such) who says that he is an evolutionist, or believes in evolution, but really has never thought out the matter.

The question is put: "What variety of evolutionist are you?" Then it is pointed out that there are more than a half-dozen different theories of evolution, which differ one from another on important points, and on some points are diametrically opposed. Thus, it is urged, one can not logically be an evolutionist until he has examined these differences so as to decide what brand of evolution he holds. And the examination may well conclude by deciding that while they can not all be right, they can be, and in fact are, all wrong. Which leaves the alternative: Creation.

This booklet could be very useful for giving to people who take an intelligent interest in the matter, but have not yet thought very deeply about it.

LETTERS TO THE EDITOR

Comments on *The Waters Above*

Dillow's new book, *The Waters Above*,¹ has severely questioned my work and conclusions in the area of thermal radiation in a canopied atmosphere, I feel it necessary to make a few comments in defense of my work², and on the book.

Dillow and I have disagreed on the correct usage of the Emden approximation for the calculation of surface temperature. I have concluded that the earth's temperature under the canopy would be too hot for life; he had concluded differently.

His new model and mathematical approach are quite different from the previous one.³ He has clouds above and below the canopy. His mathematical approach to the problem is also different. Dillow says that using a more correct approach to the Emden approximation he calculates a surface temperature of 314° C and chides me for not calculating this more "reasonable" temperature. However, in his calculation he commits an unfortunate but serious mathematical error, apparently while converting from one system of units to another. He says,

"The optical depth, τ_ν , is given by $\tau_\nu = \int k_\nu \rho dz$ where k_ν is the mass absorption coefficient for radiation of wave number ν ; ρ is the density; and z is the altitude. In the canopy model, 40 feet of precipitable water or 1,219 cm. are being assumed. Thus $\int \rho dz = 1,219$ cm. The problem is to find a value of k_ν for each of absorbing gas in the atmosphere: ozone, carbon dioxide, and water vapor. In the following model, the solar spectrum has been divided into 35 spectral intervals and Table 7.1 gives the values of k_ν in each interval. To find the optical depth for each spectral interval, the values of k_ν from Table 7.1 are multiplied by 1,219."⁴

The first minor thing wrong in this paragraph is that the integral does not equal 1,219 cm. It equals 1,219 grams per square centimeter. We have density times length, not just length. I was assured in a telephone conversation that this is a typographical error.

One cannot simply multiply the values of k_ν in the table by 1,219; for 1,219 grams per square centimeter are in CGS units and the table values are in MKS units. Dillow also assured me that he made the conversion and not multiplied CGS units by MKS units. However, he is off in his calculated temperature, I believe, because when making the conversion he seems to have divided by a factor of ten instead of multiplying by 10. This means that the fourth power of his temperature is approximately 100 times too small.

The method adopted employs the Emden approach by calculating the flux over each of 35 spectral intervals according to the equation

$$F = \sum_{\nu=1}^{35} (1 - A_\nu)(2 + 1.5\tau_\nu) SC_\nu / 8$$

where F is the flux, ν is the wave number, A_ν is the albedo of the earth in the spectral region under consideration, τ_ν is the optical depth in the spectral interval and SC_ν is the value of the solar constant in that interval.

On page 228 and in a footnote on page 230 Dillow lists the pertinent information for this equation. Converting the 1,219 gm/cm² to MKS units yields 12,190 kg/m².⁵ For the spectral interval $\nu = 5.24 \times 10^5$ to 5.54×10^5 he lists $A_\nu = .15$, $k_\nu = 8.8$, SC_ν must be multiplied by 2.16493×10^{-5} (see footnote page 230) which yields 13.38 joules/meter² sec. Since $\tau_\nu = k_\nu \times 12,190$ (see page 227) then $\tau_\nu = 107,272$. Plugging these values into the above equation yields a flux of 228,753 watts per meter squared.

In order to solve for the temperature the earth would have if this were the only frequency of light received one needs to divide by the Stefan-Boltzman constant, 5.6697×10^{-8} joules/meter² sec., and take the fourth root. This yields 1417° K or 1144° C. This is the temperature the earth would have if it received only light in this one spectral interval. This is far hotter than the 314° C he reports for the total of all fluxes.

Laboriously hand calculating the surface temperature, following Dillow's method, gives a mathematically correct surface temperature of 1874° K or 1601° C. The only way Dillow's temperature could be arrived at was to assume that the optical depths are off by a factor of 100 as would come from a mistaken factor in the conversion from CGS to MKS units!

