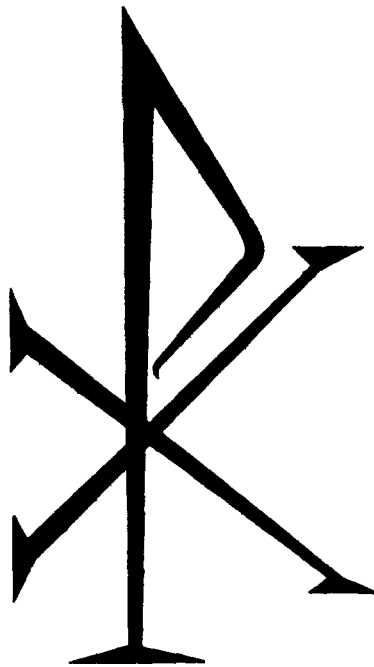


# **CREATION RESEARCH SOCIETY**

1967 ANNUAL



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

VOLUME 4

JUNE, 1967

NUMBER 1

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## 1967 ANNUAL

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**WILLIAM JOHN TINKLE**

This fourth Creation Research Society Annual is dedicated to Professor William John Tinkle, retired. Professor Tinkle is a charter member of the Creation Research Society, and richly deserves recognition for his devoted pursuit of truth under the guidance of God. He is Secretary of the Creation Research Society.

Dr. William John Tinkle was born in a log cabin in Indiana in 1892. Losing his father at a very early age, he was reared by his mother and maternal grandparents, who took him to Sunday School and church regularly. He early showed an interest in gardening and learned all the species of trees in the neighborhood. In high school his grades were the highest of any in the school.

Dr. Tinkle was awarded the degree of Bachelor of Arts by Manchester College in 1916, having majored in biology. He wrote a thesis on "The Darwinian Theory in the Light of Later Research." After this he taught several years, beginning in a district school having all the grades.

As was the custom in the Church of the Brethren, Dr. Tinkle was elected to the ministry by a vote of the congregation. He spent a year in Bethany Biblical Seminary in Chicago. The Ohio State University conferred the degrees of Master of Arts and Doctor of Philosophy, the field of specialization being zoology. Other schools attended were Marion Normal Institute and University of Wisconsin. He is listed in American Men of Science and Leaders in American Education.

Starting to write for publications as a high school sophomore, he has written *fundamentals of Zoology* and shared in writing *Modern Science and Christian Faith*, published by the American Scientific Affiliations.

He has spoken in Indiana, Ohio, Pennsylvania, California, Texas, and Canada and taught at Taylor University, LaVerne College, Anderson College, and others.

Dr. Tinkle married Lula Rench who passed away in 1966, leaving a daughter, a son, and three grandsons.

Tinkle's M.A. thesis was on "The Inheritance of Habitual Wandering," and to his surprise it was condensed and published in the Literary Digest. His Ph.D. thesis was on "Deafness as a Eugenic Problem."

Some of his articles follow. The Paradox of a Century; Logical Accuracy; The Christian in a World of Change; DNA Helpless by Itself; Nature and God's Personality; Look Again Before You Doubt; Agreeing with Science; Conformity a la Mode; Fun With Science (a series) Biological Theories of J. Henri Fabre; Crossing in Relation to the Origin of New Groups; Genie Purity and Its Implications; The Role of Mutation in Long Range Change; Change and Progress; These Wonderful Scientists; It's a Fact (a series); Communism and Her Ally; and many others.

He has been a member of the American Genetic Association, the Indiana Academy of Science, and the American Association for the Advancement of Science for many years.

## EDITORIAL COMMENTS

Though this 1967 Annual is primarily devoted to a discussion of comparative protein and DNA-RNA studies, it is only fitting that we should start this series of articles with one on Mount Ararat. For, after all, we do believe that the DNA of all land-inhabiting birds and mammals either walked, ran, or flew down this mountain and then gradually became dispersed over the face of the earth.

Frankly, until reading Clifford Burdick's article, I had never realized that Mount Ararat was so high or had so much ice on it! The great volcanic explosion which resulted in the Ahora Gulch and the occurrence of conchoidal pillow lava are remarkable evidences of catastrophism. Quite evidently the pillow lava was formed *under* water, perhaps during the subsidence stage of the Flood. We hope that a more detailed report on the glaciers of Mount Ararat may be published later.

In order for us to understand how modern DNA studies reveal the amazing intricacy of God's handiwork, we must first of all understand the basic data and theory. Duane Gish, with his usual clarity, does this in a discussion of the history of DNA discovery and formulation of structure. His exposure of the pseudo scientific folly of enthusiasts who envision the day when man can control his own heredity is very much needed, since magazines seem full of such stories.

Though his work is incomplete, Wayne Frair presents interesting results of his comparative protein analysis of turtles. Eventually this type of analytical work should enable us to define more clearly the basic "kinds" of plant and animal species. I venture to predict that there will be many more basic "stem organisms" than even most creationists now imagine. We are always particularly pleased to receive articles reporting *original* research, and hope that other scientists in our group will submit results of their own work for publication.

