

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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NUMBER 1



**SUDDEN BURIAL AND
RAPID FOSSILIZATION**

CREATION RESEARCH SOCIETY QUARTERLY

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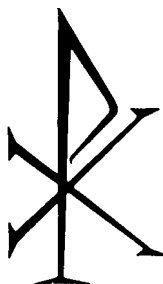
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Cover Photograph

This is a "catching" illustration of a *Dapalis macrurus* ready to enjoy a meal of a smaller member of his species. Both were buried suddenly—a necessity for fossilization. Two discussions of rapid burial and fossilization within a Flood model appeared in the March 1989 Quarterly (CRSQ 25:181-2). This well-preserved fossil was found in a shale quarry near Marseilles France—lithology, Stampian Age (comparable to North American Oligocene). The "tail to tail" dimensions are approximately 17 cm.

Ronald C. Calais

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See the current CRSQ for ordering information

CREATION RESEARCH SOCIETY

History The Creation Research Society was first organized in 1963, with Dr. Walter E. Lammerts as first president and editor of a quarterly publication. Initially started as an informal committee of 10 scientists, it has grown rapidly, evidently filling a real need for an association devoted to research and publication in the field of scientific creation, with a current membership of over 660 voting members (with graduate degrees in science) and over 1100 non-voting members. The Creation Research Society Quarterly has been gradually enlarged and improved and now is recognized as the outstanding publication in the field.

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

Membership Voting membership is limited to scientists having at least an earned graduate degree in a natural or applied science. Dues are \$17.00 (\$21.00 foreign) per year and may be sent to Glen W. Wolfrom, Membership Secretary, P.O. Box 14016, Terre Haute, IN 47803. Sustaining membership for those who do not meet the criteria for voting membership, and yet who subscribe to the statement of belief, is available at \$17.00 (\$21.00 foreign) per year and includes a subscription to the Quarterlies. All others interested in receiving copies of all these publications may do so at the rate of the subscription price for all issues for one year: \$20.00 (\$24.00 foreign).

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

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

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

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

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

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Editorial Comments

Four editors have served our *Quarterly* previous to my term:

Walter Lammerts	(1964-68)
George Howe	(1969-73)
Harold Armstrong	(1974-84)
Emmett Williams	(1984-89)

It is both a privilege and challenge to continue the high level of scholarship which these men have established. As you may know, the entire process of *Quarterly* preparation is voluntary: research, writing, peer review and editing. Your subscription fee goes entirely toward the publication and delivery of the journal.

This is the 101st issue of the *CRS Quarterly*. Twenty-five years of the Creation message have been com-

pleted, beginning in 1964. With confidence in this strong heritage, I enter the editorship with two immediate goals. First, our *Quarterly* needs articles that are useful to the reader, whether pastor, teacher, scientist, speaker, or just a loyal friend. This implies articles with original research and ideas, with applications and suggestions for further study. Dr. Emmett Williams has made a good beginning in this regard. *Second*, our *Quarterly* subscription list needs to be expanded. The material is too valuable for the present limited circulation of the journal. Which areas can you help us in as we begin our second quarter century together?

Don DeYoung, Editor

INSTRUCTIONS TO AUTHORS

1. Manuscripts shall be typed and double spaced.
2. An original plus two copies shall be submitted to the editor of the *Quarterly*.
3. All submitted articles will be reviewed by at least two technical referees. The editor may or may not follow the advice of these reviewers. Also, the prospective author may defend his position against referee opinion.
4. The editor reserves the right to improve the style of the submitted articles. If the revisions of the editor and referees are extensive, the changes will be sent to the author. If the changes are not suitable to the prospective author, he may withdraw his request for publication.
5. Due to the expense involved, manuscripts will not be returned to authors.
6. All references (bibliography) must be presented in the style shown in the *Quarterly*. If a prospective author is not familiar with the CRS format, the editor will furnish an example reference page.
7. All figures and drawings must be prepared professionally. No sloppy hand drawings or freehand lettering will be accepted. The editor reserves the right to approve submitted figures. Unacceptable illustrations will result in rejection of the manuscript for publication.
8. Any manuscript containing more than 25 pages is discouraged. If a topic cannot be covered to the author's satisfaction in this length of pages, the author must divide his material into separate papers that can be serialized in the *Quarterly*.
9. The *Quarterly* is a journal of original writings. Only under unusual circumstances will I reprint previously published manuscripts. Never submit an article to two or three journals, including ours, hoping all of them will publish your work. I consider this practice unethical. When submitting an article, please state if the material has been published previously or has been submitted to other journals.
10. Book reviews should be limited to 500 words or less.

MORE CREATIONIST RESEARCH (14 YEARS)*—PART II: BIOLOGICAL RESEARCH

DUANE T. GISH**

Received 6 August 1988 Revised 25 September 1988

Abstract

Biological creationist research in the past 14 years is reviewed as it was in the first decade of the Creation Research Society (Gish, 1975)^a. See Part I: Geological Research CRSQ 25:161-70.

Variable Production of Growth Rings in Bristlecone Pines

Dendrochronology, the establishment of a chronology, or dating by counting tree rings, assuming that each ring represents an annual growth cycle, can be extended by matching tree-ring patterns of old living trees with patterns of long-dead trees. One tree commonly used for this purpose is bristlecone pine

(*Pinus aristata*) because of the long ages of some living specimens and because multiple growth rings in bristlecone pine under usual circumstances are very rare.

*See Gish (1975).

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^aAvailable from CRS Books, 5093 Williamsport Drive, Norcross, GA 30092 for \$2.00 prepaid and postpaid.

Bristlecone pine trees growing in the White Mountains have been explored for this purpose. This range of mountains is east of the Sierra Nevada Mountains and separated from them by a fairly wide desert valley. The area is about 14 miles east of Big Pine, California. Using bristlecone pine dendrochronology, ages as old as 7,100 years have been obtained. Walter Lammerts (1983, pp. 108-15) has discovered, however, that under certain experimental conditions, extra growth rings could be induced in bristlecone pine, calling into question the reliability of dendrochronology in establishing accurate absolute ages.

He measured growth rates of seedlings of bristlecone pine under various conditions, including normal outdoor conditions; ordinary greenhouse conditions; greenhouse conditions supplemented by maintenance at a temperature of 70°F with no extra light; greenhouse conditions supplemented by a heat lamp for 16 hours per day and maintained at a minimum of 70°F; and greenhouse conditions supplemented by treatment with fluorescent light for 16 hours per day, and maintenance at a minimum of 70°F. The group that showed the most rapid growth was the group given the treatment with the heat lamp. The fluorescent light treatment was next most effective in promoting growth, but considerably less so than the heat lamp. The use of the heat lamp and fluorescent lamp simulated a 16-hour daylight period, with the heat lamp providing extra heat, of course. The plants maintained at 70°F with no extra light exhibited considerably less growth, even less than those plants held under ordinary greenhouse conditions. Those plants grown outdoors had a growth rate only a fraction of those grown in the greenhouse.

Lammerts discovered that seedlings left to grow under ordinary greenhouse conditions, with no extra light or heat (Lammerts' home is in Freedom, California, where temperatures are cool enough in winter so that no growth took place during that period), exhibit only one growth ring after 2.5 years. The most significant of Lammerts' findings was the discovery that an extra growth ring could be induced by depriving the plants of water for two to three weeks in August and then resuming watering. Ordinarily, Lammerts had found, a three-year old bristlecone pine exhibits two growth rings, since, as noted above, no growth ring forms in the first 1.5 years of life. When Lammerts examined three-year-old bristlecone pine trees which had been deprived of water for three weeks in August, followed by normal watering during a warm month in September (September is often the warmest month of the year there), he found that they had three growth rings instead of the two expected. Four-year-old bristlecone pines similarly treated exhibited four growth rings instead of the three found for similar plants whose growth was not interrupted by depriving them of water for two to three weeks in August.

Lammerts points out that soil moisture is at an optimum in the spring, and then diminishes steadily to such an extent as often to halt growth. Then, as the high pressure builds and the heat increases, even more stress has to be endured by the young pine forests. In the early fall, however, evaporation from the formerly existing large lakes again results in clouds and early fall rains, even in such inland mountain areas as the White

Mountains. The pine trees would then resume growth, as Glock noted, with the result that another flush of growth and resultant growth ring occurs, just as in the experiment where the young seedlings formed an extra growth ring following return into the ground under the mist system after their drying out.

In the spring, the hot sun and increasingly long days would act the same as the heat lamp treatment, only more so, and stimulate growth of the pine trees, especially in June and July, thus causing them greatly to extend their root systems. This would make them even more vulnerable to stress resulting in cessation of growth until the early fall rains.

Lammerts cites considerable historical evidence that the part of the U.S. embracing this area of California, and actually much more, was much wetter in the past. The Great Salt Lake, in Utah, is a remnant of Lake Bonneville, which had an area of 50,000 square miles. Its decrease in size is said to be correlated with a 200-year period of drought beginning about the year 1200, as determined by tree ring studies. Even as late as 1860, the snowfields of the High Sierras were much larger than recently. As Lammerts points out, with extensive snowfields there would be much evaporation from them in the spring and early summer. The prevailing westerly winds would carry this evaporation over the areas easterly as clouds yielding rain to an extent considerably more than at present. The growth in the spring and early summer would cease during the dry period in late summer. Then, after an early fall rain, or possibly snow, followed by a hot spell in September, growth would resume, yielding an extra growth ring.

Lammerts postulates that it is possible that the presumed 7100 years of age postulated for some bristlecone pines could be reduced to an actual age of about 5600 years, assuming that extra rings would be formed by effects of stress during 50% of the approximately three thousand years since the end of the Flood. Lammerts acknowledges, of course, that it yet remains to be seen whether these results can be duplicated with older bristlecone pines.

Loss of Vigor Due to Mutations

In an earlier publication, Tinkle (1971, pp. 183-5) had reported the loss of vigor in tomato plants, due to a mutation which resulted in pleiotropy and extra cotyledons. Tinkle (1975, p. 52) has since reported the results of additional tests on tomato plants and on campion. Seeds of mutant tomato plants, bearing three cotyledons, and seeds of normal plants were planted in a cool, fairly light basement. After two months, 20% of the three cotyledon plants had survived, while 37% of the normal two-cotyledon plants were surviving. Tinkle found the mutant to be a late-bloomer, and after a light frost, 76% of the leaves on a mutant plant showed damage, while only 54% of the leaves of the normal plant revealed damage. The normal plants were also higher yielding, averaging a total weight of fruit of 119.3 oz. compared to 92.0 oz. for the three-cotyledon plants.

Tinkle also obtained three-cotyledon campion among normal two-cotyledon plants. After transplanting to outside soil, the mutant plant showed considerably more loss of leaves and leaf damage than did each of three normal plants. Tinkle concluded that even a

small change in morphology, due to mutation, causes a significant derangement of physiological function, as evidenced by loss of vigor.

Post-Fire Survival of Chaparral Relative to Recovery by Seedlings and Crown Sprouting

George Howe (1976, pp. 184-90) has studied the regrowth of two chaparral shrubs, *Adenostoma fasciculatum*, H. & A. (chamise) and *Ceanothus crassifolius* (buck brush), after fires in the Newhall, California area. He found that chamise seedlings are important in regeneration of chamise populations, even though fire-damaged chamise plants can regenerate by sprouting from their crowns. Burned buck brush plants, in contrast, are unable to regenerate by crown sprouting and are thus limited to seedling regrowth following destruction by fire.

Some evolutionists have maintained that chaparral genera, which resprout from old plants, as well as repopulate burned areas by seedlings, routinely have fewer species because they reproduce vegetatively by sprouting, thus bypassing microevolutionary changes which accompany the sexual life cycle involving new seedling generations. Howe noted, however, that chamise, which regenerates vigorously by seedlings after destruction by fire, is limited to only three species. These results conflict with both the observations and theory of Vogl and Schorr (1972, p. 1186), who stated,

We strongly suspect the *Arctostaphylos* and *Adenostoma* seedlings seldom contribute to mature chaparral cover . . . We hypothesize that a suspected preferred attraction of animals to seedlings allows the resprouts to grow relatively undisturbed particularly with high herbivore densities.

Howe does state that further research is necessary to determine if chamise seedlings respond differently in the San Jacinto Mountains, where Vogl and Schorr made their observations, compared to the Newhall California area, where Howe made his observations.

As noted by others, *Ceanothus* (buck bush), which regenerates exclusively by seedlings, has numerous species (58). Other genera, which regenerate by both sprouting and seedlings after fire, possess fewer species, ranging downward from *Quercus*, with 12 species, to genera like *Pickeringia* (chaparral pea), and four others that have only one species per genus. Thus, generally, a large number of species within a genus does correlate with the ability to reproduce by seedlings only. Some evolutionists, such as Wells (1969), suggest that the "ancestral," or "primitive" condition was the ability to crown-sprout, and that the loss of this ability within a genus leads to greater rates of speciation and to enhanced specialization in species, due to increased intensity of natural selection. Howe suggests, however, that the reverse may be true—that the ancestral characteristic may have been the lack of ability to crown-sprout, since the greater number of species within *Arctostaphylos* and *Ceanothus* are unable to crown-sprout. Thus, species that crown-sprout are outnumbered in both genera, because the rate of speciation slowed, or even stopped, in those lines in which crown-sprouting developed.

Howe points out that whichever may be the case, no real evolution, certainly not macroevolution, is in-

volved, since, from beginning to end, chaparral remains chaparral. The real question in origins is, of course, not how to account for the varieties of chaparral but how to account for the origin of basic plant kinds, such as, for example, chaparral, pine trees, peach trees, and bougainvillea. Howe further points out that it is merely an assumption that all species within a genus have arisen from a common ancestor by natural means and he finally points out, with support from biologists who are evolutionists, that many of the supposed species within the genus *Ceanothus* may be mere varieties within a single species. In fact, the 58 species of *Ceanothus* may possibly be reduced to just three species.

Howe concludes that since the chamise chaparral, *Adenostoma*, not only reproduces by crown-sprouting but also reproduces vigorously by seedling after a fire. Yet the genus *Adenostoma* has only three species and there is nothing inherent in the ability to rapidly speciate in those genera which possess the ability to repopulate by seedlings. Howe suggests that further research should include hybridization studies to determine which species in the genus *Ceanothus* are true species and which may be mere subspecies. Further studies are needed to discover if there are other genera which, although presently believed not to do so, actually do repopulate after fire by seedling regrowth.

In a later paper, Howe (1982, pp. 3-10) discusses, in greater detail, the evolutionist and creationist explanations for the two methods of reproduction, resprouting, and seeding after fire.

The Creation Research Society Grand Canyon Experiment Station

George Howe (1984, pp. 9-16) has described observations that he and John Meyer made during a trip to the Creation Research Society Grand Canyon Experiment Station (GCES) and its environs. The GCES, located on 2.5 acres, is about 22 miles north of Prescott, Arizona, and about six miles north of Chino Valley, on U.S. 89. Howe and Meyer recorded many notes on both the fauna and flora of that portion of Arizona. They suggest that the GCES can be used as a center for studies of the biology and geology of an area within a 200-mile radius of the GCES.

Howe and Meyer suggest several research projects and have invited suggestions from others. Their suggestions include research on lichens growth rates; factors governing the growth rates and survival of junipers; a search for new crops suitable for production on an economical scale in a type of environment similar to that near the GCES; hybridization experiments to determine the limits of plant created kinds, the determination of chromosome numbers in various plants as another assist in delimiting plant kinds; the restoration of native grass cover which has been displaced by human activity; and various other studies utilizing other features within a 200-mile radius of the GCES, including, of course, the Grand Canyon, the south rim of which lies about 110 miles north of the Station.

Since Howe's paper was published, the GCES has been fenced, a well has been installed, and other facilities have been placed in readiness for the construction of a research building which has been

approved by the CRS Executive Board. All activities related to the GCES, as well as all other research projects supported by the CRS, are supported by income derived from the CRS Laboratory Project Fund. The principal of this fund is kept intact, only the interest earned on the fund is spent on research activities. Tax-deductible donations to the fund may be sent to the CRS Laboratory Project, 1306 Fairview Road, Clarks Summit, PA, 18411.

Survival of Organisms in Freshwater and Saltwater

The Flood of Genesis 6-8 destroyed all land-dwelling, air-breathing animals except those on the Ark. What happened, however, to freshwater and saltwater creatures in the mixed waters of the Flood? There seems to be little doubt that many of them failed to survive the catastrophic effects of the Flood and became extinct. Those that survived apparently were able to tolerate the degree of mixing they encountered or were able to take advantage of special conditions existing during the Flood. Norbert Smith and Stephen Hagberg (1984, pp. 33-7) have conducted experiments to determine survival rates of freshwater and saltwater organisms in waters of varying amounts of salt and have also demonstrated that such organisms might have survived the Flood due to layering of freshwater over saltwater.

In the experiments by Smith and Hagberg, a 10-gallon aquarium was partially filled with 20 liters (somewhat more than five gallons) of artificial seawater from a commercial mix (Instant Ocean). The bottom of the aquarium was covered with crushed oyster shells and brine shrimp were added. The water was aerated and maintained at about 22-23°C throughout the experiment. The saltwater fish, Blue Damsel Fish (*Abudefduf uniocellatus*) was placed in the tank. In order to reduce salinity, fresh water was added and salt water was removed, maintaining a volume of 20 liters. Salinity was constantly monitored. Observations were made on the activity and behavior of the fish and the fish were removed to a recovery tank when they showed loss of locomotor activity, as exhibited by their inability to right themselves.

To test the rate of dilution on tolerance levels, salinity was reduced at rapid, intermediate, and slow rates. In the fast rate, salinity was reduced in twenty 1.5 parts per thousand increments in two hours; in the intermediate rate, the salinity was reduced in twenty 1.5 parts per thousand increments in 20 hours, and in the slow rate, the reduction was in twenty 1.5 parts per thousand increments in 40 days. The salinity at which loss of locomotor activity was experienced (in parts per thousand) were: 0.80 ± 0.08 for rapid dilution; 0.88 ± 0.36 for intermediate rate of dilution, and 20.3 ± 1.1 for slow rate of dilution. It appears that a slow rate of dilution, rather than increasing a saltwater fish's ability to adapt to dilution of salt content, actually decreases that ability. That was apparently the case with the Blue Damsel Fish which lost locomotor ability at greater dilution with a more rapid rate of dilution.

In the test of a heterogeneous Flood model (layering of freshwater over saltwater), a 55-gallon tank was filled to a depth of 20 cm with artificial seawater. The bottom was covered with crushed oyster; marine algae were added, and the mixture was aerated. A good growth of algae provided oxygen and brine shrimp

were added. Marine organisms, consisting of Striped Damsel Fish, Hermit Crab, and sea slugs (Gastropods), were added. After overnight, a 16-cm layer of freshwater was placed over the seawater without mixing of the two layers. Freshwater organisms, including Mosquito Fish (*Gambusia affinis*), Goldfish (*Carassius auratus*), snails, and duckweed (*Semina sp.*), were added to the freshwater layer. Although there was some increase in salinity in the freshwater layer, and decrease of salinity in the saltwater layer, all animals and plants survived the 30-day duration of the experiment. Except for occasional excursions of the Goldfish and Damsel Fish into other layers, all organisms remained in their own layer, except the Mosquito Fish. These freshwater fish moved freely throughout the aquarium, with no seeming preference for any salinity layer.