I still stand on my previous contention⁶ that the assumptions in my article⁷ were charitable, to say the least, to the canopy position. I calculated 1172° C. However, regardless of whether the temperature is 1601°, 1172° or 314°, the result is the same. Life would be impossible at any of those temperatures.

He also chides me for saying that clouds couldn't form under the canopy, which is where his previous model has placed them.^{8, 9, 10} On pages 234 and 235 he proves that clouds could only form near the top of his canopy and then says I'm wrong in saying that they couldn't form *under* the canopy. His figure 7.1 proves that they couldn't form under the canopy. I will accept his proof on this point. At a later point in his text, apparently without any quantitative thermodynamic consideration, he places clouds under his canopy again! (See page 240)

There is a window in the infrared spectrum between 8.5 and 13.5 μ through which heat escapes today. Under a canopy the optical depth in this window is 122, which means that the *direct* escape of radiation would be blocked. The meteorological expert quoted was talking about the present atmosphere, *not a canopied earth*. Surely, radiation cannot travel unimpeded through 122 optical depths.¹¹

Dillow calculated a surface temperature of 314° C by Emden's method, but then rejected the results. There seems to be no proof that a temperature inversion exists on the surface, it is assumed that it does.¹² The thing really needed by canopyists is a proof that an inversion had to exist, not an assumption. He then proceeds to calculate a cool surface temperature but there is, I believe, an oversight.¹³ When light travels through a layer a certain percentage is transmitted. This percentage is called the transmissivity, α . Using only the transmissivity Dillow calculates that the earth's surface was 68° F. He erred in never accounting in this calculation for the energy absorbed in many of the radiative interactions. If α was transmitted, then $1 - \alpha$ was absorbed. There are no $1 - \alpha$ terms in his calculations.

The issues which Dillow and I are contending over are complex. Due to the vital importance of this issue to the creationist, I would beg and plead for all qualified creationist physicists to research this problem and report their results.

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- ⁵This conversion can be found in any good handbook of physics.
- ⁶Morton, Glenn R., 1981. Reply to Dillow. *Creation Research Society Quarterly* 17 (4):229-230.
- ⁷Reference 2, pp. 164-170.
- ⁸*Ibid.*
- ⁹Reference 3.
- ¹⁰Reference 1, p. 234. In spite of his contention at this place that clouds could form only above 35 km, lower on the page Dillow has replaced the clouds under the canopy.
- ¹¹Reference 1, p. 245.
- ¹²*Ibid.*, p. 240.
- ¹³*Ibid.*, pp. 242-243.

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Defense of Copernicus

In a recent paper on "The Sun's Luminosity and Age" James Hanson considers the incandescence theory to be "... another example of the frequent superiority of pre-Copernican astronomy over the present Copernican-evolutionary views."¹ But surely the Copernican revolution centered around a new hypothesis to explain relative celestial motions rather than being concerned with the source of solar luminosity. Copernicanism is not basically Darwinian, but can be part of a creationist perspective as well.

It is not my purpose to engage in endless controversy over dogma, for our priority is to promote God's work (1 Tim. 1:4). Many aspects of the geocentricity/heliocentricity issue seem open to question; nevertheless, my personal favorite is a sun-centered system. The following comments are offered as "food for thought."

Geocentricity is founded to a large extent on the principles of Aristotle and Ptolemy. Aristotle believed in the possibility of just one motionless point in the universe, the center. In addition, the center of the earth was proposed to be coincidentally at the center of the universe, the heavens moving in perfect circular paths around the center. Hugh Kearney points out the significance of this teaching during the 16th century: "... since Aristotelianism was so strongly entrenched in the universities, it was inevitable that Copernicus' views should be rejected in the academic textbooks."² Vigorous opposition did not subside until the publication of Galileo's works. According to Konrad Krauskopf, "That such an age-old tradition should be slow to yield to new ideas is quite understandable, although the zeal with which the Christian scholars defended a product of pagan logic seems a bit extreme."³

Galileo's discovery of Jupiter's satellites proved the existence of heavenly bodies which did not revolve around the earth. Analogy seems to argue that the sun, because it is far larger than Jupiter, has the most companions moving around it. Without magnification the visible planets are like "dancing stars," many of which have moons. Here we find bright objects surrounded by comparatively darker bodies. If the planets are to revolve around the brightest sphere, then the sun must hold the central position. Why are the middle portions of the majority of galaxies brighter than the revolving outer areas? To assume that sources of brightness usually revolve around darker locations or objects leads to an expectation to observe a great number of doughnut-shaped stellar clusters. Thus, there may be a parallelism between the central hub of galaxies and the sun along with the outer galactic arms, which have a lesser star density, and the planets. Analogous reasoning not only supports creation (Heb. 3:4), but also lends credence to heliocentricity.