John Grebe does a remarkable job of pointing out what little we know in relation to what remains to be known. Though his mathematical conclusions may be involved, he certainly makes clear the point that *spontaneous* origin of such systems as DNA, selective amino acid build-up into proteins, and properly correlated enzymatic activity are mathematically impossible. In fact, if a butterfly did not exist, one could claim certainly that it would be impossible to create one, based on man's knowledge!

A splendid complementary article to Grebe's is Emmett L. Williams' demonstration, using data from D. E. Hull, that accumulation of the simple organic compounds needed for life is thermodynamically impossible. It is sad that every high school boy and girl is not made thoroughly familiar with these facts and principles of physical chemistry, as an antidote to all of the evolutionary theory given to them in classrooms, magazines, and television.

Harold Armstrong, in addition to furnishing us with his quarterly "News and Views," has presented a splendid philosophical treatment of just what kind of "cause" DNA really is. I like particularly his discussion of Commoner's work showing the limitations of DNA. With so many expositors of science making a sort of "god" of DNA, it is time to show that, with all of its complexity, DNA still is but the "servant" of the cell or organism as a whole, not the "master."

We hope that our readers will feel better acquainted with DNA as a result of reading this Annual, and will use information herein for articles in local papers and magazines, thus counteracting the false impression so often given, that life is about to be artificially created, or that evolution is demonstrated by DNA studies.

Walter E. Lammerts,  
Editor

## ARARAT—THE MOTHER OF MOUNTAINS

CLIFFORD L. BURDICK, PH.D.

206 N. Jacobus Avenue, Tucson, Arizona

*This article presents some of the observations made during an expedition to Mt. Ararat sponsored by the Archeological Research Foundation of New York. Eastern Turkey consists of a relatively barren undeveloped area. Tectonically it is very active, and unstable structurally. The region has been folded, faulted, and intruded with basic types of volcanic rock, such as andesite and basalt. Mt. Ararat is 17,000 feet high, and at its greatest height perhaps measured nearer 20,000 feet.*

*Evidently the cover rocks were Paleozoic and Mesozoic limestone, and in places like Mt. Ararat were domed up by rising magma which burst through channels along fault lines.*

*During the Flood period at least three blankets of basaltic or andesitic lava were extruded over the original Ararat which may have only been about 10,000 to 12,000 feet high originally.*

*Much of the lava is in rounded blocks called pillow lava, having a conchoidal appearance indicating it flowed out from the fractures while under water. After subsidence of the flood waters, almost the whole north-east side of the mountain blew up forming the Ahora gulch. Rock fragments and ash from this eruption cover about 100 square miles.*

*Greater Ararat is covered with an ice cap down to the 14,000 foot level. This cap is hundreds of feet thick and divides into 12 "fingers" or glaciers.*

*An analysis of five rock samples is given and also a list of fossils found by Abich.*

### Introduction

Mount Ararat is one of the best known mountains historically, but also one of the least known geologically. For some reason some scientists have shied away from that area, perhaps because of its very Biblical connection.

Two German geologists have made geological observations of the Ararat area; Hermann Abich, about 1845; and M. Blumenthal some 110 years later. Abich, it appears, was not afraid to mention the Flood and the Ark of Noah in connection with Ararat, but not so with Blumenthal. So far as I know, geological evidence concerning Mount Ararat is unavailable to American science, while geological data for most other parts of the world is quite abundant.

In 1946, an archeological company was organized in California, the Sacred History Research Expedition, with the objective of helping to fill this empty void scientifically, by means of archeological, geological, glaciological, and other projects planned.

Dr. Kinnaman, the famous American archeologist was to be a member of the expedition. Col. Koor, the Russian soldier-archeologist, was to lead us to some 20 archeological sites in need of investigation. But perhaps the time was not yet ripe. Twenty long years passed before this study of the Ararat area became reality. In 1966, ten scientists and mountain climbers actually arrived at camp on Mount Ararat to begin this important work.

George Vandeman was chairman of the board of the Archeological Research Foundation of New York, and a prime mover in the organiza-

tion. R. E. Crawford of Washington; Drs. Calvin and Agatha Thrash of Columbus, Georgia; Wilber Bishop of Cleveland, Tennessee, and Sam Martz of Nashville, were directors of the Foundation.

Dr. Lawrence Hewitt of Huntsville, Alabama, was leader of the expedition, assisted by Harry Crawford of Denver, who had previously scaled the mountain to its peak. Nicholas Van Arkle of Holland was in charge of the glaciological work, mapping the ice cap—some 17 square miles in extent. He was ably assisted by two Swiss mountaineers.

Alva Appel of Washington, D. C. and William Dougall of Seattle assisted Mr. Crawford in mountain climbing and recording general observations of interest, (even hoping that one such observation might happen to be some remains of Noah's Ark, as per rumors that natives from time to time had stumbled on portions of the original wood).