These experiments, limited though they were, indicate that at least some marine organisms can tolerate only limited dilution of salt water. It is suggested, by Smith and Hagberg, that the vast majority of marine life was destroyed by the Flood but that small, protected areas of the pre-Flood seas were overlaid with freshwater during the Flood, permitting certain marine organisms to survive the duration of the Flood.

The Creation Research Society Grasslands Experiment Station

A 3.5-acre plot of grassland, approximately seven miles southeast of the town of Weatherford in southwestern Oklahoma, has been made available to the CRS and designated as the CRS Grasslands Experiment Station (GES), with E. Norbert Smith as Director. In 1983, Stephen Hagberg and Smith (1984, pp. 62-6) initiated research at the Station. This research was primarily designed to encourage further long-term studies of various aspects of this prairie plot and the floral and faunal species which inhabit it. This plot has never been under plowed cultivation, although it has been used for winter livestock grazing for at least 75 years. Very little of the once vast prairie grassland area that originally existed in the U.S. still retains its original character, in terms of the composition and relative abundances of the plant and animal species that inhabited it. The GES does provide a small plot of original prairie grassland in southwestern Oklahoma.

In their report, Hagberg and Smith describe the characteristics of the soil of the GES and the climate of this area of Oklahoma. They conducted preliminary research into the types of species of plants present on the plot, their relative abundance, and their distribution over the plot. As expected, grasses (Gramineae family) made up the largest portion of total ground cover. Other families represented included Leguminosae, Compositae, and Solanaceae. Beginning in the first week in July and continuing about once a week through the first week of September, a series of plant collections was made at the plot, the specimens being pressed and identified. Two 1m x 1m square plots were spaded up in the downslope and upslope areas. It is anticipated that this will allow study on the course of plant succession on these plots.

This region of Oklahoma is situated between native short-grass prairie to the west and tall-grass prairie to the east. Both "eastern" and "western" species of

amphibians (salamanders, frogs and toads), reptiles (turtles, lizards, skinks, racerunners and snakes) mammals (opossums, shrews, moles, raccoons, badgers, skunks, coyotes, squirrels, gophers, rats, mice, armadillos, and rabbits), and many birds are found in the area.

Hagberg and Smith, in addition to a continuation of studies already initiated, suggest a series of other research projects that could be done at the GES that would contribute to the general scientific knowledge in the areas of botany, zoology, and ecology. They further suggest that research here might serve as a basis for an understanding of events leading up to and factors involved in the perpetuation of prairie grasslands under post-Flood conditions, and that ecological studies utilizing the diversity of plant and animal species at the GES might perhaps contribute to the question of origins.

Plant Succession Studies

In the spring of 1969, George Howe and Walter Lammerts staked out areas near their homes in California for plant succession studies, in order to discover any possible evidence for the establishment of varieties and eventually sub-species, which would lend support to the concept of microevolution. The results of studies through 1973, as reported by Lammerts and Howe (1974, pp. 208-28), provided no evidence for the production or enhancement of varieties or sub-species through natural selection. In fact, under unfavorable and catastrophic conditions, natural selection apparently worked to perpetuate the normal or more prevalent varieties. Lammerts (1984, pp. 104-8) reviews the results and implications of the 1969-1973 studies and briefly reports on observations on the plots made by George Howe in March of 1984. Howe's observations on plant varieties and abundances in 1984 merely served to confirm the results he and Lammerts had obtained in their earlier work, with no significant changes being observed.

Lammerts points out the alarming rate at which plant species are becoming extinct. He states that the loss of genetic diversity on a worldwide scale, caused by plant extinction, cannot be overemphasized. One ecological consultant warns us that as many as 100 species of organisms per day will be lost by the end of this century.

Factors Involved in Population Controls

Darwinian evolutionists suppose that extrinsic factors, such as starvation, disease, and predation are responsible for the maintenance of population sizes, and thus lead to natural selection of variants more resistant to these factors, eventually giving rise to new species, and so on, up the evolutionary scale. If it could be shown that organisms possess some intrinsic self-regulating mechanism that controls population sizes, this would weaken the Darwinian evolutionary hypothesis. This inspired interest by E. Norbert Smith (1985, pp. 16-20), in experiments designed to test the effects of various conditions on the reproductive ability of organisms. He reported on the results of his experiments, using the common freshwater arrow-headed planarian, or flatworm *Dugesia dorotocephala*, as his test organism. He designed his experiments to test the effects of such factors as feeding frequency, popula-

tion density, nature of substrate surface, metabolic or waste products produced by the planarians, and crawl space on asexual reproduction. Reproduction in *D. dorotocephala* is both sexual and asexual. Asexual reproduction occurs by fissioning. The posterior end of the worm clings to a surface while the anterior end moves away. The tail end breaks off and both pieces regenerate missing parts. Asexual reproduction rates were determined by counting the number of fragments produced per worm per unit time.

Smith found that in each experimental group, increasing worm density reduced the rate of asexual reproduction. Reproduction appeared to be more closely linked to density than to feeding frequency. For example, at a density of two worms per 10 milligrams fed once a week, reproduction is reduced from one fragment every 23.3 days to one fragment every 29.5 days, an increase of 6.2 days. If, however, a density of four worms per 10 milligrams fed twice weekly is employed, one fragment every 42.9 days is produced, compared to one fragment every 23.3 days, employing a density of two worms per 10 milligrams fed twice weekly, an increase of 19.6 days. Similar experiments comparing crowding to feeding frequency, employing other densities and frequencies, produced similar results. Increasing density always reduced reproduction rates. Substrate surface characteristics, such as slime and the presence of metabolic and waste products in the water, seemed to have little or no effect. Increasing crawl space by introducing a microscope slide in a test box, increased somewhat the reproduction rate in the test box compared to the rate in a control box containing no slide.

Smith's results led him to state that the planarian, *Dugesia dorotocephala*, can regulate its population density independently of so-called Darwinian checks, since negative outside forces such as starvation, predation, or disease were not necessary for population homeostasis. This indicates, Smith declares, that animals were designed with the ability to avoid over-exploitation of their habitat.

Origin of the Kaibab Squirrel

The tassel-eared squirrel, *Sciurus aberti*, inhabits areas in Arizona, New Mexico, and in several isolated spots in Mexico. It feeds on cones and terminal buds of Ponderosa Pine, so its distribution is limited to Ponderosa Pine forested areas. The Grand Canyon, 200 miles long, 5,000 feet deep, and 12 to 15 miles across, with the Colorado River running through it, acts as a barrier to terrestrial animal movement. What is commonly called the Abert squirrel inhabits the Coconino Plateau, just to the south of the Grand Canyon, and what is called the Kaibab squirrel inhabits the Kaibab Plateau, just to the north of the Grand Canyon, across from the Coconino Plateau. Some zoologists give the Kaibab squirrel species status, *Sciurus kaibabensis*, while others designate it as a subspecies, *Sciurus aberti kaibabensis*, of the Abert squirrel. Supposedly, according to evolutionists, the Grand Canyon has existed for at least several million years, separating the two varieties of the tassel-eared squirrel into populations isolated from one another. This separation, they believe, was of sufficient duration to permit differentiation into separate species, or at least into separate subspecies.

John Meyer (1985, pp. 68-78) examined nearly 100 specimens of Kaibab and Abert squirrels in the Grand Canyon National Park Study Collection. The purpose of his study was to determine the extent of the differences between the Kaibab and Abert squirrels, and, using the generally accepted notions of zoologists concerning the mechanisms required to give rise to variations and the time required for such changes to take place, to estimate the time these two populations of squirrels have been isolated from one another. If the separation of the ancestors of these two varieties of the tassel-eared squirrels into isolated populations was indeed caused by the formation of the Grand Canyon, this estimate would thus provide an approximate time for the formation of the Grand Canyon. Meyer's studies convinced him that the differences between the Kaibab and Abert squirrels were essentially minor, being limited to relatively slight differences in coloration, and thus, if the differentiation were caused by separation due to the formation of the Grand Canyon, the formation of the Grand Canyon must have occurred recently—on the order of thousands of years ago, rather than several million years.

In general, the main color features of the typical Abert squirrel include a dark-colored tail, a white belly, and a steel-gray body. The typical Kaibab squirrel has a white tail and a nearly pure-black belly. Except for these differences, the Kaibab and Abert squirrels appear to be similar in all respects, according to Meyer. There is significant variation in the coloration of both the Kaibab and the Abert squirrel, although the variation is more striking in the Abert squirrel. This variation has given rise to Abert squirrels that resemble Kaibab squirrels and Kaibab squirrels that resemble Abert squirrels. Thus Hall (1967) refers to some of the squirrels on the north rim as "Abert-like Kaibabs," and in the Grand Canyon National Park Study Collection, Meyer found a drawer of animals labeled "Kaibab-like Aberts." Based on 28 measurements from the skulls of each of 10 individuals, Meyer reports that the morphology of Kaibab squirrels differs little from that of Abert squirrels, which is in agreement with the reports of other investigators.

Of the ten conditions which evolutionists assume that must exist for significant genetic variations to arise and thus for evolution to occur, Meyer would definitely associate eight of these, and possibly all ten, with the two isolated populations of tassel-eared squirrels. Based on evolutionary assumptions, then, if the Kaibab and Abert populations of the tassel-eared squirrels have been separated for several million years, these two populations should differ in very significant ways. Because of the minute differences between Kaibab and Abert squirrels that Meyer was able to identify, limited as they were to minor differences in coloration, he maintains that the Abert squirrels on the south rim and the Kaibab squirrels on the north rim of the Grand Canyon represent, for all practical purposes, one continuous population. Therefore, he reasons, the separation must have been recent, thus indicating a recent formation for the Grand Canyon.

While one may agree with Meyer that the data indicate these two populations of squirrels have not been separated for several million years, it will be difficult for some to agree that this establishes an

approximate age for the formation of the Grand Canyon. If the Grand Canyon was formed during the waning stages of the Flood, as receding Flood waters drained from the emerging North American continent, there would have been no squirrels on either rim of the newly formed Grand Canyon. It would be many years after the formation of the Grand Canyon before squirrels and other animals could have arrived. It appears more likely that the tassel-eared squirrel migrated to areas on both sides of the Grand Canyon and that these areas have since become ecologically isolated from one another in relatively recent times. Evolutionists, of course, assume that this isolation occurred several million years ago, whatever the causative factors. This assumption, Meyer's work definitely contradicts.

Isolation of the Shiva Temple

As one stands on the Grand Canyon's North Rim across from Shiva Temple, the view is breathtaking. The panoramic visual sweep of the canyon is stunning. The emptiness is overwhelming, as the lowering sun casts continually changing shadows across the red, tan, and gray strata which make up the walls, buttes, temples, and precipices of the mile-deep canyon. On the opposite canyon wall, one can barely make out the thread-like Kaibab and Bright Angel trails. A tiny splotch of green marks the oasis at Indian Gardens. The only sound impinging upon one's ear is the turbulent wind capering along the precipitous North Rim, the faint cry of an eagle, and perhaps the distant boom of thunder echoing across the mightiest canyon on earth, signalling the late afternoon development of an incipient thundershower. It is difficult to imagine that this lonely outlook was the jumping-off point for a world-famous expedition a half century ago in the fall of 1937.

With this bit of journalistic eloquence, John Meyer (1987, pp. 120-5) introduces his description of a 1937 American Museum of Natural History expedition to Shiva Temple, an isolated butte in the Grand Canyon. This expedition was undertaken by evolutionists, with the conviction that the animals on Shiva Temple had been isolated from their ancestors on the North Rim of the Grand Canyon for many tens of thousands of years, therefore evolution should have produced significant evolutionary differences between animals on Shiva Temple and their relatives on the North Rim of the Canyon. When the results of the expedition revealed no differences between these creatures, evolutionists concluded that the animals on Shiva Temple are not isolated, but can easily scale the walls of Shiva Temple. Therefore, they declared, animals easily cross from the North Rim of the Grand Canyon to the top of Shiva Temple.

Desert conditions prevail in the bottom of the saddle between the North Rim and Shiva Temple. These conditions, Meyer and George Howe believe, might construct a barrier to the movement of small forest dwelling species from the North Rim of the Canyon (elevation about 7650 feet), to the top of Shiva Temple (elevation about 7700 feet), a barrier even greater than the problem of scaling the vertical walls of Shiva Temple. Meyer and Howe therefore undertook a study

to evaluate the degree of isolation of Shiva Temple, using direct observation of vegetation, and selected climatic variables and known habitat preferences of the small mammals of the Grand Canyon area (Meyer and Howe, 1988, pp. 165-72).

Using a chartered plane, Meyer and Howe took more than 100 photographs of the vegetation and general topography of Shiva Temple. For the purpose of taking measurements on soil and air temperatures, and relative humidity, five stations were established on the North Rim of the Grand Canyon at 7650 feet, and two stations on the saddle between the North Rim and Shiva Temple, dubbed Shiva Saddle by Meyer and Howe. The bottom of this Saddle has an elevation of 6300 feet. The Saddle is narrow and is flanked on each side by nearly vertical walls which descend at least another 1000 feet to basins below. As Meyer and Howe point out, the Saddle, small in size and very flat, receives direct heating from the sun throughout most of the day and from rising air from below. The horizontal distance between the North Rim and Shiva Temple is about two miles.

Both Shiva Temple and the Kaibab Plateau (which includes the North Rim), are capped by Kaibab limestone—a highly porous material. As a result, there is a complete lack of standing water on Shiva Temple and an almost complete lack on the North Rim. Temperature measurements showed that soil temperatures at the shaded station in the Saddle were as much as 13°C higher than at the shaded station on the North Rim. At the same time, soil temperatures at the unshaded Saddle station were about 12°C higher than at the unshaded North Rim station. The relative humidity was significantly lower in the Saddle than at the North Rim. At all times of measurement, the air temperature was 1 to 6°C warmer on the Saddle than at the North Rim.

Ground-based and aerial observations showed that the Saddle area is populated almost exclusively with pinyon pine and juniper. The top of Shiva Temple and the lower reaches of the Kaibab Plateau at the North Rim, on the other hand, contain heavy homogeneous stands of Ponderosa Pine. Aerial photographs provide evidence that the distribution of plants on Shiva Temple is similar to that of the North Rim. In order to traverse the area between the North Rim to Shiva Temple, it is necessary to descend about 350 feet below the Rim to a ridge which runs nearly one-half mile. One must then descend from the south end of the ridge another 100 feet to reach the Saddle, which is about three-quarters of a mile across. After the Saddle is crossed, to reach the top of Shiva Temple, a climb of about 1350 feet up steep talus slopes and finally a nearly vertical pitch is required. The top of Shiva Temple encompasses an area of about 300 acres.

Meyer and Howe found that the pinyon pine and juniper forests of the ridge and the Saddle between Shiva Temple and the North Rim differ markedly in plant species composition from the two Ponderosa Pine forests on the top of Shiva Temple and the North Rim. Thus, in addition to the climatological barrier presented by conditions in the Saddle, the differences between plant species in the Saddle and on the North Rim and Shiva Temple appear to provide an additional obstacle to migration of small mammals from the

North Rim to the top of Shiva Temple. The vegetation on Shiva Temple, on the other hand, is strikingly similar to vegetation on the North Rim.

As Meyer and Howe note, the climatic and vegetational differences between the North Rim and the Saddle and difficulties of ascending Shiva Temple are not sufficient to block the migration of some mammals from the North Rim to Shiva Temple. On the other hand, there are a number of species of small mammals that inhabit Ponderosa Pine forests but which do not frequent areas which have the types of vegetation found in the Saddle. Furthermore, the Kaibab squirrel (*Sciurus aberti kaibabensis*) is not found on Shiva Temple, even though the Ponderosa Pine, which is found on Shiva Temple, provides the main food source of this squirrel. Thus, if the Kaibab squirrel were able to cross the area between the North Rim and Shiva Temple and ascend Shiva, it would find conditions there suitable for its existence. Thus, the fact that the Kaibab squirrel is not found on Shiva Temple constitutes additional evidence that Shiva Temple is biologically isolated for some mammals from the North Rim.

While indicating that further research is necessary, including a more extensive study of vegetation and the trapping of small mammals in the Saddle area, Meyer and Howe conclude that there is sufficient evidence to indicate a recent origin and significant isolation of Shiva Temple. They point out that if microevolutionary changes may result from the isolation of subpopulations over a long period of time, then, since no such microevolutionary differences between mammals found on Shiva Temple and on the North Rim can be detected, the isolation of Shiva Temple must have occurred recently, if indeed Shiva Temple is isolated. They maintain that there is significant isolation of Shiva Temple from the North Rim for a number of small mammals which are found on both the North Rim and Shiva Temple, thus establishing that this isolation could not have occurred tens of thousands of years ago but must have occurred recently.

Meyer and Howe point out that their data, which support isolation of Shiva Temple for some mammals, provide evolutionary theory with a two-horned dilemma. They state that:

On the one hand, short-term isolation of small mammals on Shiva Temple presents the problem of a recent formation of this topographical feature. On the other hand, long-term isolation of small mammals on Shiva Temple without concomitant changes in gene frequency is hardly consistent with allopatric speciation.

References

- CRSQ—Creation Research Society Quarterly
 Gish, D. T. 1975. A decade of creationist research. *CRSQ* 12:34-46.
 Hagberg, S. C. and E. N. Smith. 1984. A report of activity on the Grasslands Experiment Station for 1983. *CRSQ* 21:62-6.
 Hall, J. G. 1967. The Kaibab squirrel in the Grand Canyon National Park. Report to the National Park Service (mimeographed)
 Howe, G. F. 1976. Post-fire regrowth of *Adenostoma fasciculatum* H. and A. and *Ceanothus crassifolius* Torr. in relation to ecology and origins. *CRSQ* 12:184-90.
 ———. 1982. Postfire strategies of two chaparral shrubs (chamise and *Ceanothus*) cast light on origins. *CRSQ* 19:3-10.
 ———. 1984. A trip to the Grand Canyon Experiment Station. *CRSQ* 21:9-16.

- Lammerts, W. E. 1983. Are the bristle-cone pine trees really so old? *CRSQ* 20:108-15.
- . 1984. Plant succession studies in relation to micro-evolution and the extinction of species. *CRSQ* 21:104-8.
- and G. F. Howe. 1974. Plant succession studies in relation to micro-evolution. *CRSQ* 10:208-10.
- Meyer, J. R. 1985. Origin of the Kaibab squirrel. *CRSQ* 22:68-78.
- . 1987. Shiva Temple: island in the sky? *CRSQ* 24:120-5.
- and G. F. Howe. 1988. The biological isolation of Shiva Temple. *CRSQ* 24:165-72.
- Smith, E. N. 1985. Experimental results of crowding on the rate of asexual reproduction of the planarian *Dugesia dorotocephala*. *CRSQ* 22:16-20.
- and S. C. Hagberg. 1984. Survival of freshwater and saltwater organisms in a heterogeneous Flood model experiment. *CRSQ* 21:33-7.
- Tinkle, W. J. 1971. Pleiotropy: extra cotyledons in the tomato. *CRSQ* 8:183-5.
- . 1976. Further research on reduced viability of mutant plants. *CRSQ* 12:52.
- Vogl, R. J. and P. K. Schorr. 1972. Fire and manzanita chaparral in the San Jacinto Mountains, California. *Ecology* 53:1186.
- Wells, P. V. 1969. The relation between mode of reproduction and extent of speciation in woody genera of the California chaparral. *Evolution*, 23:264-7.