Several passages of Scripture come to mind in relation to Copernicanism. Holy Writ proclaims "God is

light (1 John 1:5)." Similarly, "Every good and perfect gift is from above, coming down from the Father of the heavenly lights, who does not change like shifting shadows. (James 1:17, NIV)." This verse agrees with the proposition that the movement of shadows from west to east is not the product of the sun, which is a symbol for the Lord (Ps. 84:11), revolving about the earth, but is caused by terrestrial rotation. Furthermore, Jesus provides the world with spiritual light (John 8:12) while the sun gives it physical light. Through Christ all things hold together (Col. 1:17). Does this suggest that the sun's gravitation holds the solar system together?

Certain spiritual implications of heliocentricity have been explored by Christian artists. As lyricist Glenn Kaiser states, "Like the planets revolve around the sun, I've learned to revolve around the One/ Who knows the score, Who is the Sum, the pure the true and faultless One . . ."⁴ In like manner, Terry Taylor writes, "Shining in the center/ My Lord in the center/ Jesus in the center revolving around Him always revolving around Him . . ."⁵

If Copernicus was wrong what alternatives exist in other star systems? Is there any reason to think that our sun is not the sole star with planets? David Fetcho gives the impression of an affirmative answer:

"... we can only speculate about what the destiny of an unfallen humanity might have been . . . If sin had *not* entered, and with it death, then obedience to the command to multiply would very quickly have filled the planet earth with an exponentially exploding population of immortals. Was mankind's benevolent subjection of the planet Earth but the first intended step in a plan that would eventually encompass galaxies?"⁶

To conjecture what if Adam and Eve had not fallen shows the probable need for planets outside the solar system. Applying the concept of heliocentricity to distant stars leaves little hope in detecting the presence of planets other than the nine we know of. However, if most stars revolve about a planet, then documentation and measurement of stellar aberration is easier. What accounts for the lack of positive evidence of planets beyond Pluto? Were billions of planets destroyed at the Fall or are there now myriads of potential planetary homes scattered throughout the universe? Do they testify to mankind's failure to "multiply" and his rebellion against his Creator?

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Yours in the coming King,
Jay Hall
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Received 1 September, 1981.

Comments on *The Seed of the Woman*

I'm most grateful for the comprehensive review of my book *The Seed of the Woman* (CRSQ: 18 (2), 1981, p. 128 ff.). It is clear that the reviewer has indeed read the book and reflected upon it. Considering that the volume is over 600 pages and follows new pathways, this represents considerable dedication to the task. I was disappointed only in one or two observations which I suspect resulted from my inability to make my position clear.

The reviewer suggests that I am taking as the basis for one of my major conclusions, that alcohol is not only a good paradigm for the poison of the forbidden fruit, but also that the *grapevine* was the fatal tree. He then observes that this is unjustified, since a vine is not a tree in the biblical sense. This would therefore suggest that my thesis is without sufficient foundation.

However, I have actually taken care to state that I do not think grape alcohol is anything more than a paradigm. I have given six reasons why it could have been any one of a number of somewhat similar toxic substances derived from other fruits from which people around the world produce an intoxicating fluid.

Whatever the slow-acting poison may have been that came from the forbidden fruit containing a mortogenic factor, it must satisfy six pre-requisites if it is to fulfill the conditions circumscribed by the events so carefully spelled out in Genesis. I am prepared to commit myself only to something akin to alcohol in the nature of its effect on the human body. I do not commit myself to grape alcohol, although in certain ways it is a not unreasonable possibility.

As to the matter of the vine not being a *tree* and therefore disqualified, I should point out that the Bible does in fact refer to it specifically as a tree in Ezekiel 15:2 and 6, for example.

I am afraid that this short paragraph (p. 129, para 3) may lead the reader to assume that I hold a position which I took pains to say I do not hold. Some other fruit could quite possibly serve the requirements of the case.

One further point is noted by the reviewer upon which I would like to comment. He proposed that the idea that the fatal defect in the human body which brings it to the grave was transmitted through Adam only and not through Eve, is "speculative and has no scriptural support". Romans 5:12 in my view does support this position.