Dr. Hewitt, besides giving leadership to the expedition, made a botanical study of the mountain and gathered and pressed some 150 plant and flower specimens. Mr. Eryl Cummings of Farmington, New Mexico, assisted me in making geological observations and in gathering rock samples.

Although the Archeological Research Foundation was the organizational unit, it operated largely on contracts with the United States armed forces, and with the Turkish government. The Turkish military command furnished transportation, as well as an interpreter and a soldier guard. The U. S. military command furnished

tents, bedding, supplies and great quantities of food (C Rations). Since the expedition operated largely in a sensitive military zone, some of the scientific data gathered were of a classified nature.

Eastern Turkey is a relatively undeveloped and semi-desert area, lying across a recognized earthquake zone, composed largely of volcanic rock. The people native to that area have to work hard to make a living, and the Turkish government welcomed this scientific expedition gathering data on biology, geology, glaciology, soil chemistry and related aspects of the region.

Much of our work during the summer of 1966, revolved about the Mount Ararat region, which created general interest because of its historical connection with the Ark of Noah. The Armenians, who have inhabited that area for many centuries, call the mountain, Massis; the Turks call it "Agri Dagh," or *painful mountain*. The Persians call it Koh-i-Nuh, that is, the "Mountain of Noah."

### Geomorphology

The central backbone of Turkey between Ankara and Erzurum is composed of a treeless, barren series of mountain chains of folded and uplifted Paleozoic and Mesozoic limestone. This is the central watershed and the source of the Tigris and Euphrates rivers. This limestone has been intruded in places by volcanic rocks, as at Kayseri (Caesarea) the locale of excavations for Hittite artifacts. The Hittite museum in Ankara is well worth visiting. South of Kayseri is a multi-peaked, snow-capped mountain of some 15,000 feet elevation, known as Erciyes.

From Erzurum, east to the Russian-Iranian border, the landscape consists mainly of volcanic rocks, except for occasional outcrops of limestone. Much of this volcanic rock is on the borderline between basalt and andesite, the samples collected from Persia being the most basic (mafic) as are also the Tendurek mountains, south-west of Mount Ararat, and the Hama, Kale and Pamuk mountains to the west.

The swampy plain between Dogubayazit and Ararat is some 4,500 feet above sea level, but on the north and east sides of Ararat the Aras river valley is between 2,500 and 3,000 feet above sea-level. Some 50 miles northwest of Mount Ararat along the Aras river is an extensive salt mine with a thickness of some 400 feet.

South-east of Little Ararat near the Iranian border is a deep round hole in the basaltic rock about 100 feet in diameter caused by a meteorite that struck the ground in 1910, drilling a clean round hole deep into the earth.

Greater Ararat is perpetually covered with an ice capping down to the 14,000 foot level in



**Figure 1. Greater Ararat and Lesser Ararat, looking Southwest, from the Aras river—the boundary line between Turkey and Russia. Ahora gulch is in the foreground of Greater Ararat.**

summer. This ice cap is hundreds of feet thick and as it flows down the sides of the mountain, it divides into twelve "fingers" or glaciers, two of which are the Parrot and Abich glaciers, the latter of which tumbles down a vertical precipice thousands of feet into the Ahora gulch, with a mighty roar that can be heard for miles. Two of our mountain climbers, who were camping in the gulch, were nearly buried when 100,000 tons or so of ice and snow came roaring down the gulch.

The comparatively high snow-line is due to the light precipitation and the upward rush of dry air, from the Aras plain. This plain is a veritable bread-basket for both Turkey and Russia. Although the upper and lower zones on the mountain are sterile, the middle zone, from 5,000 to 11,500 feet, is covered with good pasture, upon which the Kurdish sheep and goat herders depend.

Mount Ararat is about equidistant from the Black Sea and the Caspian, the Mediterranean and the Persian Gulf. Around Mount Ararat gather many traditions connected with the Deluge. Col. Koor, the Russian soldier-archeologist, lists some 20 such archeological sites which should be investigated.

Both the ice cap and the resulting glaciers move over rough terrain, which breaks them into segments, separated by crevasses. Often new falls of snow drift over these crevasses, thus hiding them from view. Climbers sometimes fall into them. In 1965, a 21 year old Oxford student tried to climb the mountain alone, and was never again heard from. It was presumed that he fell into a crevass. The year before an Austrian doctor was separated from his party in a blinding snow storm, and search parties were unable to find him. It has been thought that he too suffered the same fate. Our