THE HIERARCHY OF CONCEPTUAL LEVELS FOR SCIENTIFIC THOUGHT AND RESEARCH

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Abstract

A correct, philosophically neutral definition of science allows scientists complete freedom in what they believe, but requires them to function in accord with rules of the method of science which flow logically from the definition. There are four conceptual levels for scientific thought and research which coordinate and unify the several elements which constitute the practice of science. These conceptual levels are explained and related to the definition of science, to the rules of the method of science and to the freedoms of scientists.

Introduction

In an earlier article (Kofahl, 1986, p. 114) a four-tiered hierarchy of conceptual levels of the practice of scientific thought and research was briefly outlined. The present paper will enlarge on this view of science. The four levels of the conceptual hierarchy are:

- *Religious-Philosophical faith or world view,
- *Episteme (philosophy of science, epistemology, motivation, goals, etc.) (Gillespie, 1979, pp. 1-18),
- *Conceptual frameworks (systems of fundamental concepts, paradigmatic theories and experiments, and assumptions for particular scientific disciplines or areas of research) (Jones, 1971), and
- *Scientific hypotheses.

Fundamental to understanding this analysis is the fact that any proper definition of science is philosophically neutral (as delimited in the earlier article) (Kofahl, 1986, p. 112). In addition one must keep in mind the basic rules of the method of empirical science which flow logically from the definition of science. The particular rules pertinent to this discussion are the following:

1. Scientific hypotheses must be so constituted as to be subject to potential falsification by empirical test.
2. Scientific hypotheses may reference only elements of the empirical world and, therefore, may not reference any supernatural entity, activity or influence.

Also pertinent to this discussion are some of the freedoms of scientists which follow from the philosophically neutral definition of science, such as:

1. The definition of science lays no restrictions or requirements on what a scientist may believe.

2. The definition of science has nothing to say about the permissible sources of scientific hypotheses.

I will analyze and explain the four conceptual levels, in conformity with the rules and freedoms just enumerated.

Philosophical-Religious Faith or World View

The all-encompassing conceptual level, that of the scientist's religious-philosophical faith or world view, obviously may incorporate the supernatural—or exclude it. Any restriction to the contrary destroys philosophical neutrality and thus renders science captive to one or another belief system. The absolute freedom for scientists to hold whatever philosophical-religious belief system each one individually may prefer is most important since each person's philosophical view of the world, either consciously or unconsciously, influences everything he thinks or does.

Episteme

The second conceptual level, episteme, includes the scientist's philosophy of science, epistemology, and other such elements as the motivations and goals for his endeavors. It is clear from the history of science that various philosophies of science which have held sway or competed in different periods have related to various theological views of the world. It seems perfectly obvious that a scientist's philosophy of science will reasonably be expected to be logically related to his religious-philosophical world view, whether he be either religious or irreligious in his beliefs. Hence, since science is by definition philosophically neutral, a scientist's philosophy of science may include the supernatural or exclude it, either explicitly or implicitly.

Motivations and goals for one's professional career are likewise commonly meshed with one's belief system. For a Christian engaged in science, one motivation would be the command of God to Adam and to his posterity to subdue the earth and have dominion over

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all of its creatures (Genesis 1:28). And for the Christian one goal would be to pursue science for the welfare of mankind (Matthew 22:39), but the ultimate goal is to glorify God the Creator through scientific endeavor (I Corinthians 10:31).

Epistemology — the science of knowledge and sources and paths to knowledge—is a controversial one for scientists holding differing belief systems. It needs careful consideration. An epistemology for science admits of only one path to scientific knowledge about the natural world, i.e., the method of empirical science. This is established by defining scientific knowledge as knowledge which can be gained by the method of empirical science. This does not mean that science necessarily provides the only path to *true* knowledge about the natural world. Probably most scientists today believe that science is the only means to valid knowledge about the natural order. On the other hand, scientists who as part of their philosophical-religious world view hold the Bible to be divinely inspired revelation, believe that it contains divinely revealed truth about the natural world. They believe, for example, that God created the universe and everything in it as revealed in the opening chapters of Genesis. They believe that life was created and that the “kinds” of plants and animals were separately created, that they did not evolve through descent with variation from one or a few common ancestral life forms. They accept these truths about the world by faith. This is not scientific knowledge, but Christians believe it nevertheless to be true knowledge. Thus the secularist who rejects divine revelation holds there is only one source of knowledge about the natural world, whereas the Christian holds that there are at least two, science and divine revelation.

Thus Christians believe in certain truths about the world which do not constitute scientific knowledge. This, however, does not make them “unscientific.” Remember that, provided they function in accord with the rules of the scientific method, scientists are free to believe anything they desire, and have any motivations and goals for their work which suit them personally and individually. The restriction on what Christians may do with divinely revealed truth in science applies at the lowest level of the four-tiered conceptual system.

Conceptual Frameworks

A conceptual framework relates to a particular scientific discipline or to a particular class of problems. It is a collection of fundamental concepts, theories, experimental results and assumptions which establish a scientist’s understanding of his work and his perspective for new research programs. Let us illustrate by enumerating some of the elements of a conceptual framework which a Christian might have for the biological science of genetics. Much would be the same as for a secularist. But for the Christian researcher there would be additional elements, including the following:

1. The assumption that species exist in permanently separate groups which correspond to the originally created “kinds,” as reported in the first chapter of Genesis in the Bible.
2. The assumption that the basic design features or patterns which distinguish these separate kinds are indeed intelligent, purposeful designs.

3. The assumption that genetic variation is limited within the boundaries of the created kinds.

As a consequence of the differing conceptual frameworks adopted by secular geneticists and Christian geneticists, there would be different questions asked, different expectations, and different choices made for new research problems. For example, the Christian geneticist would be interested in determining the limits of genetic variation. He would be interested in the genetic mechanisms which limit variation. He would seek information which would help identify the created kinds. He would also expect his research results to fit logically with the basic assumptions of his conceptual framework.

Hypotheses

We have seen that the upper three members of our hierarchy of conceptual levels can incorporate elements of the supernatural. The fourth member, that of hypotheses, may not. This is because the supernatural is both immaterial and personal. That which is immaterial is not observable or measurable by our natural senses or by scientific instruments. Furthermore, that which is personal cannot be relied upon to react according to natural laws, to respond always in the same way under controlled conditions. In other words, God cannot be subjected to controlled experimental study. Therefore, because of the requirement that scientific hypotheses must be empirically testable, no supernatural entity, influence or activity may be referenced. This is because a hypothesis which incorporates anything which cannot be observed or measured and which cannot be relied upon to yield reproducible results under controlled experimental conditions will not be an empirically testable hypothesis. It will not be a hypothesis of empirical science.

Can a bonafide scientific hypothesis be constructed under a conceptual framework which incorporates elements of the supernatural? The answer is yes. Under a conceptual framework for genetics which includes the separateness of created kinds, research programs can be designed which comply with the rule that scientific hypotheses may not incorporate any element of the supernatural. For example, a hypothesis in genetics might postulate a genetic mechanism which establishes and/or maintains the genetic integrity of particular groups of related species. Or a hypothesis might postulate certain genetic characters or elements which can be used to identify such groups of species. Or a hypothesis might postulate a means of establishing common inheritance between certain species and denying it between other species. Such hypotheses are logically related to the creation-oriented conceptual framework which I discussed above and can be empirically testable because they do not incorporate any supernatural elements.

Any hypothesis framed under the Biblical creation conceptual framework which has been discussed, if it survives empirical tests, will provide circumstantial evidence for the conceptual framework. The new data resulting from the empirical tests can be incorporated logically into the conceptual framework, as can the surviving hypothesis. And, in appropriate places Christians should be free to point out the logical implications of their results. They should be free to draw conclu-

sions and publish them, conclusions which they offer in support of a created, rather than an evolved world.

The Place of Evolution and Creation in the Hierarchy

The place for such concepts as evolution and creation in the hierarchy is at the level of the scientist's episteme. This would accord with Karl Popper's classification of Darwinism as a "metaphysical research programme" (Popper, 1976). Incidentally, when he came under attack for this idea, even though he made some cautious revisions of his language, Popper never withdrew this designation for Darwinism. We assert that creation, likewise, is a metaphysical research program.

Conclusions

The four-tiered hierarchy of conceptual levels for the practice of science provides each participant in the scientific enterprise with guidelines for exercising his

or her freedoms while at the same time abiding by the rules of the method of science. It helps to categorize correctly the various intellectual elements involved in the practice of science so that they are not confounded one with the other. It promotes clarity of thought with respect to the relationship of such concepts as evolution and creation to science. Finally, it provides a basis for mutual understanding and respect between scientists whose belief systems and professional commitments may be diametrically opposed.

References

- CRSQ—Creation Research Society Quarterly*
 Gillespie, N. C. 1979. Charles Darwin and the problem of creation. University of Chicago Press, Chicago.
 Jones, A. J. 1971. The nature of evolutionary thought. *CRSQ* 8:44-9.
 Kofahl, Robert E. 1986. Correctly redefining distorted science: a most essential task. *CRSQ* 23:112-4.
 Popper, Karl. 1976. Unended quest. Open Court Publishing Company, La Salle, IL. p. 168.

PANORAMA OF SCIENCE

Small Comets May Mean A Young Solar System

An interesting astronomical controversy has raged since 1986 that, when resolved, may show the solar system is young. Louis Frank and two graduate students discovered dark spots on ultraviolet images of the earth's high atmosphere taken by the Dynamics Explorer I satellite (Frank, Sigwarth and Craven, 1986a). The spots, which appear similar to flies on a TV screen, were found on virtually every one of over 10,000 images taken over a six-year period. The spots, which last two to three minutes, are estimated to cover an area of 2-3,000 km². Frank interprets these spots as water vapor absorption of ultraviolet light from disintegrated small comets (Frank, Sigwarth and Craven, 1986b). From the size of the spots, Frank deduced that the comets average 12 meters in diameter with a mass of 10⁸ grams of ice and bombard the earth at a rate of 20 per minute. He has been very careful and has analyzed the data for other possibilities, like instrument problems, statistical errors, and ultraviolet absorption by oxygen. The results are said to be "startling" and "its influence in several fields of science will be profound" (Eberhart, 1986). However, Frank has drawn sharp criticism. He was even urged to withdraw his interpretation of the data, and both Frank and *Geophysical Research Letters* (the journal that published his research) were warned they would lose their credibility.

Frank's interpretation is not without physical difficulties. Scientists naturally ask: "Why these comets have not been detected before?" Comets are not pure water ice and therefore astronomers should see a flash of light when the comet hits the atmosphere. Also the comets should be seen by radar. Comets should be striking other heavenly bodies also. When they hit the moon, the sensitive seismographs placed on its surface should have detected them (Anon. 1986a). Small comets should be vaporized rapidly by the sun (Anon., 1986b). Hydrogen should escape from the small comets, but the amount of atomic hydrogen in interplanetary space is too small (Beardsley, 1988; Kerr, 1988a). Frank explains these and other problems by what

seems to be strange properties for comets. The small comets are supposed to be fluffy aggregates with a density of only 0.1 gm/cm³ and covered by a mantle of black dust. A comet with these properties would last a considerable time in interplanetary space and could remain undetected. The coating of dust on the comets keeps them from vaporizing, so that little hydrogen escapes. Observations of Halley's comet support the hypothesis that these small comets could be coated with black dust. As the comets approach the earth at less than 20 km/sec, they disintegrate by tidal and other forces about 1,000 miles from the earth, vaporize by sunlight, and "softly" strike the upper atmosphere as a moving cylinder of water vapor and do not produce a flash of light. An analogous process on the moon, according to Frank, would allow them to go undetected by the moon seismographs.

A number of objections to the small comet hypothesis are mainly based on the presumed old age of the solar system. Frank is quoted as saying: "If you accept these [tiny comets], your concept of the solar system has to be entirely different from what's in the literature today" (Monastersky, 1988). The most obvious problem is that the ocean would have an extraterrestrial origin and would have been very small when the earth was young, which would have far-reaching consequences for origin of life theories. If the earth has been bombarded by small comets at the rate observed, over three times as much water should have collected in 4.6 billion years, even considering photodissociation of water and the escape of hydrogen from the upper atmosphere. Moreover, Mars and the moon should be covered with a deep ocean. The rings of the outer planets should have been torn apart. According to some scientists, football-field sized craters should be punched all over the moon, whereas too few craters exist for the presumed age of the moon. If the comets are real and the rate of bombardment has been constant, then these objections to the small comet theory would be solved by assuming a young solar system. Although the small comet hypothesis is outrageous to most scientists, Frank claims the hypothesis is not a

conflict with any solidly known fact of the solar system. However, Frank deduced some of the comet's properties with the "fact" of an old solar system in mind. His critics have also objected to his theory because of the same "fact."

Since 1986, a flurry of research has been conducted mainly to disprove Frank's theory. However, most of the new evidence has tended to support him. For instance, a rocket probe and microwave monitoring of the high atmosphere have detected an unexpected increase in water vapor in small areas, probably from extraterrestrial origins (Huyghe, 1988, pp. 9, 10). Frank has recently added supporting evidence from a second set of ultraviolet radiation observations from the Swedish Viking satellite. In addition, the comets may now have been photographed by a telescope, scanning at the estimated velocity of the comets. The small comets were not detected before because astronomers have kept the view of their telescopes fixed. Clayne Yeates, who made the observations, used Frank's estimates of size, frequency, and velocity. He is quoted as saying: "Everything agreed precisely with the predictions" (Kerr, 1988b, p. 1404).

Despite the recent supporting evidence, many critics insist that the spots are probably due to instrument defects. However, this objection seems hollow since a NASA rocket jettisoned an "artificial comet" of ice at the top of the atmosphere. The water vapor was detected by the ultraviolet instruments on two satellites and looked similar to the spots Frank and his colleagues observed (Huyghe, 1988, p. 10).

Frank's research also has potential to explain several mysterious phenomena. For instance, the water vapor from the small comets may account for the rare, mysterious noctilucent clouds high in the earth's atmosphere. These clouds are seen rarely in summer at twilight at mid and high latitude. They look like cirrus clouds, but are much higher (about 80 kilometers in a very dry area above the stratosphere). Another phenomenon possibly explained by the comets is the occasional bursts of gas discovered on the moon.

If Frank's research and interpretation are correct or nearly correct, creationists have another in a growing list of solid geophysical dating methods for an earth much younger than evolutionists believe. Already, some scientists are trying to whittle down the implications by saying that the rate of small-comet bombardment is not as numerous as observed today (Monastersky, 1988). I wonder if they would also suggest this for radioactive decay rates? Frank believes the comets are 12 meters in diameter with a density of freshly fallen snow. Yeates believes that they are about three to five meters in diameter. Hence, they would be denser (close to the density of normal comets). As a result, these small comets would cause more moon craters and disrupt the rings of Saturn. The fact that few moon craters of the correct size exist and Saturn's rings are only slightly disturbed strongly indicate a young solar system. However, final conclusions from the small comet controversy must wait for further confirmation of the comet's existence and their physical properties. However, creationists must be wary that evolutionists do not sweep the young solar system implications under the rug by conclusions or additional hypotheses based on an old earth assumption. This is common

practice in historical science and makes the whole edifice of evolution and an old universe look internally consistent.

References

- GRL—*Geophysical Research Letters*
 SA—*Scientific American*
 SC—*Science*
 SN—*Science News*
 Anon. 1986a. Holes in the atmosphere. SA 255(1):64-5.
 Anon. 1986b. Holy Moses, it's hailing comets: *Sky and Telescope* 234-5.
 Beardsley, T. M. 1988. Ice storm. SA 259(6):21-5.
 Eberhart, J. 1986. Spots in the air: a comet controversy. SN 129:199.
 Frank, L. A., J. B. Sigwarth and J. D. Craven. 1986a. On the influx of small comets into the earth's atmosphere, I. Observations GRL 13:303-6.
 ——— 1986b. On the influx of small comets into the earth's atmosphere, II. Interpretation. GRL 13:307-10.
 Huyghe, P. 1988. Oceans from comets—new evidence. *Oceans* 21:8-11.
 Kerr, R. A. 1988a. Comets were a clerical error. SC 241:532.
 ——— 1988b. In search of elusive little comets. SC 240:1404-4.
 Monastersky, R. 1988. Comet controversy caught on film. SN 133:340

Contributed by Michael J. Oard

Origin of Bedded Salt Deposits (Nutting)

Nutting (1984) discusses the uniformitarian hypotheses of the origin of vast salt deposits (evaporites) in the crust of the earth. Basically all of the proposed models involve the evaporation of water (p. 4) which requires long periods of time which is usually preferred by naturalists. These models are classified generally

Basinal deposits—

formed in a basin behind a bar over which the sea poured during high tide seasons (p. 6) [Modifications of this model are outlined (pp. 7-12)]

Sabkhas—

formed in a supratidal desert environment of either coastal or large inland lake margins (p. 12)

Desiccated deep basins—

a sabkha-type origin that results from the drying of a large body of water such as the Mediterranean Sea (p. 16)

These models are discussed within the framework of the actual chemical, geological and physical evidence gathered at evaporite sites. Nutting proposes that all uniformitarian schemes fall far short in explaining the origin of the deposits. He offers a catastrophic model involving heated water which developed due to volcanic or igneous intrusive activity (pp. 52-70) to explain the deposits.

The geologic setting for the model requires (p. 52.):

1. A period of intense undersea volcanic or igneous intrusive activity,
2. Widespread hydrothermal vent systems through which much water circulates.
3. A basin for deposition of no specific water depth although large deposits require large basins.

Derivation of the salts for deposition is by a combination of two mechanisms (pp. 52-3):

1. Enrichment of the salts in seawater by the circulation of normal seawater through the hydrothermal vent system.

2. Direct addition of salts by magma effluence containing large proportions of salt mineral ions.

Salt can be deposited by the following mechanisms (pp. 53-4):

1. Precipitation as the saline waters ascend and are cooled by the colder seawater above.
2. Precipitation of salts that are less soluble in hot saline water, such as calcium carbonate and calcium sulfate, due to the heating from hotter waters coming up from below or from variations in magmatic activity.
3. Precipitation resulting from the pressure release as the brine mass rises.
4. Precipitation resulting from a change in the Eh of the system.
5. Precipitation resulting from a change in the pH of the system.
6. Precipitation resulting from a process of brine mixing where two brines of different salinities react as described by Raup (1970) and Wilcox and Davidson (1976).