This verse reads: "By one man (the Greek is precisely represented by this rendering) sin entered into the world and death by sin so that death passed upon all men, for that all have sinned". In *Seed of the Woman* this verse is treated in an extended note (pp. 514-518) which deals with the Greek original. I have here set forth good reasons for believing that the last phrase in this verse should be rendered "for as much as all have sinned". This makes the universality of the end result ("all have sinned") a clear demonstration of the universality of the mortal defect (since even infants die who have not yet sinned), a defect which manifests itself in all of Adam's naturally conceived descendants, and which originated in a single individual—"one man".

By contrast, Eve became "the mother of all living"

(Gen. 3:20), her seed in itself having escaped the fatal effect of the poison in spite of the fact that she had also ingested it. Her body was mortalized like Adam's, but her seed was preserved untouched. Interestingly enough, this view of Adam's special responsibility for the introduction and transmission of the mortogenic factor was held by both Luther and Calvin (see p. 145), along with a number of early Reformed theologians, some of whom are quoted.

If, as the reviewer suggests, the idea has "no scriptural support", this can be true only in the sense that the doctrine of the Trinity has no scriptural support either—except by implication. Indeed, Romans 5:12 and Genesis 3:20 seem to me sufficient support, though I have shown that the rest of Scripture bears out my thesis in many other ways by implication.

I should like the reader to know that the reviewer had no small task imposed upon him. The subject matter covers a very broad sweep of data, almost all of which is supported by reference to the works of the best authorities available to me, historical, theological, linguistic, and scientific. Some 60 pages of documentation attest to this, besides numerous footnotes. Over 45 years of research went into hammering out of this volume and not a little of it touches upon physiological matters which have not traditionally formed part of conventional treatment of the subject.

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Received 15 October, 1981.

Comment on *The Discovery of Genesis*

I read *The Discovery of Genesis* about one and one half years ago, having borrowed it from a friend; but I was not as much impressed as Mr. Swanson was.¹ I found a great number of the proposed etymologies to be far-fetched, as, indeed, Mr. Swanson admits they might seem. To me one of the most blatant examples was the statement that the symbol for fire, which is surely a pictogram of leaping flames, was derived from a glorified man, simply because the two signs are somewhat similar. (But the early forms, as shown, were not.)

These and the other signs are shown in the adjacent chart of Chinese Characters. There "M" indicates the Mandarin pronunciation, according to the Wade-Giles romanization; "C" indicates Cantonese, according to the Yale romanization.

Another pictogram, which the book explains as an ideogram, which it is not, is that for clothes. Note the original form.

Another fault of the book is that it often ignores the fact that some Chinese characters are phonetic in nature, so that every single element need not contribute to the meaning. I believe that *jouh* (*tsao*) is one of these, *gou* (*kao*) giving an approximation to the sound, while the radical "go" gives the general class of the word. Again, another meaning of the character for "create" or "make" is "go to" or "reach"; and here the force of the radical becomes apparent.

(I am giving for these Chinese words first the Can-

火 Fire [early form 𤇀]

人 Man [early form 𠤎]

衣 Clothes [early form 𦘒]

 Chinese style garment, model for 𦘒

造 Make — M: tsào C: jəuh

告 Speak — M: kào C: gou

[also written 告, indicating connection with 牛, cow, rather than 土, earth]

辵 combinant form of 辵, go & stop.

婪 Covet — M: lán C: làhm

禁 Forbid — M: chin C: gam

林 Woods — M: lín C: làhm

淋 Gonorrhea — M: lín C: làhm

彬 Elegant — M: pīn C: bān

霖 Heavy(rain) — M: lín C: làhm

琳 Gem — M: lín C: làhm

木 Tree 森 Forest

船 Ship M: chuán C: syühn

舟 Boat (general word)

八 Eight 口 Mouth

谷 Valley — M: yüán C: yühn

沿 Along; coast — M: yén C: yühn

義 Righteous(ness)

我 I/Me possibly derived from hand 手 and spear 戈

[Compare 找, to seek]

羊 Sheep or goat

tonese pronunciation, with which I am more familiar, then in brackets the Mandarin.)

Laahm (lan), and gam (chin), based on the phonetic lahm (lin) are further examples. Other words containing this phonetic are "gonorrhea", "elegant", "heavy" (i.e., rain) and "gem"; and it is hard to see any connection between these and the Garden of Eden. In fact, the reduplication of "tree" does not indicate specifically

two trees, but a number of trees, as is shown by the character for "woods" or "forest". In this connection, the sign with three elements means more particularly "forest", i.e., a large number of trees.