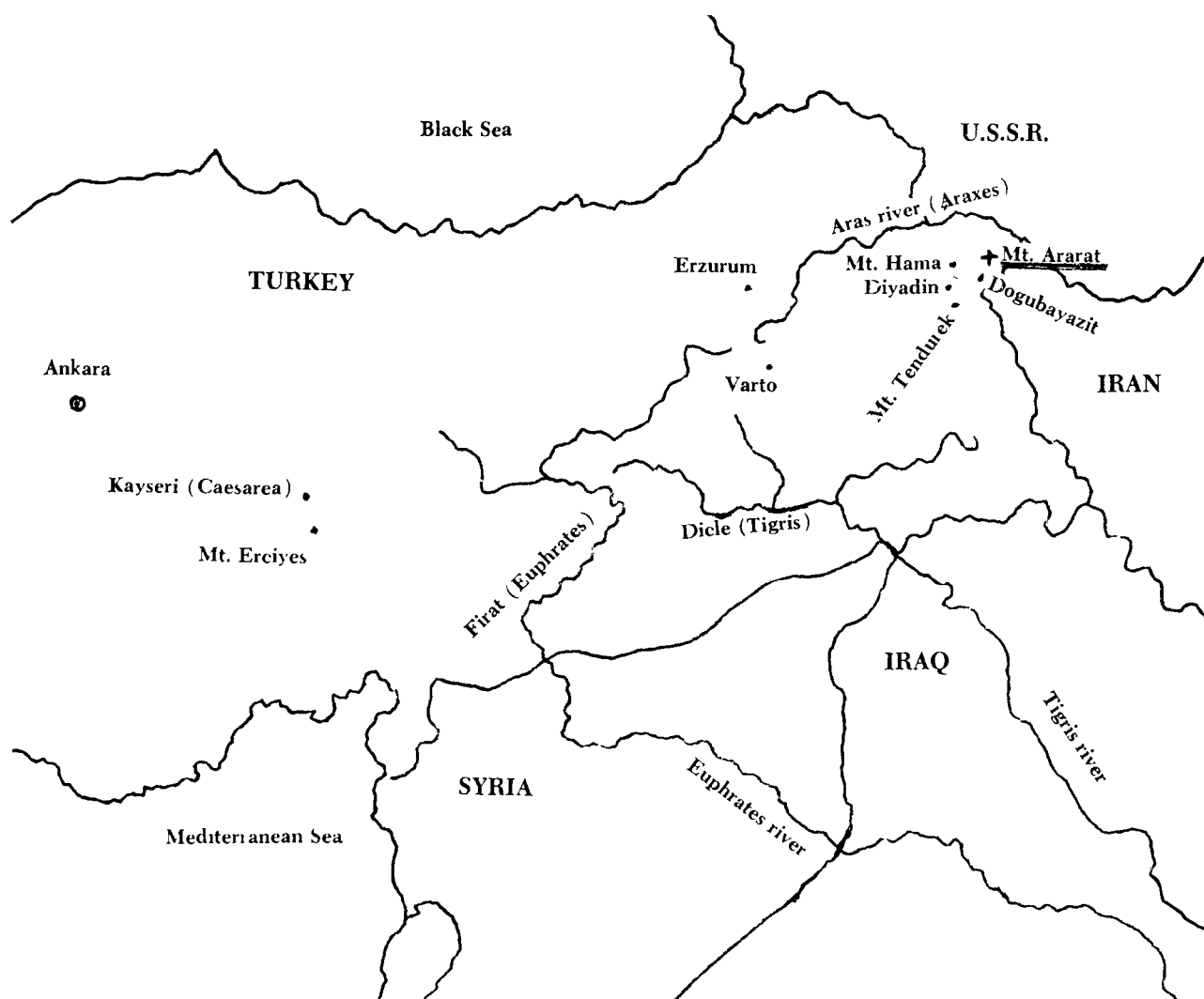


Figure 2. General geography of Ararat region.

mountain climbers never climbed the mountain in less than groups of three tied together with nylon ropes. Even so, two of them actually fell into crevasses, but were pulled free by their companions.

The dangers are many. Storms of wind of 100 miles an hour and temperatures of below zero made life disagreeable for our glaciologists. Also, our geologists were caught out on the mountain in a thunder-storm in pelting sleet and rain, and the ensuing fog made it difficult for them to find their way back to camp late at night, soaking wet, cold and exhausted. Without a good sense of direction and a flashlight, they might have been "victims" of Ararat.

Tradition places the Garden of Eden in the valley of the Aras river; Marand is the burial place of Noah's wife; at Ahora (Aghuri) was the spot where Noah planted his first vineyard. In-

cidentally, we noticed this summer that a vineyard is still located there. Here was also situated the monastery of St. James, until both it and the village of Ahora were destroyed in 1940 by an earthquake and resulting avalanche, which came thundering down Ahora gulch.

James Bryce, the British statesman, author, and later ambassador to Washington once climbed Mount Ararat, and he wrote of his experiences in a book, *Transcaucasia and Ararat*, I know of nothing so sublime as the general aspect of this huge yet graceful mass seen from the surrounding plains: no view which fills the beholder with a profounder sense of grandeur and space than that which is unfolded, when, on climbing its lofty side he sees the far-reaching slopes beneath, and the boundless waste of mountains beyond, spread out under his eye. Its very simplicity of both form and

color increases its majesty. All lines lead straight up to the towering, snowy summit. There can be but few places in the world where so lofty a peak soars so suddenly from a plain so low, and consequently few views equally grand . . . the mountain raises itself solitary and solemn out of a wide sea-like plain.