This model was first alluded to by Nevins (1974). Figure 1 illustrates the process involved in the hydro-

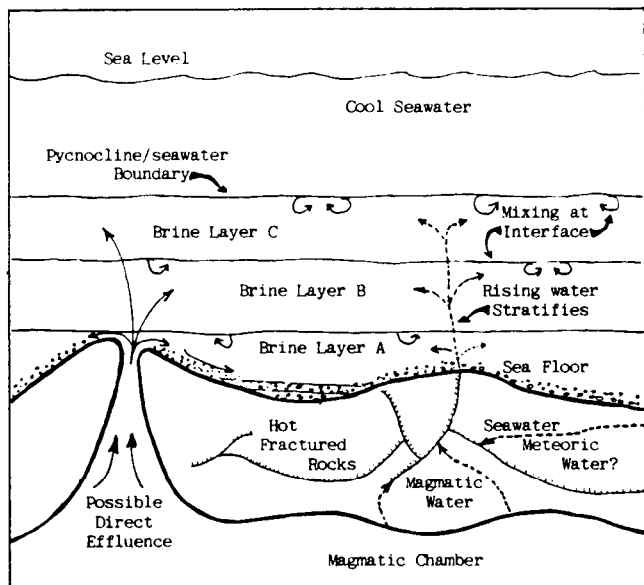


Figure 1. The Hydrothermal Model of Salt Deposition.

1. Increased volcanic and magmatic activity leads to widespread hydrothermal vent systems.

2. Enrichment of seawater is by direct magmatic effluence or by circulating seawater through hot fractured rocks of hydrothermal vent systems.

3. Hot brine either precipitates immediately as it responds to changes in thermodynamic conditions, or it stratifies, forming a pycnocline (brine layers A, B, C).

4. Precipitation of salts that are less soluble in cold water, such as halite, occurs as brine layers are cooled by the colder waters above the pycnocline.

5. Precipitation of salts that are less soluble in hot water occurs as brine layers are heated from below. This includes anhydrite, gypsum, and limestone.

6. Precipitation by Raup's mechanism (1970) occurs as layers of brine mix. This can involve entire layers or can be confined to the interfaces as a result of convective heat.

7. Precipitation occurs as ions in brine layers react with normal, oxygenated, seawater. (Nutting, 1964, p. 55).

thermal model. Nutting then compares this catastrophic model to field observations (pp. 71-89) and concludes that it is superior to any uniformitarian scheme. A final section of the thesis (pp. 97-8) correlates the hydrothermal model with the Flood. This dissertation is an excellent beginning-point for further study on the formation of evaporites.

References

- CRSQ—*Creation Research Society Quarterly*
- Nevins, S. E. 1974. Reply to critique by Daniel Wonderly. *CRSQ* 10:241-4.
- Nutting, D. I. 1984. Origin of bedded salt deposits: a critique of evaporative models and defense of a hydrothermal model. Master of Science Thesis. Institute for Creation Research, El Cajon, CA.
- Raup, O. B. 1970. Brine mixing: an additional mechanism for the formation of basin evaporites. *American Association of Petroleum Geologists Bulletin* 54:2246-59.
- Wilcox, F. L. and S. T. Davidson. 1976. Experiments and precipitation brought about by mixing brines. *CRSQ* 13:87-9.

Contributed by Emmett L. Williams

Scientific Literalism vs. Myth (Roche)

We learn that men are poets and mystics moved by the mysteries of life and the divine powers of nature. We learn that we who are human yearn to share in the mysteries about us, yearn to add meaning to mystery by personalizing it, yearn to finish the tales. Always our myths bespeak our wonder that Nature is, precisely, unnatural, a thing touched somehow by divinity. Should the story tell us, said Chesterton, that when we pluck a certain flower a princess in a castle across the sea will die, a thing impossible seems almost inevitable; our imagination accepts it before cold reason can say nay. Scientific literalism may sneer that this defies the laws of Nature, but cannot explain why our heart leaps and our blood pounds. In truth, the Nature we are part of is larger and far more beautiful than is seen by the anti-hero literalist. Pity the sad soul who must regard a tale in 'scientific' terms, for this is the only way it can be completely misunderstood. Adds Chesterton, "... he who has no sympathy with myths has no sympathy with men."

The one thing we can say about myths is that they are not lies. Myths are men's stories, a common heritage of all peoples. They have always been—until the rise of the anti-hero—a reflection of something very deep in our nature, and a common source, in symbolic language, of the transcendent truths that bind us in human society. Who, except in a truly natural, wonderless world, would say that a tale is nonsense and that dreams cannot come true? But if we inhabited such a world, men themselves would have been wonderless things, unable ever to spin myths. And here we see what this odd dispute about mythology is really about. Mythology has always had religious overtones, reflecting the quest of man's soul for its rightful home. This the anti-hero must ruthlessly suppress. There is no scrap of room in his lonely cosmos for anything unnatural or divine. No hint of the miraculous or even the imaginative may intrude. But the anti-hero's "scientific" literalism gives us a world far too prosaic for our spirit, our imagination, our humanness—and we hate it. We are forever unhappy in it. It gives us nothing but earthbound appetites when we long to soar above ourselves. All our great mythmakers know better than this, and give us wings for starlit skies.

The argument is ever thus between the would-be rationalist and the poet who likens a skylark's flight to a rose in thick foliage. The prosaic mind can claim that there is true, or rather half-true. But is it all we want of life that a skylark may be no more to us than a bird, species *Aluadu arvensis*? This is what Dyson, Tolkien and Lewis were arguing about: the truth of myth and metaphor.

The other side of our story is that the anti-hero, human despite his own protestations, is a prolific spinner of myths himself. Given his stunted and bloodless view of life, his myths are usually pretty awful, but there is no doubting the breed. Real Deities, announced in capital letters, parade around and do all manner of weird things among themselves, or to Man. In the myth of Historical Determinism, the goddess History moves forward in stages, carrying us to ever higher states of society, until we embrace the heavenly Socialism in the end. History's sister, Economy, likewise determines that Capitalism (an evil god indeed) will be overcome by Socialism in time. There are swarms of deities in the anti-hero's pantheon, all perfect and quite impervious to human frailty. The Presidency, Democracy, the Working Class, Higher Education, the Environment, the Girl Scouts—there is no end of them, all immortal, all beyond sin. Hence, the Presidency survived Nixon and lives on. Economy was ravaged by Inflation, but will recover. Every human group or institution is personified as a deity ("the White House said today. . ."), and every tale told about them is a true myth, as real to modern listeners as the doings of Greek gods were to the Greeks. Except we have far more deities and tell far more myths about them than the ancients. The only reason we do not see all this as superstitious in the extreme is that we have discarded the art of making *good* myths, and rebuked the sense of reverence that wells deep within us. All we have left is a horde of wretched ideological myths, redoubled in number to make up for their almost total lack of art. We see again, in our petty appeals to the goddesses Ecology, Natural Selection, Improving Technology and all the rest, how profound was the warning that if we will not believe in true myth, we will believe in anything. No more today than in the ancient world can the human mind get along without reaching for the divine.

Only one of the anti-hero's myths seems to me to have any beauty or depth to it: so perhaps it is the most central and deeply felt. No, not the myths of Revolution's struggle to create Heaven on Earth: that one is appallingly ugly. The pretty one is Nature By Herself. It states no more strangely than pagan tales of giants cleft in two or she-bears carrying the stars in a box *before* creation. "In the beginning, there was a large agglomeration of neutrons that Big Banged." It is the tale of expanding matter, adrift within literal nothingness, with stars dying and supernovae collapsing to give us the heavier elements that make life possible, leading to Man's anointment as priest of Nature Herself. It's all familiar, so we needn't recount the details, nor even deny that it may be true in detail. Besides, our delight in myth does not lie in true details. Who could not love this wild, menacing, life-giving, mysterious hilarious goddess Nature; this changeless, everchanging cascade of shapes and forms and lines and colors

and perceptions, this torrent of kangaroos and volcanoes and rainbows and skylarks and giggling brooks and slimy things and sunsets and stars pinpricking the night? We fear her but adore her, Nature, this wild and wonderful thing, and cannot bear for her to be tamed, a mere created thing ruled by some god. One would be hard of heart not to rejoice in a myth so grand.

I grew up in the Colorado wild country, love it still, and hate to obtrude a prosaic thought into so charming a myth. But that's not how things are. The reality is even better. We have all of Nature to love, but there is more. Look around you. Do you see anything really natural? The room, its furnishings, your clipped nails, the paper these words are printed upon in your hands, every sentence you are reading which results from human choice—these are all triumphs of man's mind and will over Nature in the raw. Indeed, every fact of civilization is unnatural. All this bespeaks a differentness that we have ourselves introduced into a formerly pristine Nature. You and I certainly prefer these triumphs; else we would be outside shivering, perhaps dying, on what is, as I write, a bitter cold night. Would we think Nature so wonderful if we were crouched in the snow, naked as all other creatures, temperatures below zero? If we are no more than children of Nature, we could not change her. But we do. No more striking example of this exists than in the laboratories of our scientists, who can transmute the very elements, turn lead into gold with fission power, or even create *new* elements. We applaud ourselves for these achievements. But wild Nature offers no such gifts to her own. The reality is that human mind and spirit and will are things not of Nature, but that have invaded her from within, partly for good, partly for ill. I must ask: Would the wild and wonderful Nature of myth change one iota if we ourselves changed our concept of her origin? Is she any less marvelous if we suppose her to be a creature of God, obeying the laws we fancy so much but attribute to her instead of to God—would she be any different because of what we think? Of course not. The sun will rise in the east whether we think nature a creature of God or self-sprung. Yet, in another sense, nothing could matter more than what we think about Nature. The moment we start seeing ourselves as her creatures alone, we start losing our human, yet extra-natural, ability to take delight in this strange goddess. Purely natural things have no awe, no poetry, no joy, no myths. Insofar as we subsume ourselves into the Myth of Nature By Herself, we forfeit the human sense wherewith we could have adored Nature as the ancients did. I count that another tragedy of a world without heroes: that we lose even our naturalness along with our humanness.

Reference

Roche, George. 1987. The curious faiths of anti-heroism. *Imprimis*. Hillsdale College, Hillsdale, MI 16(12):4-5.

Darwin, Marx, and Freud helped shape the modern mind into conformity with the world view of Mechanistic Materialism.

Opitz, E. A. 1978. The uses of reason in religion. *Imprimis* 7(2):4. Hillsdale College.

A Mathematical Illustration of the Law of Symmetric Variation

Introduction

Organisms remain within their kinds because they obey the Law of Symmetric Variation. The power of this law is seen in a hypothetical mathematical illustration. A brief precis of the law may be helpful and readers may wish to read my earlier work on the law (Brown, 1987).

In the Law of Symmetric Variation, the symmetry lies in the many different codons coding for each amino acid; change from one to any of the others produces symmetry. Variation comes in two main types. First, every amino acid has a chemical family to which it belongs. Within this family, changes normally produce a minor change in protein. Secondly, changes from family to family can be acceptable if they are not too different from the group or the particular amino acid of that group or family. If, however, they are drastically different, they are normally removed by the efficient enzymic repair system; if not, they could cause the elimination of the organism. Changes of a more marked nature that are allowed to remain, will do so as a broader expression of the variation of the law, because they do not upset embryonic development. Also, it is important to note that genes can have more than one function.

Amino Acid Families

The families of amino acids are based on two main criteria, relating to the size of their side chains and their degree of polarity. A convenient description of an amino acid takes into account both of these factors, hence they are labelled as being 'small polar,' 'large polar,' 'small nonpolar,' 'large nonpolar' and 'intermediate polarity.' These factors have an influential role on the folding of any given protein.

Although some amino acids are electrically neutral, they nevertheless have localized regions of positive and negative charge. This is due to the presence of oxygen and nitrogen atoms, which have a strong attraction to electrons. Other amino acids are ionized by way of physiological conditions. Such amino acids are nonpolar and have side chains normally made up of carbon and hydrogen. Because of the chemical make-up of the amino acids, together with the polarity factor, there is a very strong attraction for like bonding with like; hence the grouping into amino acid 'families.' Authorities vary to some extent as to the arrangement of some of the amino acids, but a fair enough representation is given by Dolittle (1986, pp. 74-83). The family groups are as follows: small nonpolar—cysteine, proline, alanine and threonine; small polar—serine, glycine, aspartate and asparagine; large nonpolar—valine, isoleucine, leucine, methionine and phenylalanine; large polar—glutamate, glutamine, lysine and arginine; intermediate polarity—tryptophan, histidine and tyrosine.

The mathematical illustration given is a hypothetical one, deliberately chosen for its simplicity. It is not based on any observed sequence of events; however, it is not contrived to the extent that it would be mathematically improbable in the real world. In the following illustration, equal opportunity is given for each of the bases of one amino acid to change. When the final

figures are added, they point clearly to the power of the Law of Symmetric Variation. I have chosen an amino acid from the large nonpolar family for the illustration, namely valine. Each of the bases of the other 19 amino acids are here used to play the part of mutations, which in nature would be brought about by chiefly external factors.

Illustration

Before giving the results of the complete illustration, let me give a lesser example. I use arginine in the role of the environmental mutation agent, acting on valine which has four codons with 12 bases, namely GUU, GUC, GUA and GUG. Arginine, a drastically different amino acid, has six codes, with 18 bases, namely CGU, CGC, CGA, CGG, AGA and AGG.

The arginine bases are substituted for the valine bases in the following manner: first, each arginine base is substituted in turn for each of the first bases in each valine codon, then for each of the second bases in each valine codon, finally for each of the third bases in each valine codon. A study is made to ascertain in how many instances no change has been effected, e.g., GUU remains GUU, followed by a calculation of how many changes have been caused, e.g., GUU becomes CUU.

The results of the above substitution sequence are as follows: the instances of symmetry at the four first bases are 32; at the four second bases 4; at the four third bases 72. For the reader who wishes to make his own calculations, note for example, a change from GUU to GUC in this particular instance, would effect no real change, due to the fact that both of these codons code for valine.

The instances of variation within the group are as follows: at the first bases 40; at the second bases 0; at the third bases 0. Consider changes from one family group to another, e.g., from small polar to small nonpolar: at the four first bases 0; at the second bases 68; at the third bases 0. Thus there are 148 instances of symmetric and variation changes within the same family group, while 68 changes all outside the group.

In reality, such changes would span many generations, together with the observed fact that the repair system in mice corrects 85% of damaged cells within 24 hours (Anon., 1986), then the same amount of similar damage could easily be handled by the repair system over generations. Eighty-five percent of 68 is 58 (to the nearest whole number) concluding that these would be returned to their original symmetric state, $148 + 58$ would leave 206 codons within the family group. Working on the premise that useful mutations are rare, if we allow two of the remaining 10 to be beneficial to the organism, the remaining eight would be selected against, thus the power of this law is clearly demonstrated.

For the main example of the illustration, the same process is followed, but this time using all of the bases of all of the codons of all of the remaining 19 amino acids. We obtain the following results: symmetry at the four first bases 164; at the second bases 160; at the third bases 684. Variation within the group to which valine belongs is as follows: at the four first bases 520; at the second 0; at the third 0. Finally, changes that fall

outside the group: at the four first bases 0; at the second 524; at the third 0.

So, with the instances of symmetry and variation within the same group standing at 1,528, plus 85% of the 520 being restored by the repair system, 442, then the total of 1,970 is supplemented by four acceptable changes outside the group to which valine belongs, giving a broader variation, the final total stands at 1,974. Thus, to the nearest whole number, 74 are selected against. The power of the law is clear.

Further Support

The areas covered by this law are amino acids, both those that form proteins and those that do not, plus the raw RNA and DNA bases (Brown, 1987). By raw RNA, I mean that which is not coded for in the nucleus. This may be found in the basal granules of the microorganism paramecium, in which it organizes the cilia, the neuromemes, trichocysts and gullet. Others view these bodies to be made of protein; either way the law is valid (Vines and Rees, 1972, p. 119).

Also, it has been found that, like other multicellular life forms, the human embryo uses the genetic information already placed in the egg by the mother, in the form of messenger RNA, then the first genetic information from the nucleus follows this (Anon., 1988). The pattern of head-tail of the Hydra is also found with a protein base in it (Anon., 1987).

A protein signal from the vegetal cells to the animal's cells has been found in early development directing the cells of frogs (Storey, 1987). Two recent findings are of interest; the first (Finkel, 1988) reports clear evidence that places one part of development in the vertebrates to a particular gene. The experiments were performed on the African clawed toad *Xenopus laevis*. The second find (Benditt, 1988), shows that a compound called cyclic adenosine monophosphate (Camp.) plays a major role in gene expression in the cytoskeleton of the cell. The compound is an important structural component of nucleic acids.

Finally, in the fruit fly, genes have been found which are clearly responsible for head, thorax and abdomen. This is done by means of a gradient (a gradient being something producing various effects in different areas by way of varying intensities; the genetic product is, as yet, unknown), instead of having molecular signposts fixed in space within the egg that trigger a specific development program in cells that can read the so-called 'localized determinants.' I encourage the reader to read this work (Goodman, 1987).

As early as 1977 it was realized that the blueprint of the egg of *Drosophila* carried a stage in which the newly laid egg does not yet have the mosaic map (Wigglesworth, 1977, p. 253); Goodman (1987) confirms that it is the genes that take care of this process.

The Law of Symmetric Variation controls all of the genetic changes discussed in this note. Together with other factors this means that organisms are kept strictly within their respective Genesis kinds.

Summary

Because of the amino acids forming family groups and having a number of codons coding for them, together with the way in which these codons are arranged, the ratio of mutations will always favor symmetric variation. This applies to all genes in all situations. Even if there is a broader expression of that symmetry, it will, nevertheless, be merely a variation of it, no more.

Any mutation will only be allowed if the complete pattern of genome interaction is fully accomplished. This is of the utmost importance, because it is the total pattern of interaction that carries the pattern of the organism, or 'body plan.' Thus, this interaction totally dictates all; the ratio of mutations ensures that this will be continually reproduced.

As part of a back-up system to this law, the repair systems return the amino acids to their original make-up, doing this to an impressive degree. Thus, organisms will remain within their respective Genesis kinds by means of the Law of Symmetric Variation.

References

- NS—New Scientist
SA—Scientific American
Anon. 1986. Running repairs on DNA. NS 110(1513):34.
———. 1987. Messages from a hydra's head. NS 116(1582):33.
———. 1988. Genes switch on early in human embryos. NS 118(1607):17.
Benditt, J. 1988. Genetic skeleton. SA 259(1):14-5.
Brown, C. 1987. The law of symmetric variation and the gene-theme model. *Creation Research Society Quarterly* 24:75-80.
Dolittle, F. R. 1985. Proteins. SA 253(3):74-83.
Finkel, E. 1988. Body plan gene caught in the act. NS 119(1626):30.
Goodman, S. 1987. Signals that break an embryo's symmetry. NS 114(1565):39.
Storey, D. 1987. Unscrambling frogs' eggs. NS 114(1563):39.
Vines, A. E. and R. N. Rees. 1972. Plant and animal biology, Volume 1. Pitman, London.
Wigglesworth, V. B. 1977. The control of form in the living body. The encyclopaedia of ignorance, Volume 2. Pergamon Press, Oxford.

Contributed by Colin Brown

QUOTE

But in the recent past, humanists (as many naturalists now prefer to call themselves) have boldly repudiated God's very existence as a transcendent personal Being. When John Dewey deplored supernaturalism a generation ago as a noxious faith and proposed replacing Judeo-Christian religion by a naturalistic humanism, he nonetheless confusingly retained the term God (for the interaction between the ideal and actual). The more recent contemporary humanist Paul Kurtz, however, urges us to "weed out permanently the idea of God."