I myself used to cite the character for "ship", with which I have been familiar for years, as evidence of the Flood. However, Wilder and Ingram state that the character is "of modern construction, not much over 2,000 years ago—long after the deluge". They suggest that, rather, it is a fusion of the general character for "boat" and that for "coast".²

Anyone reading *The Discovery of Genesis* who is not already familiar with Chinese characters, or has not access to other books on etymology, should be warned that the book is overly speculative. It does seem though, and in my opinion that is the most valuable information in it, to present undeniable evidence to show that the early Chinese were originally monotheistic, and worshipped The Supreme Ruler, *Shangti*.

I do agree that the character for "righteousness" indicates the time when the sacrifice to make me (see the chart) righteous was a sheep or goat. Today, at least in southern China, the pig is the large animal most commonly sacrificed. The pig, of course, is an unclean animal in the Old Testament.

I must add here, however, that Wilder and Ingram provide an alternate explanation: that I am righteous when I become lamb-like or peaceable rather than belligerent.³

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³*Ibid.*, pp. 160 & 161.

Sincerely,
Daniel D. Rees
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Received 17 June, 1981.

Some Plants Need Light, and Seasons

I agree with Mr. Westberg that there are species of plant which can grow in conditions of extremely low light.¹ My point, however, does not concern such species. I am interested in how those species (for instance, corn, sorghum, pine trees, and there are thousands of others) which require high light, survived before the Flood, if at that time no part of the Earth received what we should consider full sunlight. While Mr. Westberg's observation that heat aids in the growth of plants, at least under some conditions, is true, it is also true, and well known among plant physiologists and biologists, that heat can not substitute for light in the process of photosynthesis. If, then, pre-Flood conditions were indeed dark, we have the problem of determining where and how such plants grew then.

May I comment also on Peterson's suggestion, which is made also by many others who believe in a canopy, that temperatures were uniformly warm throughout the

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year, on all parts of the Earth, before the Flood?² I must question that idea. For there are many plants, for instance many species of *Abies*, *Quercus*, *Rhododendron*, and *Vaccinium*, which absolutely require cold winter weather. These plants, in fact, can not survive without cold temperatures for part of the year. Some species, such as the Sitka spruce (*Picea sitchensis*) grow successfully only in places which are nearly always cool or cold, such as the Pacific Northwest. These species must have had cool habitats available to them before the Flood, if they were created during Creation Week.

Because of these climatic requirements for the survival of many species of plant, I find it difficult to ac-

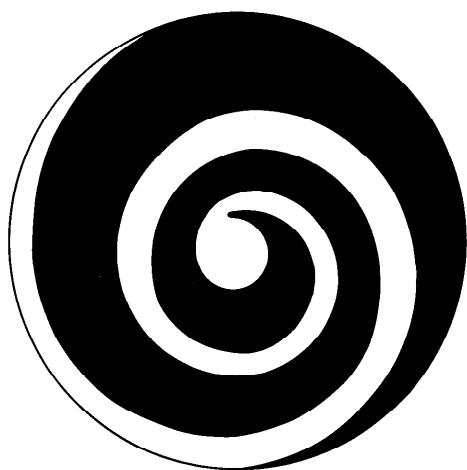
cept the notion of a light-and-temperature-altering pre-Flood canopy.

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Sincerely,
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Received 22 October, 1981.

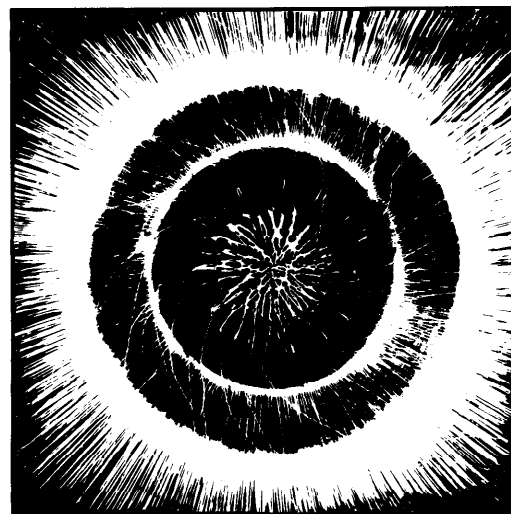


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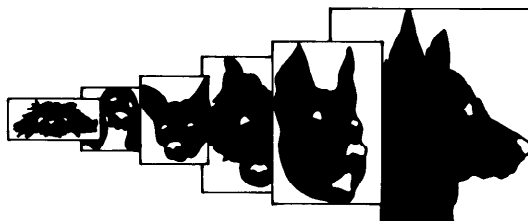
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