### Structure

The structural trends of eastern Turkey are in a northwest, southeast direction, such as the Aras river flowage, and the "lining-up" of the triple volcanic peaks, Alagoz, on the Russian side of the Aras river, and Greater Ararat and Lesser Ararat, in Turkey. These triple peaks are in a line, because that is the direction of strike of the elongated fault in the basement complex up through which the molten magma flowed.

If the fractures are shallow, as in the August 19, 1966 quake, no lava is emitted, but when the fault extends many miles deep, it taps the area where the temperature exceeds the melting point of basalt, about 1,200 degrees Centigrade. The fault or fracture relieves the surface pressure, and the hydrostatic pressure forces the liquid magma to the surface, much as oil is blown out when an oil gusher is drilled.

The Tendurek mountains to the west and southwest of Ararat are also volcanic extrusions along faults parallel to the Alagoz-Ararat fault lines, and are part of the complex fault system which winds and twists in a generally north-south lineament through the Dead Sea in Palestine and across the Red Sea into eastern Africa, comprising what is known as the East African Rift. This fault or rift is signalized by volcanism and block-faulting, indicating tension faults.

The Dead Sea, about 1,300 feet below sea-level and the deepest land depression on earth, is a **graben**, or fault-block, that has dropped down when the tension drew the crust apart. I followed the most recent fault for some 50 miles from Varto, the epicenter of the August 19 quake, to a point between Erzurum and Ararat.

This most recent faulting, which caused the severe earthquake, which wrecked the city of Varto and caused some 2,000 deaths, was minor in displacement as compared with the scars left by the earlier faulting which took place presumably at or soon after the Flood period. The recent rift caused a displacement of mere feet, while the "original" fracture zone was probably miles wide in places, and furnished a channel-way up through which flowed mountains of magma. This may have taken place at the time of the volcanism which formed the Alagoz-Ararat mountain chain.

Apparently the Paleozoic-Mesozoic limestone complex which covered parts of the region was

severely deformed, compressed, folded, and in places like the Ararat area domed up when the rising magma burst through. This doming effect is most evident when one views the same limestone formation on all sides of Mount Ararat. The beds dip away from the mountain on the Turkish, the Russian, and the Persian (Iranian) sides.

There were several eras of volcanic events. Professor Nazmi Oruc of Ataturk University at Erzurum told me that his soil sample study from well drillings in the Aras valley showed at least three periods of volcanism, the layers of lava being interbedded with sediments.

West-southwest of Ararat and west of Diyadin occurs a thick bed of basalt overlaid with limestone, apparently conformable. A river flows through the limestone, and the latter has been folded into an anticline which has fractured along the axis. This fracture has permitted ground water to penetrate down to the limestone-lava contact.

The lava was apparently not very cool, when the limestone was laid down, for it heated the water to the boiling point, and the steam pressure has forced steady geysers to shoot from the surface. This water flows down the sides of the geyserite or tufa and is caught in pools similar to the hot water pools in Yellowstone Park.

Some of these pools are just the right temperature for bathing, and are usually put to such use. This hot springs tufa is varicolored like that in Yellowstone. Local Turkish authorities hope eventually to make a park or national monument of this hot springs-geyser area.

The orogeny of the hot springs bespeaks fast tectonic activity, catacyclismic action, and does not fit long-ages geology. Seemingly, basaltic extrusion was quickly followed by deposition of limestone before the hot lava cooled. If this limestone, designated Cretaceous, was laid down some hundred million years ago, surely the lava would have lost its heat long ago, for the limestone covering the basalt is not very thick. In fact one wonders how it could have retained its heat this long even if the rock was formed at the time of the Flood!

The Genesis record tells us that, early in Creation week, the whole earth was covered with water similar to the flooding by the Deluge; the difference being that the whole earth was originally almost a perfect globe, without mountains and ocean basins. There was less water then to cover the earth than now.

Then, the record tells us, the Creator formed the ocean basins, and dry land by diastrophism or uplift. The water ran off the land into the basins; as most geologists agree that the ocean basins existed from earliest times. We are not

informed how high the continental cratons or mountains were, but presumably not as high as now. Genesis mentions rivers; among them is the Euphrates, which rises not too far from Mount Ararat. A river drainage system needs high land for its source.

Evidence gathered at Mount Ararat indicates that the original mountain was much lower than the present one and was of different composition or at least of different texture and different color. The metrological differences will be discussed later, but the original Mount Ararat apparently was not more than from 10,000 to 12,000 feet in height. The present peak is about 17,000 feet, and at its greatest height perhaps measured nearer 20,000 feet. Erosion has worn it down.

During the Flood period—in the broad sense—at least three blankets of basaltic or andesitic lava were extruded over the first Ararat. Volcanic eruptions have taken place periodically ever since, but with subsiding activity. More recent flows have been extruded from cracks lower down on the mountain as each succeeding extrusion had less force than the preceding one.