Naturalism reduces all reality to impersonal processes and events. It assails not simply this or that particular article of Christian belief, but rejects the very possibility of a credible theistic faith. Naturalism mythologizes the basic theses of biblical theism, namely, God, creation, revelation, redemption and judgment.

Henry, Carl F. H. 1986. The God of the Bible and moral foundations in Burke, Thomas J., editor, *The Christian vision: man and morality*. The Hillsdale College Press. Hillsdale, MI p. 3.

EDUCATIONAL COLUMN

A DEMONSTRATION OF THE MIXING MODEL TO
ACCOUNT FOR Rb-Sr ISOCHRONS

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Abstract

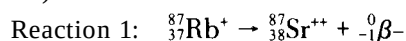
The rubidium-strontium isotopic dating method has been used extensively for approximate age determination of igneous rocks. Yet, this method suffers from unproven assumptions concerning the original concentrations of isotopes in the rocks. The isochron method appears to overcome this weakness. Nevertheless, the isochron method is not the only possible explanation of the isotopic data, and it is clearly invalid in many cases. Another concept, the mixing model, has been introduced which appears to be a valid explanation for a large portion of the isotopic data. It might be considered, therefore, to be a superior scientific model. This report describes a method to demonstrate the apparent superiority of the mixing model over the isochron method to students interested in geochronology.

Introduction

Isotopic dating methods are relied upon heavily by scientists interested in determining approximate age dates for artifacts. Consequently, the validity of the theoretical assumptions and accuracy of experimental methods involved in them need to continually be reappraised and revised when necessary. The rubidium-strontium dating method is no exception. This report describes a method to demonstrate the apparent superiority of the mixing model over the isochron method to explain rubidium-strontium isotopic data.

The rubidium-strontium method has been used for dating igneous rocks that happen to contain both potassium rich minerals (e.g., orthoclase, biotite, and muscovite) and calcium containing minerals (e.g., plagioclase and apatite). Because of similarities in ionic radius and charge, rubidium (Rb^+) often replaces potassium (K^+) in the crystal lattice sites of potassium rich minerals. Similarly, strontium (Sr^{++}) often replaces calcium (Ca^{++}) in the crystal lattice of calcium rich minerals. Consequently, rocks containing minerals rich in both potassium and calcium will also contain traces of rubidium and strontium (Faure, p. 75).

Rubidium-87 ($^{87}_{37}\text{Rb}^+$) is a naturally occurring radioactive isotope of rubidium and spontaneously decays (Reaction 1) to strontium-87 ($^{87}_{38}\text{Sr}^{++}$), a stable isotope of strontium, with elimination of β^- radiation (electrons eliminated from the nucleus when a neutron is converted to a proton). Thus, the atomic mass (superscript) is essentially constant, but the atomic number (subscript) is increased by one unit due to the formation of another proton in the nucleus. Consequently, radiogenic $^{87}\text{Sr}^{++}$ will be found along with nonradiogenic $^{87}\text{Sr}^{++}$ and $^{86}\text{Sr}^{++}$ in rocks rich in potassium and calcium. The ratio of $^{87}\text{Sr}^{++}$ to $^{86}\text{Sr}^{++}$ is thought to depend upon the $^{87}\text{Rb}^+ / ^{86}\text{Sr}^{++}$ concentration ratio, and the time elapsed since crystallization of the rock (Faure, p. 76).



The rubidium-strontium isochron dating method involves three basic steps: (1) determining the ratio of $^{87}\text{Sr}^{++}$ to $^{86}\text{Sr}^{++}$ in several fragments of the same rock,

(2) plotting the values against the ratio of $^{87}\text{Rb}^+$ to $^{86}\text{Sr}^{++}$ found in the same fragments, and (3) interpretation of the results (Faure, pp. 79-81; Jager, pp. 15-16). If a line with a positive slope (an isochron) is obtained from such a graph, it is generally thought by geochronologists that the data is valid and that a reliable date for crystallization of the rock can be calculated from its slope (using Equation 1, where t is the apparent age of the rock in years, and λ is the decay constant for $^{87}\text{Rb}^+$, $1.42 \times 10^{-11} \text{ yr}^{-1}$; Jager, p. 4). If the data is scattered so that a reliable line with a positive slope cannot be obtained, it is generally assumed that the data is not valid due to metamorphism (e.g., minerals having been leached into or out of the rock). Therefore, no meaningful age can be calculated, and the data is sometimes ignored (Faure, pp. 77, 90). Finally, the y intercept of the isochron (Figure 1) represents a sample with no rubidium ($^{87}\text{Rb}^+ / ^{86}\text{Sr}^{++} = 0$). The value of $^{87}\text{Sr} / ^{86}\text{Sr}$ at this point is assumed to represent the original primordial ratio of strontium isotopes in the rock (approximately 0.699, Faure, p. 111). Thus, the isochron method appears to overcome the common radiometric dating difficulty of not knowing the original concentration of daughter isotope in the rock (Faure, p. 81; Young, pp. 185-93).

$$\text{Equation 1: } t = \frac{\ln(1 + \text{slope})}{\lambda}$$

The isochron dating method is not the only possible explanation of the isotopic data, however. A second interpretation, called the mixing model, has been presented which suggests that there may not actually be any valid relationship between the isotope ratios and the age of the rock at all. The mixing model suggests that the isotope ratios may be explained by assuming that two or more igneous rocks originally containing different concentrations of isotopes were heterogeneously mixed (Akridge, 1982; Arndts and Overn, 1981, p. 1; Kramer, Arndts, and Overn, 1981, p. 1; Austin, 1988; Faure, pp. 97-106; Mandock, pp. 65-91).

Formation of a straight line when $^{87}\text{Sr} / ^{86}\text{Sr}$ is plotted vs. $1/\text{Sr}$ (where Sr is the total concentration of strontium isotopes) is an indication that mixing has indeed occurred (Faure, pp. 97-106; Kramer, Arndts, and Overn, 1981, p. 1). Formation of a straight line with a

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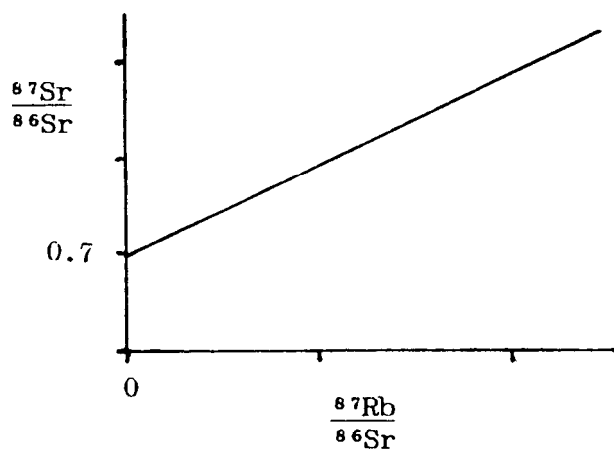


Figure 1. Rubidium-strontium isochron.

correlation coefficient larger than 0.9 has actually been found in 8 (44%) of the 18 published isochrons examined, with an additional 5 (28%) having a correlation coefficient greater than 0.8! Only 5 (28%) had a correlation coefficient less than 0.8. However, failure to obtain a straight line does not rule out the possibility of mixing. Isotopic data which do not produce a straight line with this test could still be the result of mixing if random dilution by material not containing strontium has occurred (Kramer, Arndts, and Overn, 1981, p. 1). Therefore, it is clear that in many published reports, erroneous ages have been calculated from lines which are actually the result of mixing, not aging. The following procedure is a simple way of illustrating to students interested in geochronology the apparent superiority of the mixing model to explain rubidium-strontium isotope ratios in rocks.

Procedure

1. Use different colored beads to represent individual atoms of the isotopes of Rb and Sr. For example, use:

GREEN beads to represent ^{87}Sr atoms
 ORANGE beads to represent ^{86}Sr atoms
 WHITE beads to represent ^{87}Rb atoms

2. Prepare three sets of beads (A, B, C) containing different numbers of each color of bead to represent three different rocks containing different concentrations and different ratios of each isotope, as shown in Table I. Place each set in a separate container and label accordingly.

Table I: Isotope Composition of Three Individual Rocks

Set (Rock)	Number of Beads			$\frac{^{87}\text{Sr}}{^{86}\text{Sr}}$	$\frac{^{87}\text{Rb}}{^{86}\text{Sr}}$
	Green (^{87}Sr)	Orange (^{86}Sr)	White (^{87}Rb)		
A	7	10	0	0.70	0.00
B	8	10	20	0.80	2.00
C	12	12	30	1.00	2.50

Notice that Rock A contains no radioactive ^{87}Rb . Consequently, it contains no radiogenic ^{87}Sr . Therefore, its ratio of ^{87}Sr to ^{86}Sr is arbitrarily set at 0.70, which is thought to be a relatively common ratio for

nonradiogenic strontium in igneous rocks (Faure, p. 111). Rocks B and C contain radioactive ^{87}Rb , and consequently might have higher $^{87}\text{Sr}/^{86}\text{Sr}$ ratios due to the presence of radiogenic ^{87}Sr .

Prepare eight additional sets of beads (D - K), as shown in Table II, to represent fragments of a rock formed by heterogeneous mixing of the three original rocks while they were in a molten state. Notice that each set, D - K, is simply a combination of sets A, B, and C in various proportions as shown in Table II. Place each set in a separate container and label accordingly.

Finally, sets A, B, D, E, and F form Group I, which is analyzed by one student. Sets A, C, G, H, and I form Group II, which is analyzed by a second student. Similarly, sets B, D, G, and H form Group III, which is analyzed by a third student, and sets B, G, J, and K form Group IV, which is analyzed by a fourth student. Each group represents a different combination of fragments of the *same rock* which had originally been formed by the heterogeneous mixing of three different rocks: A, B, and C.

Results

The first student will analyze the rock by counting and recording the number of atoms of each isotope found in each set (fragment) in Group I. Then he will calculate and record the ratios of ^{87}Sr to ^{86}Sr and ^{87}Rb to ^{86}Sr for each set (as shown in Tables I and II). The ratios are then plotted on linear graph paper with $^{87}\text{Sr}/^{86}\text{Sr}$ on the vertical axis and $^{87}\text{Rb}/^{86}\text{Sr}$ on the horizontal axis, as shown in Figure 2. The best straight line is drawn through the points, and its slope determined. Finally, the apparent age (t) of the rock is calculated from the slope and the decay constant (A) for ^{87}Rb using Equation 1. For this group of data, the slope is calculated to be 0.050 and the apparent age is, therefore, 3.44×10^9 years. The $^{87}\text{Rb}/^{86}\text{Sr}$ ratio of zero on this line corresponds to an original primordial $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of 0.700.

The second student analyzes the *same rock* similarly using the sets (fragments) in Group II and plots the data (Figure 2). For this group, the slope is found to be 0.120 and the apparent age is 7.98×10^9 years. A $^{87}\text{Rb}/^{86}\text{Sr}$ ratio of zero also gives a $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of 0.700.

The third student analyzes the *same rock* using Group III and plots the data (Figure 2). However, the points are so scattered that it is not possible to draw a straight line through the data with any degree of reliability. Therefore, no age for the rock may be calculated from this data, and no y-intercept can be obtained.

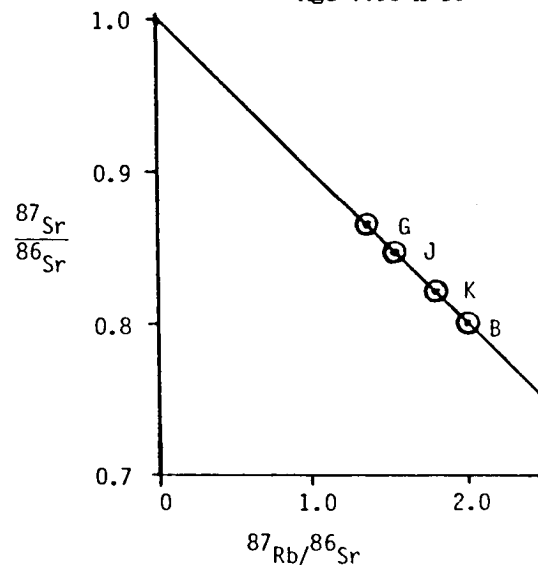
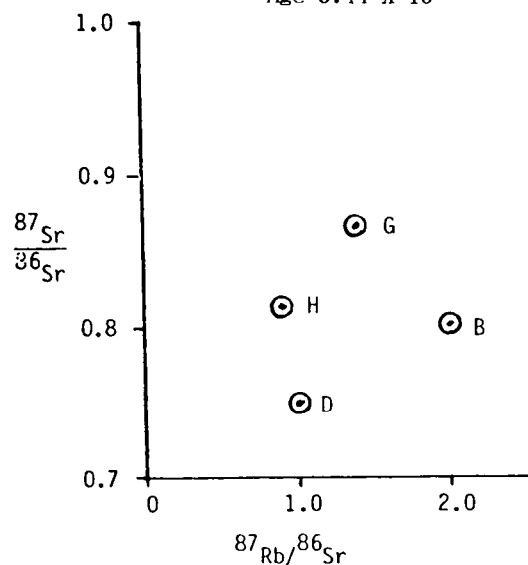
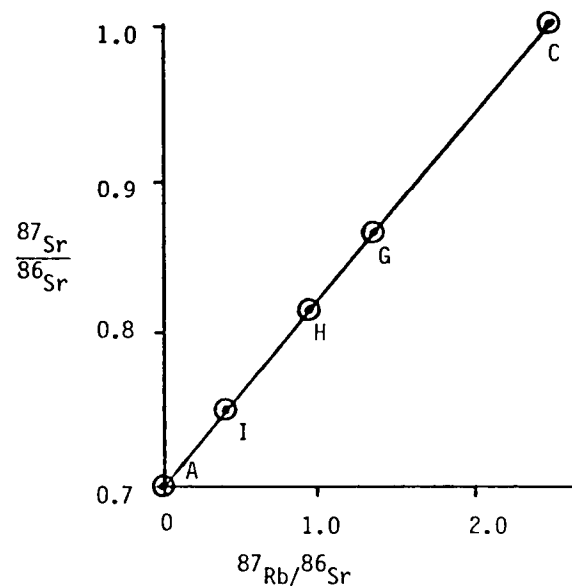
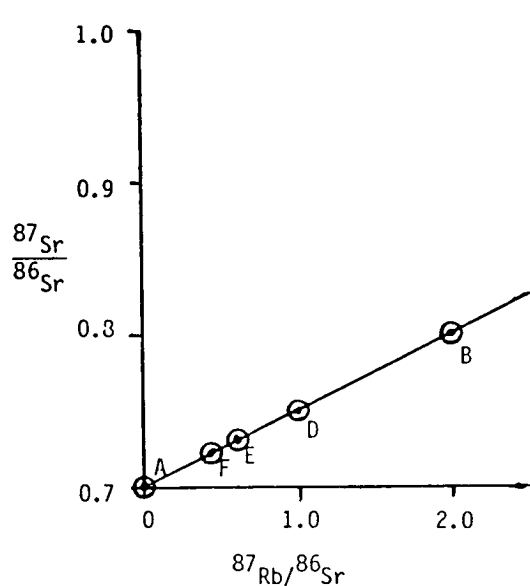
The fourth student analyzes the *same rock* and plots the data (Figure 2) obtained from Group IV and discovers a negative slope, -0.100, and therefore, a negative age! Consequently, no meaningful age can be calculated for the rock from this data either. Extrapolation gives a y-intercept of 1.001.

Conclusions

The isochron dating method has produced four different results for the *same rock*! Obviously, it cannot be correct. Furthermore, if this method does produce the correct age, how can it be recognized

Table II. Isotope Composition of Eight Fragments of a Heterogeneous Rock Formed by Mixing Rocks A, B, and C in Various Ratios.

Set (Frag-ment)	Formed by Mixing	Number of Beads			$\frac{^{87}\text{Sr}}{^{86}\text{Sr}}$	$\frac{^{87}\text{Rb}}{^{86}\text{Sr}}$
		Green (^{87}Sr)	Orange (^{86}Sr)	White (^{87}Rb)		
D	1A + 1B + 0C	$7 + 8 = 15$	$10 + 10 = 20$	$0 + 20 = 20$	0.75	1.00
E	2A + 1B + 0C	$2(7) + 8 = 22$	$2(10) + 10 = 30$	$2(0) + 20 = 20$	0.73	0.67
F	4A + 1B + 0C	$4(7) + 8 = 36$	$4(10) + 10 = 50$	$4(0) + 20 = 20$	0.72	0.40
G	1A + 0B + 1C	$7 + 12 = 19$	$10 + 12 = 22$	$0 + 30 = 30$	0.86	1.36
H	2A + 0B + 1C	$2(7) + 12 = 26$	$2(10) + 12 = 32$	$2(0) + 30 = 30$	0.81	0.94
I	6A + 0B + 1C	$6(7) + 12 = 54$	$6(10) + 12 = 72$	$6(0) + 30 = 30$	0.75	0.42
J	1A + 1B + 1C	$7 + 8 + 12 = 27$	$10 + 10 + 12 = 32$	$0 + 20 + 30 = 50$	0.84	1.56
K	1A + 4B + 1C	$7 + 4(8) + 12 = 51$	$10 + 4(10) + 12 = 62$	$0 + 4(20) + 30 = 110$	0.82	1.77

**Figure 2. Graphs of various combinations of isotopic data from the same heterogeneous rock.**

since two different ages were obtained? Finally, how can one be sure that the age is correct, since it was produced using the same method which obviously gives incorrect ages? From this demonstration, it is clear that the age determined for a rock using the isochron dating method cannot be recognized as accurate simply because a line is obtained with minimal scatter of data. If this were true, all lines should have had the same slope, resulting in the same age for the rock. But they do not. Furthermore, a valid isochron cannot be recognized simply because the y-intercept provides an acceptable $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of 0.70. Lines obtained by the first two students both meet this requirement, but both cannot be correct.

Conversely, poor data, often ascribed to a partial loss of one or more isotopes (leaching) since crystallization of the rock, cannot be recognized simply because of scatter or a negative slope for the line. Notice that students analyzing Groups III and IV used some of the same data as students analyzing Groups I and II. If the data was recognized as valid by students analyzing Groups I and II because they obtained isochrons, how could it be declared invalid by students analyzing Groups III and IV when scatter or a negative slope is obtained? What, then, does allow one to recognize valid or invalid data and results?

The results seem to depend solely upon the individual sets of data chosen for the analyses. Since there is no apparent reason to select some data as accurate and reject other data as inaccurate before doing the analyses, it appears that the validity of the analyses can only be determined by whether the results are consistent with some predetermined factors or presuppositions. Therefore, whether the results are accepted or rejected is not determined by the accuracy and validity of the data itself or the inherent validity of the method, as is commonly thought, but by the validity of the researcher's presuppositions. If the results happen to agree with these presuppositions, they are arbitrarily accepted as valid. If they disagree, they are arbitrarily rejected as invalid. Consequently, the isochron dating method appears to add nothing of value to our understanding of the age of rocks. Furthermore, if the linear data is due to mixing, any age calculated from the slope would be erroneous.