Ararat is known as a *shield* type of volcano.

This section would not be complete without mentioning what was perhaps the most violent eruption associated with Ararat. This did not occur in 1840 as some have surmized, it was infinitely more terrific. Very likely some time after the flood-waters had subsided, almost the whole north-east side of the mountain blew up. A long deep gash was opened in the mountain, known now as the Ahora gulch. This is many miles long and thousands of feet deep and wide, and a conservative estimate would be that from one to two cubic miles of rock debris and volcanic ash was blown from the mountain.

Large surface fragments were hurled miles away down toward the lower slopes of the north-east side, where they are yet visible. Lighter volcanic ash was blown into the upper atmosphere and settled down as light-colored whitish tuff on the east and north-east sides of the mountain.

This ash covered some 100 square miles of surface to a thickness of from hundreds of feet near the mountain to a few feet, ten miles away. Thus, a sloping pediment of some 3-5 degrees was formed, which is similiar to those seen in the desert Southwest in Arizona. As a result, varied rock specimens of the whole Ararat area are found in the Ahora gulch.

This is the type of volcanic eruption that buried Pompei and Herculaneum. Presumably Noah and his family had left the area by that time. The original Ararat had been deeply blanketed before that, and the only part of the original Ararat now exposed is that at the head

of the Ahora Gulch where the giant explosion opened it up.

Little Ararat and other parasite cones are of more recent origin, for Little Ararat is smoother and less gullied and eroded than Greater Ararat. The only forests in the whole area are located on the eastern slopes of Little Ararat.

### Stratigraphy

Abich and others in the past have done stratigraphic studies in the limestone formations of eastern Turkey. They identified index fossils and others belonging to late Paleozoic, mainly Permian; also Triassic, Jurassic and Cretaceous of the Mesozoic, besides some of the early Tertiary. The following are Abich's classifications, taken from the Dogubayazit-Igdir area:

|                                 |                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Devonian, gray limestone:       | <i>Atrypa reticularis</i><br><i>Atrypa aspera</i><br><i>Spiriferseminoi</i>                                                       |
| Mississippian, dense limestone: | <i>Productus auritus</i><br><i>Dalamella michellini</i>                                                                           |
| Pennsylvanian, dark limestone:  | <i>Fusulina verneuili</i><br><i>Productus intermedius</i><br><i>Fusculinella lenicularis</i>                                      |
| Permian, limestone, shale:      | <i>Goniatites albichianus</i><br><i>Reticularia</i><br><i>Spirigera</i><br><i>Zaphrentis lepticonica</i>                          |
| Triassic, limestone, dolomite:  | <i>Xenodiscus</i> -Arten.<br><i>Pseudomonotis</i> -Arten<br><i>Paratirolites</i> -Arten<br><i>Goniatites abichianus</i>           |
| Jurassic: (Ammonites)           | <i>Soninia sowerbyi</i><br><i>Lytoceras mediterraneum</i><br><i>Sphaeroceras bullatum</i>                                         |
| Cretaceous:                     | <i>Mortoniceras texanum</i><br><i>Parapachydiscus neubergeri</i><br><i>Cyclasteraturicus</i>                                      |
| Eocene:                         | <i>Discocyclus archiaei</i><br><i>Nummulites irregularis</i><br><i>Asterodiscus</i>                                               |
| Oligocene:                      | <i>Nummulites incrassatus</i>                                                                                                     |
| Pliocene:                       | <i>Planorbis</i><br><i>Clupea lanceoplata</i><br><i>Cardium protractum</i><br><i>Tapes greganus</i><br><i>Orbicella defrancei</i> |

These fossils are *all* invertebrates.

### Petrology

As already mentioned, Eastern Turkey lithologically consists mainly of two types of rock, Paleozoic and Mesozoic limestone intruded by

volcanic rock, much of it being an andesitic-basaltic complex on the borderline between andesite and basalt. For that reason it is not practicable to map off certain parts of the mountain as basaltic and other parts as andesitic, since composition varies from place to place, not permitting a mapable unit.

The central highlands of Turkey consist in large part of a whitish limestone interspersed with volcanic rocks. The eastern part of the country is mainly volcanic, interspersed with limestone.

Many of the faults cutting through the mountain of Ararat have been filled with a red intrusive rock that resembles a sandstone, but strangely enough is of essentially the same composition as the black and gray basalt and andesite, the difference being that the black magnetite has been oxidized to a red goethite. Following is a typical mineralogical composition:

#### **Sample No. 1**

augite 3% rimmed with geothite  
hypersthene 5% rimmed with geothite  
andesine (55) 52%  
glass 40% partly devitrified  
magnetite trace

The augite is a triclinic pyroxene, while hypersthene is orthorhombic in crystal structure. These pyroxenes are more typical of basalt than andesite, but the plagioclase is andesine, from which the rock *andesite* gets its name. The high percentage of glass indicates that the rock was quickly "frozen" or cooled, so that solidification took place quickly, too fast for crystals to form.

Sample No. 2 was a gray-black rock taken from the 12,000 foot level to the north of the Ahora Gulch. The mineral composition is strangely like sample No. 1, although macroscopically it does not much resemble it.

#### **Sample No. 2**

augite 1%  
hypersthene 10%  
andesine (43) 87%  
magnetite 1%  
apatite trace  
(Apatite is a phosphorus oxide)

As alluded to in the section on Structure, the Ahora gulch exposes the inner core of the original mountain which is distinct in color and texture from the volcanic rock. It is coarse-grained porphyry with a light buff color and much pyrite. This indicates a deep-seated intrusive that cooled slowly, permitting the coarse phenocrysts to form first. Then the whole mass was uplifted through the cover-rock, allowing the remainder of the magma to cool more quickly and form fine grained crystals and glass. This inner core

may represent the original mountain dating from Creation. Sample No. 3 was collected from several places in the Ahora Gulch.

#### **Sample No. 3 Andesite porphyry**

bastite 5% (replaces a pyroxene)  
glass trace (inclusions in plagioclase)  
hypersthene trace (poikilitic inclusions in plagioclase)  
andesine 50 94%  
sphenite trace  
leucosene trace  
apatite trace

Sample No. 4 is also a sample from the Ahora gulch from the inner core of the mountain. Its mineralogy is similar.

#### **Sample No. 4**

augite 4%  
hypersthene 10%  
andesine (55) 30%  
(rims are andesine 50)  
magnetite 2%  
glass 53%  
apatite trace

Sample No. 5 is also from the same source as the two previous, but the rock is a basalt rather than an andesite, because the plagioclase is more basic-labradorite.

#### **Sample No. 5 Basalt-porphyry**

augite 1%  
hypersthene 3%  
labradorite 35%  
glass 56%  
hematite 5%

These samples are typical, and it would not be necessary to give details on more samples.

### **Cataclysmic Flood Geology**

Mount Ararat is easily associated with the Ark of Noah and the Flood in the thoughts of many people. Often the question is asked, What evidences, if any, are found around the mountain to substantiate the flood concept?

The answer would be that, if the flood was world-wide as we believe ample evidence indicates, then we should find such evidences not only around Mount Ararat but most anywhere. However, since this paper is an outline in brief of some of the main points of the geology of the Ararat area, I will attempt to point out a few evidences of the flood which were identified in the summer of 1966.

One such evidence has been described concerning the geysers and hot springs west of Diyardin. (See section on Structure) In time past, these geysers were apparently much more active, as volcanic activity was greater in times past.

Some lava was perhaps poured out under water while the flood was at its height, for stresses were built up in the crust of the earth, as it was put out of isostatic balance due to the shifting of sediments from one place to another.

The Hawaiian Islands were built up from the bottom of the ocean, some 14,000 feet deep, by volcanic extrusion. When lava is extruded under water it is cooled quickly and solidifies so rapidly that crystals often have no time to form, like obsidian; or very small crystals are formed,

Much of the basalt and andesite composing upper Ararat was of this type. The lava is often found in rounded blocks called *pillow* lava, because they are of pillow-like appearance having conchoidal fractures. Much of the basalt on Ararat had semi-circular fractures, typical of underwater extrusion. When did the waters reach the 14,000 foot level on Mount Ararat?

There is the puzzle of the upturned limestone beds surrounding Mount Ararat, on the Turkish, Russian and Persian sides. Near the city of Dogubayazit these limestone formations, some 1000 feet in thickness are tilted from as much as 45 degrees with respect to the horizontal to almost vertical. The true cause is apparent, although others have not apparently sensed it. The strata dip away from Mount Ararat on every side just as the surface dirt crust does when a seedling bursts up through.

Evidently Mount Ararat burst up through the limestone beds to form a near 20,000 foot peak or series of them; and, thus, provided shelter for the Ark from the tempestuous storm, as the waters began to recede. The Genesis account says that strong winds blew to dry up the flood waters. If the standard geologic column is right, then these limestone formations were laid down some 100,000,000 years before Mount Ararat came into existence, at a time when the greatest land inundation from the sea took place. For that reason, I wonder if perhaps the Cretaceous period and the Flood may not be synonymous? And, carrying the comparison a bit further, would that not place Creation week way back in the Precambrian? We, of course have presented our reasons for not accepting the validity of orthodox time scales, such as 100,000,000 years in earlier issues of Creation Research Society publications.

According to Genesis geology, we could scarcely visualize a universal deluge between Creation and the Flood, for the Euphrates valley, we believe, was the cradle of civilization. Limestone is precipitated under water; therefore, such sedimentary rock must have been laid down during the inundation of the earth by the flood waters—the early part perhaps—since Mount Ararat was apparently elevated to its

full height during the latter period of the flood, to provide the above mentioned haven for the Ark. There are small peaks on the top of Greater Ararat, which might well have provided that haven.