Student Instructions

Introduction

Each student will be given the "Introduction" to the demonstration and four or five sets of beads. Each set represents a different sample of the *same* large rock. The beads represent atoms in the rock sample:

Green = ^{87}Sr
Orange = ^{86}Sr
White = ^{87}Rb

Procedure

1. Count the number of each type of atom in each sample and record the data in a table.
2. Calculate and record in the table the values of $^{87}\text{Sr}/^{86}\text{Sr}$ and $^{87}\text{Rb}/^{86}\text{Sr}$ for each sample.
3. Plot the data on graph paper with $^{87}\text{Sr}/^{86}\text{Sr}$ on the vertical axis and $^{87}\text{Rb}/^{86}\text{Sr}$ on the horizontal axis. Draw the best straight line through the points.
4. According to evolutionists, what information can be obtained from the graph about the original rock?
5. Determine the "original" ratio of $^{87}\text{Sr}/^{86}\text{Sr}$.
6. Calculate and record the slope of the line.
7. Calculate and record the "age" (t) of the rock in years using the following equation:

$$t = \frac{\ln(1 + \text{slope})}{1.42 \times 10^{-11}}$$

8. Repeat steps 2 - 7 for the data obtained by the other three students.

Conclusions

1. Does the "original" ratio of $^{87}\text{Sr}/^{86}\text{Sr}$ determined from your data agree with the ratio determined from the other students' data?
2. Does the age calculated with your data agree with the age calculated with the other students' data?
3. Is it legitimate to ignore part of the data?
4. What do your answers to Questions 1, 2, and 3 tell you about the validity of this dating method?
5. Referring to information in Tables I and II, is it possible to account for all of the data?
6. Can you test this explanation graphically?
7. Which explanation of the isotope ratios appears to be superior?

References

- Akridge, R. 1982. Radiometric dating using isochrons. Impact No. 113. Institute for Creation Research. El Cajon, CA.
- Arndts, R. and W. Overn. 1981. Isochrons. *Bible-Science Newsletter* 19(4).
- Austin, Steven A. 1988. Grand Canyon lava flows: a survey of isotope dating methods. Impact No. 178. Institute for Creation Research. El Cajon, CA.
- Faure, Gunter. 1977. Principles of isotope geology. John Wiley. New York.
- Jager, E. and J. C. Hunziker. 1979. Lectures in isotope geology. Springer-Verlag. New York.
- Kramer, M., R. Arndts and W. Overn. 1981. Proof of the validity of the mixing model. *Bible-Science Newsletter* 19(8).
- Mandock, R. L. N. 1982. Scale time versus geologic time in radioisotope age determination. Institute for Creation Research. El Cajon, CA.
- Young, D. A. 1977. Creation and the Flood. Baker Book House. Grand Rapids.

QUOTE

In the Bible God is Himself the Good and He declares His original creation to be essentially good. God's commandments articulate and summarize His will for His creatures, and by this His own righteous standard He judges all people and nations. He suspends our destiny in eternity on our response to His law and to Jesus Christ "the just and holy one."

For Plato, the Good was independent of God and was normative for the Demiurge who according to Plato gave form to the universe. But for the Bible nothing is absolutely independent of God; everything is dependent on Him. Augustine, Duns Scotus and the Protestant Reformers insisted that God Himself decrees the good.

Henry, Carl F. H. 1986. The God of the Bible and moral foundations in Burke, Thomas J., editor, *The Christian vision: man and morality*. The Hillsdale College Press. Hillsdale, MI p. 5.

ARTICLE REVIEW

Land Mammals and the Great American Interchange
by Larry Marshall. 1988. *American Scientist* 76:380-88.

Reviewed by G. Richard Culp*

The article is a popularized version of the author's views as stated in *The Great American Biotic Interchange* (Stehli and Webb, 1985). Several features of Marshall's writing deserve commendation. The message is clear in spite of the difficulty of the subject and the many sources quoted. He tends to avoid sarcasm and polemics; in fact, one gets the initial impression that the tone is moderate and rational, particularly if there is agreement on the assumptions that he makes. Marshall recognizes the need for further study before crystallizing one's conclusions, in several instances.

The article breathes confidence in one's ability to date fossil remains by such statements as "These rocks have been confidently calibrated . . . (Stehli and Webb, 1985)." These methods of calibration are found to be: (a) The "estimated age based on knowledge of the stage of evolution of its fauna" which is simply a re-statement of the threadbare circular reasoning that even many non-believers in the field now find embarrassing; (b) radiometric dating, particularly by the potassium-argon method, which has been found inaccurate in underwater volcanic material, and which has been dated at 22,000,000 years despite the known age date of little more than 200 years (Noble and Naughton, 1968). In addition, since it is now admitted that such inaccuracies can be due to hydrostatic pressure, (Dalrymple and Moore, 1968) these errors will likewise appear in fossils, most of which were formed in and under sedimentary deposits, some of which are thousands of feet in thickness, generating tremendous hydrostatic pressure. Thus, despite extensive field work, Marshall's conclusions are based on speculation rather than factual evidence.

Other assumptions are:

- (1) Evolution must be accepted as a fact, despite the failure of evolutionists to find one species that has really developed into another of significantly different kind.
- (2) A huge land mass (called "Gondwana") once existed from which South America, Africa, Antarctica, Australia and India have broken off and separated via "continental drift."
- (3) South America separated from Africa 100,000,000 years ago and migrated westward.
- (4) Three million years ago a Panamanian land bridge emerged to join North America with South America. Ignoring the dates assigned as mere speculation, such isthmus formation would be possible, although the data on silica content of sediments on both sides of the land must be considered tenuous as a source of proof.

The first three assumptions cannot be used as even likely, let alone proven.

Marshall states that the fossil remains can be divided as follows:

Stratum 1—Large animals that are largely extinct.

Stratum 2—Genera which are still in existence today, such as Cebidae (New World monkeys), Rodentia (rodents), Dasypodidae (armadillos), Didelphidae (opossums), Felidae (cats), Cervidae (deer), Equidae (horses), Ursidae (bears), Canidae (dogs), Camelidae (llamas), Tapiridae (tapirs), Tyassuidae (peccaries), Leporidae (hares), Procyonidae (raccoons).

Stratum 3 — *Homo sapiens* (man).

To the creationist, it will be apparent that his classification largely agrees with what we understand the fossil record to demonstrate. The sudden extinction of an estimated 96% of the large land animals is consistent with the great Flood of Noah's time, the greatest cataclysm in the historical record, which we find from many tribal accounts in various parts of the world in addition to the Bible. We find this a far more likely explanation than the usual evolutionist view shared by Marshall, that this extinction was due to man arriving on the scene and annihilating nearly all of the large species by "a process of overkill called 'Blitzkrieg' (p. 386)."

Marshall concedes that much of the ungulate-like taxa took place before the interchange, consistent with the fact that the present-day genera listed above may have come southward across the land bridge at Bering Strait, and then down over the Isthmus of Panama after the Flood, which conceivably could have caused its rise above the oceans. Inasmuch as he speculates that man was present to cause overkill of the animals of Stratum 1, it is apparent that Stratum 2 may have and has co-existed with man, consistent with man's arriving simultaneously with the lower creatures or soon afterward.

A more reliable approach to the geographical distribution of animals (and plants) can be obtained by actual observation and direct study of living species on both sides of the ocean, and observing that in the centuries since the species now in America have passed over the Bering Strait (or former land bridge) they remain the same species with their living (and fossil) counterparts in Eurasia (Culp, 1988). I am continually amazed at the way in which scientists of the stature of Marshall quote voluminously from current theories and opinions, and then try to build on them as though they are facts that have been actually proven by careful, objective experiment. Anthony Standen, an entomologist, compared this to building a house of cards, reasoning that "if this is true, and that is true (and so on ad infinitum) that this is also true (Standen, 1950)." This is particularly true of Marshall's dependence on the late G. G. Simpson for an objective classification of fossil remains. It is well known that the latter was a confessed atheist, who believed that all school children should be indoctrinated with evolutionist dogma. He confessed that "it is irresistible to speculate and extrapolate," indicating that such activity should "be taken in a spirit of good clean fun" (Simpson, 1964). At the same time he remained close-minded to the solid facts presented by creationists. His "objectivity" was demonstrated by the fact that he could "see" clear lines of evolutionary development in

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specimens quite diverse in structure, while contrariwise he was unwilling to classify the fossil dog-like marsupial in South America with the Australian family Thylacinidae (which included the Tasmanian wolf). This was despite the fact that after careful measurements, Sinclair, whom Simpson agreed was an able anatomist, decided that they were very close anatomically and should be classified in the same genus. Simpson's stance here was apparently to accommodate his own claim that all Australian marsupials had developed their characteristic structures because of "splendid isolation" from the rest of the world (Simpson, 1980).

In recent years, attorney Norman Macbeth began to sift through the evolutionist theories for evidence, as some doubts had arisen in his mind. He was told that Simpson would be able to answer all his questions, but he found Simpson to take a "rosy view" of supposed links between fishes and amphibians, amphibians and reptiles, reptiles and birds, reptiles and mammals, all on meager evidence (Macbeth, 1971). It is apparent that Marshall leans heavily for evidence on radiometric dating, "dating" fossils by a preconceived relative age based on evolutionist assumptions, and the

ready acceptance of subjective evolutionists such as G. G. Simpson for classification. This leaves him no real evidence on which to base his case. As Stephen Jay Gould concedes. "The fossil record with its abrupt transitions offers no support for gradual change (Gould, 1977)."

References

- Culp, G. Richard. 1988. The geographical distribution of animals and plants. *Creation Research Society Quarterly* 25:24-7.
- Dalrymple, G. B. and J. G. Moore. 1968. Argon-40: excess in submarine pillow basalts from Kilauea Volcano, Hawaii. *Science* 161:1132-5.
- Gould, S. J. 1977. The return of the hopeful monsters. *Natural History* 86(6):22-30.
- Macbeth, Norman. 1971. Darwin retried: an appeal to reason. Gambit, Ipswich, MA.
- Noble, C. S. and J. J. Naughton. 1968. Deep ocean basalts: inert gas content and uncertainties in age dating. *Science* 162:165-6.
- Simpson, G. G. 1964. This view of life. Harcourt, Brace, and World. pp. vii-ix.
- Simpson, G. G. 1980. Splendid isolation. Yale University Press, New Haven, CT.
- Standen, A. 1950. Science is a sacred cow. E. P. Dutton, New York.
- Stehli, F. C. and S. D. Webb. 1985. The great American biotic interchange. Plenum Press, New York. pp. 49-85.

BOOK REVIEWS

The Necessity of Creationism in Public Education, by David Herbert. 1986. Hersil Publishing, London, Ontario, Canada. 30 pages. \$3.00 Canadian.

Reviewed by Clifford L. Lillo*

Although written by a Canadian, this book is as applicable to public schools in the United States as to those in Canada. Herbert says there is a crucial problem in attempting to have creationism taught in the schools: evolutionism is perceived by many to be a branch of experimental science, whereas creationism is considered to be faith-based and thus not a proper subject for public schools. Thus, it is essential that the public be taught the truth, i.e., both evolution and creation are valid scientific theories and both are based upon faith.

The author begins by stating

When viewing the panorama of history—some 4,000 known societies to date—one is immediately struck with the inescapable fact that man is religious by nature. . .

Man's worship . . . focuses around finding answers to what are called the Three Eternal Questions:

Where did we come from?

Why are we here?

Where are we going? (p. 5)

In the next chapter, Herbert says, "Man, in his search for the answers to the Three Eternal Questions, has only two sources at his disposal: Supernaturalism or Naturalism." (p. 6) Supernaturalism recognizes the limitations of man and the existence of a Supreme Creator-God, while naturalism places absolute confidence in man and postulates that there is no need for a Supreme Being.

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In succeeding chapters, the author provides an historical perspective on how the two schools of thought have been used since the time of Plato (429 B.C.) to the present to answer the three eternal questions. He says in conclusion,

Creation Science (history) and Evolution Science (history) are the end product of two religious systems—namely creationism and evolutionism . . . In our present naturalistic society, only Evolution Science is deemed appropriate for our educational system. It is argued that Creation Science, being religious, should be excluded from the classroom. Such reasoning is totally fallacious as both Creation Science and Evolution Science are equally religious and at the same time equally scientific . . . since the academic community is constantly doing research to substantiate Evolution Science. . . [it] is thus regarded by the public at large as being the only valid perspective to present in the classroom.

. . . Thus it is imperative to have creationism presented in all classes dealing with the important question of origins to give students a balanced viewpoint. (pp. 23, 24)

Anti-Evolution, An Annotated Bibliography by Tom McIver. 1988. McFarland & Company, Inc., Jefferson, N.C. 385 pages. \$39.95.

Reviewed by Clifford L. Lillo

Never before has there been a published bibliography of anti-evolution source material as extensive as this one. The book belongs in the personal library of every active creationist. McIver states, "Much of the research for this study was conducted at the Institute for Creation Research . . . I have also used the libraries of Ambassador College and Fuller Theological Semi-

nary (p. ix).” Having said that, it is necessary to state that McIver is not a creationist. In a personal conversation he described himself as “an observer.” Based upon his book, that translates into “agnostic,” although some readers might use the harsher term, “evolutionist.” That the author is clearly not in the creationist camp is immediately obvious in the Introduction where he says,

Though I disagree with the anti-evolution arguments and conclusions, I sympathize with their concerns . . . We need to pay attention to what it is they are saying, in order to understand their real motivations—religious, moral, political and educational (p. xi).

In the Bibliography there are nearly 100 cases of bias, even though the author states,

I make no attempt to refute or oppose the arguments and conclusions presented in these works, nor even, in most cases, to note any personal disagreement at all with the author’s contentions (p. xi).

A few examples will illustrate this bias:

Doomsday 1999 AD: . . . repeats . . . Ark-eology tales. Noah’s Flood, and Atlantis and other myths, prove that the world has been destroyed before. (p. 17)

Speak to the Earth: Creation Studies in Geoscience: [the CRS’s] primary activity remains the publication of its *Quarterly*: a slick, impressively scientific-looking magazine . . . (p. 119).

The author has chosen to include occult and pseudoscience publications as well as creationist publications. Examples:

Hampden, John: flat earth advocate (p. 102).

Hanson, James. *A New Interest in Geocentricity* (p. 103).

Hoggan, David L.: strongly pro-German . . . has written for the *IHR* [Inst. for Historical Review] [pro-Nazi] journal (p. 117).

Steiner, Rudolf. *Cosmic Memory: Atlantis and Lemuria*: Dense occultic philosophy . . . “Man existed before there was an earth (p. 260).

There was one curious aspect to this anti-evolution book. Some of the publications listed did not deal with evolution. Examples:

Challenge of the Space Age: Does not address evolution specifically (p. 140).

Moses’s Principia. 1748 . . . apparently not concerned with evolution directly (p. 123).

In spite of these drawbacks, this listing of 1,852 publications will provide a valuable resource for the active creationist, since it does list almost every creation publication.

Time’s Arrow, Time’s Cycle by Steven J. Gould. 1987. Harvard University Press, 240 pages. \$17.50.

Reviewed by Michael J. Oard*

“James Hutton and Charles Lyell are paragons of reason based on objective fieldwork while their con-

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temporary catastrophists were motivated by religious bias.” Creationists know this is not true, but most mainstream scientists and practically all textbooks still portray this image. Steven Jay Gould in this book shows from the original historical writings that the “fathers of geology” were not quite the heroes as commonly believed. In fact, the contemporary catastrophists were more objective, and better observers of nature.

Time’s arrow is the presumed temporal sequence of unrepeating events, such as the theory of evolution. Time’s cycle is defined as the concept of repeating events over time. After an introduction to the discovery of “deep time” (the concept of an old earth), Gould delves into the misunderstanding of Thomas Burnet, who in the late seventeenth century wrote a fanciful theory of the earth based on Scripture. Gould actually defends Burnet’s methodology (not his science) because Burnet tried to find natural explanations for many events in the Bible, similar to Immanuel Velikovsky in our day. Burnet, much defamed by modern scholars, is usually contrasted to his contemporary, Nicholas Steno, who is portrayed as an objective observer of nature. Gould shows that this image is mostly false, there was little difference between Burnet and Steno. In fact, Burnet’s methodology was actually a precursor to the principle of uniformitarianism.

Most of the book delves into the false textbook image of Hutton and Lyell. To understand how Gould arrived at his conclusions, we must first understand the four meanings of uniformitarianism as established by these two men. The *first* is the uniformity of law, which states that the laws of nature are constant in space and time. The *second* meaning is the uniformity of process, which states that all past phenomena are a result of processes now acting (actualism). These two meanings make up methodological uniformitarianism or the method of historical scientific investigation. Creation and the Genesis Flood are automatically excluded from historical science by these meanings of uniformitarianism.

However, Gould does admit that methodological uniformitarianism is an assumption, and neither observable nor testable:

. . . but we can never see past processes, and no amount of current repetition can prove that present causes acted in the same way long ago—hence our need for a postulate about the invariance of nature’s laws . . . you can’t go to an outcrop and observe either the constancy of nature’s laws or the vanity of unknown processes (pp. 119, 120).

Thus, methodological uniformitarianism is an unprovable basic assumption in historical science. Its justification is usually maintained by straw men arguments, such as, if miracles are allowed in history, science would be impossible.

The third and fourth meanings of uniformitarianism, on the other hand, are testable and have come up short. The *third* meaning is the uniformity of rate, the assumption that present processes have operated at the same rate in the past. The *fourth* meaning is the uniformity of state: there are no irreversible processes in nature. This last concept of uniformity is little

known today and difficult to understand. One example would be the assumption that although land and sea have changed positions in the past, they have always maintained the same proportions. The uniformity of state is a statement of time's cycle. These meanings of uniformitarianism are called substantive uniformitarianism because they are supposed to be the empirical substance of the principle. These latter two meanings of uniformitarianism were especially defended by Hutton and Lyell, despite contradictions. These men defended a particular theory of the earth and interpreted fieldwork in the light of their theory, not the other way around. Gould states: "Indeed, I shall show that their visions stand prior—logically, psychologically, and in the ontogeny of their thoughts—to their attempts at empirical support" (p. 10). Hutton was especially convinced of his theory before he did much fieldwork (pp. 63, 71-6). In fact, Hutton was not considered a major researcher by continental geologists of the time: "Hutton's near contemporaries ranked him among the antiquated system-builders of a speculative age" (p. 72, see also pp. 66, 86).

Lyell did more fieldwork than Hutton, but all was recast within the uniformity of rate and state. Lyell realized that the popular interpretation of geology and the fossils showed progression (time's arrow), but he argued against appearances to defend his theory. He believed that the fossil record was imperfect and would support his theory after more fieldwork. In defending the uniformity of state, Lyell believed that a warmer climate would return to mid-latitudes, bringing back extinct animals:

Then might those genera of animals return, of which the memorials are preserved in the ancient rocks of our continents. The huge iguanodon might reappear in the woods, and the ichthyosaur in the sea, while the pterodactyle might flit again through umbrageous groves of tree-ferns (pp. 101, 102, as quoted from Lyell's *The Principles of Geology*, 1830, p. 123).

Lyell was originally trained as a lawyer and skilled in rhetoric, which he abundantly invoked in his books (pp. 104-12). In his later years, he was forced to abandon his uniformity of state and accept evolution.

The reason few people, including scientists, are aware of the cardboard image of Hutton and Lyell is because few have read the original works, unlike Gould. Hutton's 1000 page book is considered unreadable and contains page after page of quotations in French, one is forty-one pages long (p. 93). Scientists of today have formed their opinions from earlier scientists who wrote about Hutton and Lyell, pitting objective scientists against ignorant catastrophists. In particular, we are "indebted" to the reinterpretation of Hutton by John Playfair, and the eulogizing of both Hutton and Lyell by Sir Archibald Geikie. Consider this recasting of history by Geikie:

In the whole of Hutton's doctrine, he vigorously guarded himself against the admission of any principle which could not be founded on observation. He made no assumptions. Every step in his deductions was based upon actual fact, and the facts were so arranged as to yield naturally and inevitably the conclusions which he drew from

them (p. 67, as quoted from the 1905 edition of Geikie's *The Founders of Geology*).

Lyell is also portrayed in the above fashion. Gould writes:

In Lyell's historical tale, told in the Manichean tradition, forces of darkness are aligned to impede progress. The small flame of truth finally begins to flicker and, through the struggle of right-thinking men, eventually burns brighter to conquer superstition and perfidy (p. 107).

However, Lyell's real scientific methodology was just the opposite: "Lyell was not the white knight of truth and fieldwork, but a purveyor of a fascinating and particular theory rooted in the steady state of time's cycle" (p. 115).

Many believe Lyell did much fieldwork on the Tertiary strata of Europe, especially around London and Paris. This strata was difficult to decipher because of its patchy distribution. The law of superposition could not be applied, and Lyell rejected index fossil dating based on his assumptions of uniformity of rate and state. Nevertheless, Lyell invented an ingenious statistical method for dating the periods within the Tertiary (p. 155-67). His method was based on the percentage of living mollusks in the sediments. Young strata presumably had a high number of extant forms, while older strata were so designated by possessing few living forms. However, Lyell actually depended upon the classification of mollusks and the fieldwork of other geologists, especially his French colleague Deshayes. Unfortunately, Lyell's method foundered when experts could not agree on the classification of species of mollusks (p. 174).

Throughout his book, Gould defends the much maligned catastrophists of the time, such as Georges Cuvier, William Buckland, and Louis Agassiz. The catastrophists were more objective and relied more on fieldwork than Hutton and Lyell. For instance, the catastrophists hypothesized catastrophic periods of mass extinction followed by the creation of new organisms. They based this concept on a "literal" reading of the rock layers, which generally show beds of distinct organisms, followed vertically by beds with mostly new organisms. Textbooks continually malign the catastrophists, contrasting them to Hutton and Lyell. Gould chides the cardboard image of textbooks: "... the world of textbooks is a closed club, passing its errors directly from generation to generation" (p. 26).

Should creationists take heart in Gould's defense of the early catastrophists? No; they are more a part of the problem than the solution. Although they were devout men, most strayed from the Biblical view of early history. They believed in an old earth, which was a consensus among scholars all the way back to the mid-seventeenth century (p. 3), and they rejected the Genesis Flood as the source of most sedimentary rocks. They were really methodological uniformitarians:

Later in this chapter, I shall show that catastrophists of Lyell's day were fine scientists who accepted both an ancient earth and the methodological meanings of uniformity (p. 112).

Even Louis Agassiz, the supposed villain of uniformitarianism, actually praised Lyell's book, *The Principles of Geology* (pp. 115-7, 126-32). I believe the early catastrophists opened up Pandora's Box to non-Biblical speculation and the higher criticism of the Bible, and actually encouraged the acceptance of the theory of evolution and an atheistic worldview. They would be more like the progressive creationists of our day, and they would likely heap contempt on Biblical creationists.

Gould has done science and creationists a favor by his historical analysis of the fathers of geology and his emphasis on the different meanings of uniformitarianism. He is not intentionally trying to help us. In fact, he is blindly committed to the theory of evolution and saves his most pejorative rhetoric for creationists. Then, why did he write a book exposing Steno, Hutton, and Lyell? I believe partly because the truth will eventually become known, discrediting science, and that blind allegiance to an assumption can retard scientific progress. Gould states:

But what does it matter? What harm is a bit of heroic folderol about an illusory past, especially if it makes us feel good about the progress of science? I would argue that we misrepresent history at our peril as practicing scientific researchers. If we equate uniformity with truth and relegate the empirical claims of catastrophism to the hush-hush unthinkable of theology, then we enshrine one narrow version of geological process as true *a priori*, and we lose the possibility of weighing reasonable alternatives (p. 114).

I believe Gould also wants to defend his theory of punctuated equilibrium, which is similar to the old catastrophist ideas. Punctuated equilibrium is contrary to the uniformity of rate in that the rate of evolution is supposed to vary from little or no change to short periods of rapid change, usually in small isolated populations that leave no fossil record. Actually, punctuated equilibrium is not a radical change from Darwinian gradualism, since the former postulate bridges only small gaps in the fossil record (Dawkins, 1986, p. 223-52). The large gaps in the fossil record are more revealing, and are to me an obvious falsification of the theory of evolution that is greatly minimized by evolutionists. To think that punctuated equilibrium can bridge the large gaps is succinctly stated by evolutionist Michael Denton (1985):

To suggest that the hundreds, thousands or possibly even millions of transitional species which must have existed in the interval between vastly dissimilar types were all unsuccessful species occupying isolated areas and having very small population numbers is verging on the incredible! (pp. 193, 194)

Although methodological uniformitarianism is an axiom of all science, what is the modern state of substantive uniformitarianism? The uniformity of state is a long discarded theory, although a cardinal belief of Hutton and Lyell. The uniformity of rate is now undergoing a similar fate due to what is called neocatastrophism, of which Gould is a part. Some of these new catastrophic ideas approach the disaster of the

Biblical Flood, like the controversial asteroid or comet-ary impact hypothesis.

Creationists have long pointed out many examples of past phenomena that surely violated the uniformity of rate principle. Now, evolutionists are embracing many of these criticisms as part of their own theory, and claiming we can no longer use the examples as evidence against mainstream historical science and as evidence for the creation-Flood model (Strahler, 1987). However, Gould admits that the message of neocatastrophism has not been absorbed by most practicing geologists, who are still operating under the old paradigm of gradualism (p. 118). The uniformity of rate has stifled progress in geology for a long time:

Uniformity of rate has therefore persisted to our present day . . . For more than a century, many geologists have been stifled—the range of their hypotheses falsely channeled and restricted—by a belief that proper method includes an *a priori* commitment to gradual change (p. 174).

This book is highly recommended reading for both creationists and evolutionists. Besides setting the historical record straight, the book brings up some penetrating questions. Why the misreading of Hutton and Lyell by men who are supposed to uphold truth? It seems to me that evolutionists should wonder about the reverse image of the fathers of geology. Fieldwork is touted as the driving force behind the development of uniformitarianism, but fieldwork is showing the inadequacy of substantive uniformitarianism. Could methodological uniformitarianism, which does not allow interventions by a Creator, and admitted by Gould as just an assumption, be questioned also? If we admit that evidence exists for past geological processes operating at a faster rate than observed today, as neocatastrophism teaches, then can we extrapolate the rate further to arrive at the Genesis Flood as a reasonable concept? After all, if we admit that present rates are not good enough to account for at least some past phenomenon, then where do we draw the line on what is acceptable?

I believe that a consistent Biblical view of origin science is indicated by II Peter 3:5, 6: "But they deliberately forget that long ago by God's word the heavens existed and the earth was formed out of water and by water. By these waters also the world of that time was deluged and destroyed (NIV)." Based on the Creation and the Genesis Flood, creationists need more sophisticated research to show that our model of earth history is much superior to the uniformitarian-evolutionary model. After all, the evolutionary model has been developed by millions of man years of research, billions of dollars, and the most up-to-date technology. Understanding the assumption of uniformitarianism and its historical development as presented by Gould is a starting point to the restructuring of historical geology.

References

- Dawkins, R. 1986. *The blind watchmaker*. W. W. Norton. New York.
- Denton, M. 1985. *Evolution: a theory in crisis*. Harper and Row. Scranton, PA.
- Strahler, A. N. 1987. *Science and earth history: the evolution/creation controversy*. Prometheus Books. Buffalo.

LETTERS TO THE EDITOR

"Disastrous" Situation

According to a survey of 400 high school biology teachers conducted by two University of Texas at Arlington sociology professors, 30 percent believe in Biblical creationism. Nineteen percent believe that dinosaurs and humans lived at the same time. The sociologists consider the situation "disastrous" (*Waco Tribune-Herald*, September 11, 1988, p. 2E).

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On Patten's Response to Northrup

In CRSQ 25:104-6 Northrup challenged Patten's Mars "flyby" theory of orogeny, charging that it "accounts inadequately for the phenomena beyond the level of surface consideration," and that it needs technical support. Based on the arrangement of geological formations and glaciers, he demonstrated that the sequence of events postulated by the flyby theory is impossible. Northrup is in the mark.

Rather than answer these direct challenges, Patten said Northrup asked the wrong questions. He then presented a portion of a vast amount of material suggesting (a la Velikovsky in *Worlds in Collision*) that Mars was in some unspecified way associated with a number of catastrophes in Earth's history. This and loosely interpreted maps showing nearly perpendicular (!) mountain arcs (minus mid-ocean ridges and other seafloor topography) supposedly render the flyby theory irrefutable.

Patten takes for granted the cause-effect relationship between Mars and orogeny on Earth, but it has not been established. Where is the supporting physics? Neither is Patten's case strengthened by the condescending attitude expressed in the response.

If creationist theories in geophysics are to have any impact on the world of thinking people, secular and Christian, they cannot take giant leaps of logic. There needs to be a chain of reasoning based as much as possible on the abundant physical evidence available and on calculations of the influence of physical forces. Northrup's questions need to be answered.

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Models for Canyon Formation

Canyon formation within a Flood, rapid erosion and rapid hardening framework is an interesting topic (see Williams, 1988). Cannot modern-day sedimentary and erosional patterns seen in areas after extensive water flow be viewed as simplified models of what could have happened during and after the Flood? Figures 1-4 show sedimentary and erosional patterns in a wash in Santa Clarita, CA. The only mechanism lacking in this case is the rapid hardening necessary to render the "walls" of the miniature canyon stable against another flowing stream after a rain. The Research Committee of the Society is studying possible Canyon formation

and rapid erosion with the Flood model rather than very slow gradual development.

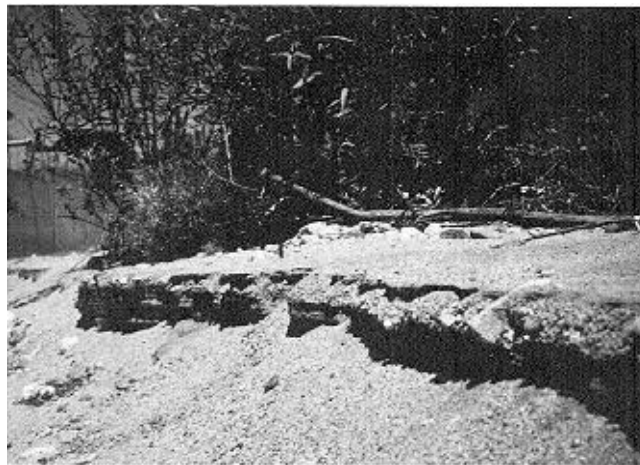


Figure 1. "Walls" and "cliffs" in a miniature canyon (a wash) in Santa Clarita, CA. Figures 1-4 are photographs by George Howe.

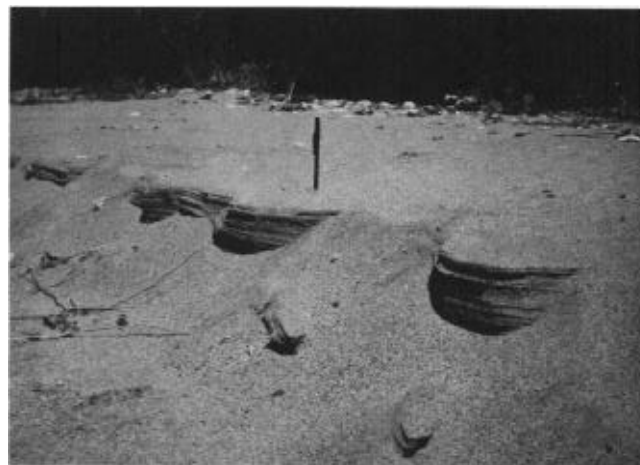


Figure 2. Note sedimentary and erosion patterns in bank of the wash.

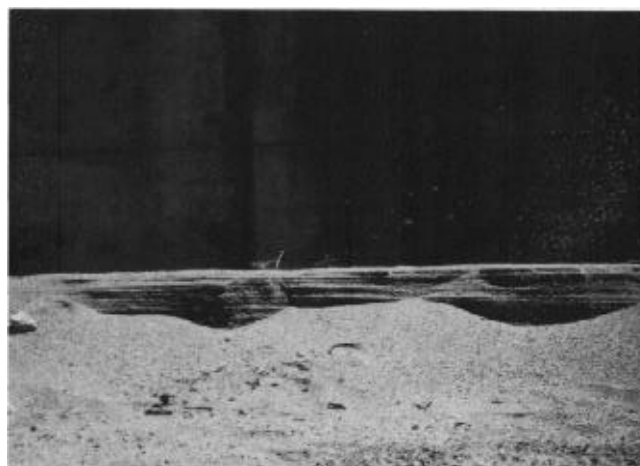


Figure 3. A view perpendicular to the "walls" of the wash.

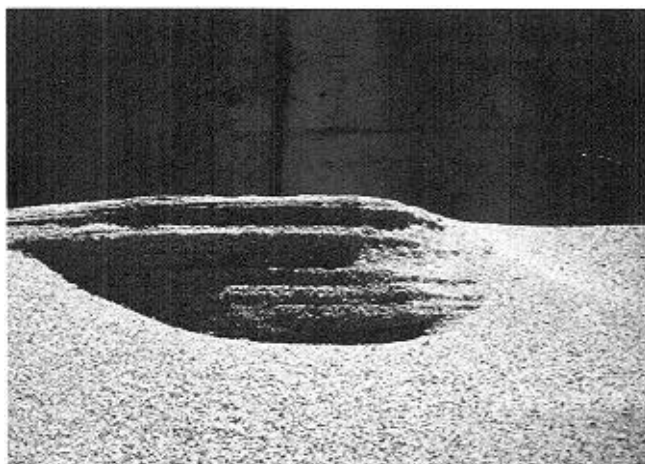


Figure 4. Undercutting is evident in the “wall” of the miniature canyon.

Reference

Williams, E. L. 1988. Santa Elena Canyon—1986. *Creation Research Society Quarterly* 25:52-4.

Emmett L. Williams
George F. Howe

Response to Setterfield

I read Setterfield’s “The Atomic Constants in Light of Criticism” with interest—and dismay. In his rebuttal to my critique, Setterfield has made an obvious factual error in claiming that C-14 is produced in our atmosphere by “solar neutrons.” In fact, it is cosmic rays which are responsible for C-14 production, not solar neutrons. “The natural production of C-14 is a secondary effect of cosmic-ray bombardment in the upper atmosphere” (Taylor, p. 2). Cosmic rays are principally protons and other atomic nuclei, not neutrons (free neutrons have a half-life of only 10.5 minutes which is far too short to make a journey through space of any appreciable distance), and for the most part they do not come from the sun but are sourced external to the solar system (which is why they are called “cosmic” rays).

This is only one mistake among many; I have singled it out, not because it is the most drastic, but because it is easily verified by the reader. Note, however, that this factual error forms the basis of Setterfield’s rebuttal to the disquieting implications of radiocarbon for his hypothesis which I have raised. So the rebuttal is wrong; and the objection stands. The pattern of responding to valid objections with further errors persists throughout “The Atomic Constants in Light of Criticism.” As a further example, it is implied that I have used a quote from Bevington in a misleading fashion by not giving it with adequate context. This is a peculiar charge since the quote I have used is the very first two sentences of chapter 1 of Bevington’s book. Furthermore, the context which Setterfield gives to “clarify” the meaning is from chapter 2. Normally chapter 1 of a book gives introductory information necessary to understand chapter 2 properly, not the other way around. This is certainly the case with Bevington.

Bevington’s discussion which follows my quote from chapter 1 is concerned particularly with the necessity of distinguishing between *systematic* and *random* errors, a distinction which Setterfield has failed to take

into account and refuses to acknowledge though pressed to do so by both Dr. Humphreys’ and my critiques. And to make matters worse, Bevington makes it very clear, even on page 10 which Setterfield refers us to for “clarification,” that his first two sentences in chapter 1 mean exactly what they say, not what Setterfield would like us to believe they say; *random* errors will be distributed around the correct value only if *systematic* errors can be neglected or corrected for. “On the average, however, we expect [our measurements] to be distributed around the correct value, *assuming we can neglect or correct for systematic errors*.” (Bevington, p. 10, my emphasis) Setterfield’s statement that “the suggestion that the one-sided decay in *c* is merely the result of the normal behavior of physical measurement does not conform to Bevington or statistical theory” is simply false. Similar distortion and error could be shown in all of Setterfield’s rebuttals, but space is prohibitive.

It occurred to me, after reading *The Atomic Constants in Light of Criticism* that I could not recall a single instance when Setterfield had ever acknowledged any error on his part or any difficulty with his theory. It seems to me that there are only two possible explanations of this phenomenon:

1. Setterfield is nearly always right, or
2. Setterfield practically never admits it when he is wrong.

Though, in truth, I would rejoice with Setterfield if the first explanation were true, his response to the many good points raised by his critics—and these include some very active, dedicated, and highly credentialed creationist scientists—and his response to my critique, leave the second explanation as the only viable alternative. Setterfield has made some very basic errors in the past—such as failing, in his data analysis, to take into account the experimental precision which researchers have assigned to their results, even though these differ by many orders of magnitude from the earliest measurements to the present. It is very disturbing to see such fundamental errors made in the first place; it is even more disturbing to find that these errors are not acknowledged and corrected, but responded to with recalcitrance and obfuscation.

References

- Bevington, Philip R. 1969. *Data reduction and error analysis for the physical sciences*. McGraw-Hill. New York.
Taylor, R. E. 1987. *Radiocarbon dating: an archaeological perspective*. Academic Press. New York.

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Inadequate Defense of c-Decay Hypothesis

Introduction

Barry Setterfield (CRSQ 25:190-7) has failed to make an adequate response to the criticisms (Aardsma, Brown, Holt, and Humphreys CRSQ 25:36-45, 84-95) of his hypothesis that the speed of light has measurably decayed in recent times (Norman and Setterfield, 1936). In spite of the length of his reply, I do not feel that he has answered the essence of the critiques.

Why Does Setterfield's Curve Level Off?

Setterfield fails to defend the strange behavior of his c -decay curve, which decays at a very high rate centuries ago but levels off to zero slope today. The leveling-off is simultaneous with the diminishing size of the experimental error bars around the data. In my critique I asked (in italics so it would not be missed): “*Why should the rate of change of c diminish in direct proportion to our ability to measure c more accurately?*” Setterfield does not answer this question at all. I had offered an explanation: **psychological bias** (the reluctance of an experimenter to publish figures too different from those previously published) made the curve high in earlier times, but improving accuracy gradually pulled the curve down to the true value. Scientists with actual experimental experience know these two effects quite well (DeYoung, 1976).

In his reply, Setterfield shows a lack of understanding of these effects. For example, he is incredulous that “16 different methods of c measurement all had to favor the same bias . . .” He fails to understand that psychological bias does not reside in the equipment or method; it is in the *mind* of the experimenter, who feels that he should get results as high as the previously published values. Thus all 16 methods were subject to the same upward bias. Further on Setterfield asks, “If Michelson had preconceived notions as to what he should find as the ‘correct’ value, than why did his data [decrease 0.04% over fifty years]?” By my suggestion, the answer is simple: Michelson was compelled to lower his estimates by the *increasing accuracy* of his data.

Thus the decrease and leveling-off of Setterfield's curve could be nothing more than a distortion due to experimenter bias. This strong possibility of systematic error makes Aardsma's critique very relevant: Setterfield has dispensed with the usual scientific procedure of weighting the data points according to their accuracy, and so his analysis has no defense against systematic error in the data. I could not find any adequate answers to these points in Setterfield's response to Aardsma. Setterfield's curt response to Brown's detailed critique is also inadequate; it does not answer the essence of the criticism, which was that the scatter in the data is as big as the alleged deviations from constancy of c .

Mistakes with Old Data

Setterfield says he is grateful that I found out the true result of Goldstein's analysis of Roemer's 17th-century data, but he does not acknowledge that it was his failure to communicate with Goldstein that produced the confusion in the first place. Now Setterfield has produced a new confusion about the matter. He claims that with the corrected Roemer point and without the incorrect Cassini point, “the remaining 162 values still give a decay.” However, he neglects to specify a value for the slope. The value turns out to be -0.5 ± 5.6 km/s per year (Aardsma, 1989). This slope is insignificant compared to the error bounds, so Setterfield is not statistically justified in claiming that the data show a decay,

Setterfield probably made this mistake because he thought the error bounds were much smaller than ± 5.6 km/s-yr. The error bounds he reports for other

slopes are amazingly small. For example, by omitting both the Roemer and Cassini points from his 163-point fit, Setterfield's slope changes from -28.59 ± 0.0016 to -6.59 ± 0.0018 km/s-yr. His error bounds are more than 10,000 times smaller than the slope change, an incredible result. For the same data, Aardsma (1989) gets the same slopes, but much larger error bounds, ± 6 km/s-yr. Aardsma and I have each checked these figures (Burr, 1974), and it is clear that Setterfield greatly underestimated his error bounds. Thus he did not know that even when his own procedure (an incorrectly unweighted fit) is properly performed on all the correct data, the statistical evidence for c decay disappears.

Eighteenth-century analyzers of Roemer's and Cassini's data miscalculated the speed of light, getting values 10 to 20% higher than today's value, much higher than even Setterfield's curve. Setterfield accepts another 18th-century analysis, that of Delambre, even though it could be subject to similar errors. Using the corrected Roemer point and excluding the Cassini and Delambre points gives a seemingly *upward* slope, $+1.4 \pm 5.8$ km/s per year (Aardsma, 1989). So simply by selecting which combination of the three earliest data points he wants to use, an investigator insensitive to statistical accuracy could claim either a decay, zero change, or an increase! This changeability of the estimated slope results from doing an unweighted fit, which is precisely what Aardsma criticized. Moreover, it points out the importance of the 17th- and 18th-century data to Setterfield's thesis. If Setterfield wants to establish his hypothesis by convincing scientists with logic, he should: (1) analyze the 17th- and 18th-century data *himself*, (2) publish the analyses in peer-reviewed journals, and (3) find a statistically valid way to deal with the very wide range of accuracies and the possibility of systematic bias.

Double-Minded Physics

Setterfield responds to my critique of his theoretical ideas by continuing to introduce dichotomies into physics. Setterfield says now that macroscopic masses (such as those of planets and people) would not change if the speed of light c were to change. This would keep “dynamic” clocks (such as planetary orbits) ticking at a constant frequency so that a speed-of-light change could be measured. On the other hand, he claims that microscopic masses (such as those of atoms and nuclei) are proportional to $1/c^2$. These masses would increase if the speed of light were to decrease, keeping the energy E constant in Einstein's equation, $E = mc^2$. Thus, Setterfield is claiming that Einstein's equation applies only to atomic-sized masses, not to people-sized masses. Fifty years of experimental physics resoundingly contradict that idea. A dichotomy between microscopic and macroscopic mass has not been found in nature, so the idea cannot be used to justify Setterfield's idea of two different types of time, “atomic” and “dynamic.” Holt's excellent analysis showed that even if one accepts Setterfield's distinctions for the sake of discussion, his theory is numerically incompatible with pulsar data. Setterfield's response lacks the precision of numbers, and as far as I can tell, does not really answer Holt's critique at all.

Toward a Correct Cosmology

Setterfield's work has had one good effect: it has focused creationist thinking on the problem presented by a large but young cosmos. We are now finding much evidence for a young earth and good explanations for the evidence used by old-earth proponents, so I am confident that there is a good answer for the cosmological problem also. It is entirely possible that God has indeed changed such fundamental physical "constants" as the speed of light, and it is good to consider models based on such possibilities. But it is not right to ignore inconsistencies in one's models, such as Setterfield's deeply-rooted dichotomies in masses and times. It is good to look for evidence. But it is wrong to grasp at statistical straws, to ignore alternate explanations, and to use substandard scholarship, as Setterfield has. Scientific truth is not revealed by debate tactics. We can only find it by careful use of scientific methods, attentively listening to each other's critiques, and forthrightly admitting our errors. Setterfield's experiences have shown me how important it is for creationists to insist on quality and honesty, not only in others, but also in ourselves.

References

- Aardsma, G. E. 1989. Private communication, January 12.
 Burr, I. W. 1974. Applied statistical methods. Academic Press. New York. p. 296.
 DeYoung, D. B. 1976. The precision of nuclear decay rates. *Creation Research Society Quarterly* 13:38-41.
 Norman, T. and B. Setterfield. 1986. The atomic constants, light, and time. Available from Lambert T. Dolphin, 1103 Pomeroy Ave., Santa Clara, CA 95051.

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Rejoinder to Setterfield

Both individuals who were free to speculate without constraint and individuals who have sought to defend a particular creationist viewpoint have proposed that nuclear decay rates, the speed of light, and the basic interaction constants for physical phenomena may have changed over the time the physical universe has been in existence. But speculation, such as that cited from V. S. Troitskii, is not proof of occurrence. One can just as well cite arguments for lack of significant change in these constants: e.g., Ralph A. Alper 1973 *American Scientist* 61:52-8; Harold Aspden 1977 *Catastrophist Geology*, 2:42-7; G. T. Emery 1972 *Annual Review of Nuclear Science* 22:165-202; A. J. Shlyakhter 1976 *Nature* 264:340; A. M. Wolfe 1976 *Physical Review Letters* 37:179-81.

What clear evidence is there for actual change in the fundamental parameters of the natural world? (Universal change, rather than rare local unique manifestations in miraculous exhibitions of the godhead.) Radiohalos provide evidence that the basic constants have been essentially unchanged (at least varied less than an order of magnitude) throughout the existence of rocks now in Earth's crust. Alpha emission probability (half-life) and energy is critically determined by the nuclear short-range and long-range forces. Alpha stopping power in the region surrounding an alpha-emitting nucleus is determined by the Coulomb (electrical) interaction force. For small halo centers radiohalos are

sharply defined and have a radius equal to the penetration range of a helium nucleus which is given the same kinetic energy as is characteristic of the alpha particles emitted from the radioactive center. If the fundamental constants have changed during the existence of Earth, to maintain an unvarying radiohalo radius, it would have been necessary for the Coulomb interaction force to have changed just enough to compensate for changes in the nuclear short-range and long-range forces. If such a compensating change could have kept one radiohalo radius unchanged, it is extremely unlikely that characteristic radiohalo radii for all alpha emitting radioisotopes would remain unchanged.

Rather than proposing multiple orders of magnitude change in the fundamental physical interaction parameters, it is much more reasonable to propose that these parameters are delicately interrelated and maintained by God to provide the marvelous physical universe we are privileged to enjoy. See Hugh Ross, *Eternity*, November 1988, pp. 73-81.

The question regarding the square root of n factor was considered when my CRSQ contribution was being processed by its referees before publication. At that time we agreed on wording that was considered to make my use of the data adequately clear. I expected that after publication there would be some question concerning this usage. My approach was to determine what conclusions were clearly indicated by the data, not to determine how the data might be used to support a viewpoint brought to it. For any reader who may have difficulty over the question regarding my use of statistics I recommend a careful rereading of my CRSQ feature and an evaluation of its conclusions as they relate to those presented by Aardsma, Humphreys and Holt.

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The Speed of Light-Corrected Roemer Values

May I comment on Humphreys' criticism (1988) of Setterfield's handling of Goldstein's results? Goldstein had to revise his results as there was a serious error in his paper. Who alerted him to this? One person who investigated his data in depth was Lew Mammel. In his checking of Goldstein's paper, Mammel found a major error in the conceptual mathematical statistics, which when corrected, gave a value for c that was 8% low with an error of 9%. This is probably the "correction" that Goldstein is referring to in his letter, although he quotes a value of "2.6% slower than it is now." The scenario does not end at this point however, for on further examination, Mammel found another serious error. A table of "observed minus calculated time" was actually of "predicted minus observed time" the precise opposite of Goldstein's "corrected" results, which Mammel finally claimed were 6% high with an 8.6% error. Thus Setterfield's thesis is actually supported by Goldstein's paper when fully corrected.

Humphreys quotes the letter from Goldstein, from which it appears that the first error has been corrected,

but not the more serious second error which reverses the result. I think that some clarification is called for. If it was Mammel's first note that alerted Goldstein to his first error, why was Mammel's second note seemingly ignored? Humphreys' paper strongly castigates Setterfield for poor accuracy and scientific integrity. If this subject is to be raised, may I point out the following aspects concerning a paper that has received wide publicity in the opposition to Setterfield's work?

1. Goldstein published this paper which contained not one but two very serious errors. This paper was specifically designed with the professed aim of discovering if there was any change in the speed of light, yet the statistical conceptual error resulted in a speed falsely close to the present value. In addition, to have subtracted the wrong values from each other gave a result the opposite to the actual change.

2. The paper was published in a prestigious journal and has been quoted by many scientists. Yet containing, as it did, two gross errors puts a question mark over the credibility of those responsible for vetting the scientific accuracy of the journal's articles. Mammel (1983a) indeed asks "Why didn't a referee spot this?" Humphreys is right to condemn Setterfield where he considers he has the evidence, but I contend that in this instance Humphreys' criticism is unjustified. In view of the errors outlined above, may I suggest that he widen his criticisms in other directions? Over the years, I have collected a considerable volume of correspondence from both sides in this debate, and I have consistently found that many criticisms are based on flawed lines of reasoning which have revealed the biased position of the writer. Occasionally, as in the present two papers, the criticisms have seemed to be unanswerable, but in his replies, Setterfield has always presented an excellent defense of his position.

References

- Humphreys, D. Russell. 1988. Has the speed of light decayed recently?—paper 2. *Creation Research Society Quarterly* 25:40-5.
 Mammel, L. 1983a. From lew Fri Dec 2 23:40:50 1983/NewsGroup: netastro/Message-ID: <795Qihuxr.UUCP./Date: Fri. 2-Dec-83 23:40:50 CST.
 Mammel, L. 1983b. From lew Wed Dec 7 23:33:37 1983/NewsGroup: netastro/Message-ID: <800Qihuxr.UUCP./Date: Wed. 7-Dec-83 23:33:37 CST.

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Reply to Bowden

If I understand Mr. Bowden's letter correctly, his chain of reasoning goes like this: (1) Lew Mammel once found a mistake in Goldstein's logic, so (2) Goldstein's latest result could be wrong again. Therefore (3) Setterfield's poor scholarship in handling Goldstein's result is justified, and (4) Humphreys should criticize somebody else. Whether or not point one is correct, Bowden's point two is well taken: Goldstein's latest result could be wrong, just as anybody can be wrong. But how Bowden gets from point two to point three is a mystery to me. How can the correctness or incorrectness of Goldstein's result have any bearing on the correctness or incorrectness of Setterfield's methods in reporting that result? When Setterfield saw a quote of Goldstein's latest result in Vivian Bound's

preprint, Setterfield (A) *assumed* the result was correct, probably because he thought it was in the direction he wanted. Then (B) without tracing the quote back to its source and (C) without asking Goldstein's permission, Setterfield published the quote (D) without referencing Bounds at all. The point I was making, that these four breaches of good scholarly practice cast doubt on the quality of Setterfield's research, is not affected by the question of whether Goldstein was correct or not.

As for Bowden's fourth point, that I should widen my criticisms to other parties, I say that I have many other things I would rather do. For me, criticism is a necessary but unpleasant duty. To delve further into this muddle of who said what about whom would not shed light on the essential question: *what can the best analysis of Roemer's data say about the speed of light in the seventeenth century?* Instead, I suggest that Setterfield do now what he should have done in the first place: directly and rigorously analyze Roemer's data for himself, and publish the analysis in a peer-reviewed journal. That would not only redeem his reputation, but it would also pull his idea out of the obscurities of second-hand science into the bright daylight of first-hand research.

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Australian Publications

Thank you for the work you do in publishing the *Quarterly* with so many informative technical articles of interest to creationists worldwide. We here in Australia have found for many years that the papers published in the *Quarterly* have often been of immense value to us in our research and presentation of scientific evidence for creation and Noah's Flood.

The net result of the work of the Creation Research Society and others has been the springing up of creationist groups in various countries around the world, with many more creationists picking up the challenge of research and writing in defense of the creationist cause. Consequently, in Australia we have seen the need for another creationist journal so that researchers can see their work published and disseminated. We have recently published volume 3 of our *Ex Nihilo Technical Journal*. In this latest volume, among many significant papers, are two of exceptional value to the creationist cause.

French creationist Guy Berthault has been conducting experiments on lamination in sediments and as a result has presented papers to the French Academy of Sciences in Paris. We have now published an English translation of his first paper so that English-speaking creationists can also have the benefit of his research. I quote from the summary:

These sedimentation experiments have been conducted in still water with a continuous supply of heterogranular material. A deposit is obtained, giving the illusion of successive beds or laminae. These laminae are the result of a spontaneous, periodic and continuous grading process, which takes place immediately, following the deposition of the heterogranular mixture. The thickness of

the laminae appears to be independent of the speed of sedimentation but increases with extreme differences in the size of the particles in the mixture. When a horizontal current is involved, thin laminated superposed layers developing laterally in the direction of the current, are observed.

The second article of note is 'The Human Vermiform Appendix—A General Surgeon's Reflections' by J. Warwick Glover, an Australian surgeon. In this paper he thoroughly discusses the various views on the importance of the appendix, particularly the views of evolutionists, and then he comprehensively lists the functions of the appendix, so that the evolutionist myth that the appendix is a vestigial organ is completely demolished.

In all, the volume contains 16 papers on various specialties from geology and biology through to archaeology and anthropology. I commend this and previous volumes to *CRS Quarterly* readers. Volume 4 is at an advanced state of preparation in readiness for publication in 1989. Among the papers will be a second contribution on sedimentation experiments.

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Relativity Thoughts

Since my paper on "The Special Theory of Relativity: Its Assumptions and Implications," *CRSQ* 25:88-90, I have been asked several times to state clearly whether I accept it or not. I thought it best to deal with my personal position on the STR in the form of a letter to the Editor rather than in a technical paper. I am not comfortable with the STR; nor shall I ever be with any theory which purports to be scientific and yet forfeits spatial objectivity. I also have a difficult time with any concept based on what amounts to proving a null hypothesis or an experiment which can only obtain a null result. Furthermore, I place little stock in measurements of systems which cannot be perturbed. This last point is probably the major "bone of contention" that I have with evolutionists: what constitutes "data" and what is merely "information" and the relative weight associated with each. I am sure that this is not the view of all, or perhaps not even most creationists, but from my perspective, scientific data are limited to objective measurements (which consist of volts, amps, seconds, meters, and counting of objects or occurrences) of systems which can be perturbed and outweigh any and all passive measurements, remote sensing (especially astronomically remote), and subjective description.

The logical inconsistencies arising from the STR have been aptly described elsewhere and include at least the following. Consider the Twin Paradox: upon their reunion after the hypothetical voyage, each should well expect the other to be younger. The standard explanation is that one experienced acceleration and one did not; however, the discrepancy in their ages is supposed to be related to the duration of the voyage and the "cruising speed"—not how fast that speed was attained. Both could easily experience the identical

acceleration and have taken voyages of vastly different duration. Consider the Muon Paradox: if time dilation is used to account for the "apparent age" of muons created in the upper atmosphere which travel only "near" the speed of light, what then can be said of the "apparent age" of photons traveling from the stars AT the speed of light? If the same formula is applied the "apparent age" of a photon received from any source is infinite. Also consider that an interferometer such as that employed by Michelson and Morley does not measure the speed of light, only the fractional difference in the number of wavelengths required to traverse two perpendicular paths. The result of the Michelson and Morley experiment may simply be an interesting wave phenomenon and have nothing to do with an ether.

The reason I do not feel compelled to either discard or embrace the STR is because I am skeptical of the whole matter. It does not distress me that the STR is confirmed by some information and not by other information; because I remain skeptical of the information being used to test the theory. Furthermore, as I stated in the paper, I will not forfeit logic in order to embrace any theory—or data for that matter—because logic is necessarily used to formulate theories and collect data. I am ever ready to discuss it; however, considering the nature of the matter, I will always remain skeptical.

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Modern Science and the Existence of God

The following amusing, but penetrating, condemnation of modern scientists is found in a recent novel (Percy, 1980, p. 192). The main character in the book is attempting a zany experiment to either "demonstrate" or "disprove" the existence of God in his personal spiritual quest.

My project is the first scientific experiment in history to settle once and for all the question of God's existence. As things presently stand, there may be signs of his existence but they point both ways and are therefore ambiguous and so prove nothing. For example, the wonders of the universe do not convince those most conversant with the wonders, the scientists themselves. Whether or not this testifies to the stupidity of scientists or to God's success at concealing himself doesn't matter.

One is reminded of Psalm 14:l; [The fool has said in heart, "There is no God"]

Reference

Percy, Walker. 1980. *The second coming*. Farrar, Straus, Giroux. New York.

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QUOTE

Though progress is essentially a modern concept, it can be traced to Francis Bacon, “the precursor of the spirit of modern life.” From his view of knowledge as primarily useful have flowed pragmatism, instrumentalism, and positivism. But the philosophy of John Dewey inaugurated a new development in the idea of progress. By rejecting form and fixity in the world and by seeking to make democracy the supreme sanction, Dewey offered “a metaphysical rendering of communism or socialism.” Given his set of values, the industrial system has a distinct educational function. But Dewey’s theory of a reconstituted society, which would entail a remaking of human nature, rested on propositions not at all self-evident to the author, who treated them to a devastating psychological examination.

Curtis, III, George M. and James J. Thompson, Jr. (editors). 1987. The Southern Phoenix in *The Southern Essays of Richard M. Weaver*. Liberty Press. Indianapolis. p. 21.

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