This may not sound so much like fanciful speculation when one reads some recent findings of the Lamont geological observatory at Columbia University. The New York Times News Service for Jan. 3, 1967, reported:

The findings also concern a layer of sediment 1,000 feet thick beneath the floor of the Atlantic. It apparently has lain undisturbed for 70 million years . . . The layer across the Atlantic floor appears to be a relic of a *catclysmic* occurrence at the end of the Cretaceous period, 70 million years ago. During the Cretaceous, oceans covered much of the present-day continents. Toward the end of the period the land rose out of the sea (or the seas subsided). Water cascading off the land carried sediment that was laid down in the deep basins. This may account for the deep buried layer.

If we but substitute the word "Flood" for "Cretaceous" in the above statement, the Lamont Geological observatory has given a very graphic, and presumably accurate, picture of just what happened at the close of the flood-period. We can detect fracture patterns running across the ocean bottoms, which may have been deepened to make room for the flood waters "cascading" off the continents. Greater deepening of the ocean basins was probably compensated for by a corresponding rise in the height of the continental blocks. Findings of ocean floor research are described in the December 2, 1966 issue of *Science*.

As the waters further subsided, isolated epeiric-seas were formed by arms of land cutting off small bodies of water from the ocean. As the winds of hurricane force dried up these inland seas, salt was precipitated. I examined one such salt mine a few miles north-west of Mount Ararat. The salt was laid down in layers exactly as the limestone and sandstone and shale were, interbedded with thin layers of silt and dust.

After the salt was precipitated, the wind evidently blew dust over the salt layer, then a stronger gale may have caused a tidal wave to bring in a fresh flooding of the basin. Then, as the winds died down, evaporating water again precipitated a new layer of salt. I counted as many as fifteen to twenty such layers in one place.

Such surges of water can be attested to by two mountaineers in the expedition. They were camping somewhat below the bottom end of

the glacier that flows down the bottom of the Ahora gulch. They were rudely awakened by a terrific roar from above when the glacier above the gulch broke loose, and some 100,000 tons of ice and rock came cascading down almost to where the men were camping. Needless to say they hastily moved their camp to safer ground.

The top of Mount Ararat, down to about the 14,000 foot level, is permanently ice-capped. This means the cap is a static entity; as the snow continues to fall, the ice-cap builds up. As a consequence of this build-up, ice "flows" outward as a *Rheid*; that is, a material that under continued pressure flows like a viscous fluid.

As the Ararat ice cap flows outward in all directions it divides into about a dozen fingers or glaciers flowing down various canyons. As is typical of all glaciers, the Ararat glaciers are eroding agents, carrying tremendous quantities of rock debris from higher to lower levels. This means that each year the total height of Ararat is a little bit lower than the previous year. If we knew the annual rate of erosion, we might be in a position to estimate the altitude of Ararat at the time of the Flood.

Scientists from the United States Geological Survey have found that glaciers in Alaska have no fixed rate of advance; that sudden surges cause what they call "catastrophic advances," at speeds from 10 to 100 times the normal rate. The normal flow is usually stated as from one to two feet per day. "The cause of these surges is not completely understood," said Dr. Mark F. Meier, research geologist at the U.S. Geological Survey office, Tacoma, Washington.

### Summary

Eastern Turkey consists of a relatively barren, undeveloped area, quite without tree cover. Tectonically, it is very active, and unstable structurally. The region has been folded, faulted, and intruded with basic types of volcanic rock, such as andesite and basalt.

Previously the cover rocks had been Paleozoic and Mesozoic limestone, but these have been eroded, folded and faulted by frequent orogenic activity, forming volcanic mountains, among which are the Tendurek range, and also the Alagoz-Ararat system. These mountains are found along fault lines which provided channels through which molten magmas flowed from deep zones in the earth's crust, or upper mantle, where the temperature is well above that of the melting point of basalt, about 1,200 degrees Centigrade at one atmosphere pressure. (At depth, the hydrostatic pressure greatly raises the melting point of rock).

On the north and east of Ararat lies the Aras River fault block, at about 2,500 feet to 3,000 feet elevation as compared with the Dogubayazit (southwest) side of Ararat at about 5,000 feet. The rim of Ararat around the mountain forms a depression ring or "moat" of marshy land, not well drained. Perhaps this was caused by a "collapse cauldron." That is, after a volcano attains its greatest height of activity, the magma settles back into the "bowels of the earth," leaving an empty void, which recedes to lower levels, like the terrain around Long Beach California, after Signal Hill was drained of oil.

The original core of Ararat was andesitic and basalt porphyry. During and since the flood period, the total height was raised thousands of feet by successive cycles of volcanic extrusion.

The Mount Ararat region contains abundant evidences of cataclysmic geologic activity, as well as signs of the complete inundation of Mount Ararat and the whole area by flood waters.

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## DNA: ITS HISTORY AND POTENTIAL

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*A brief history of the discovery of nucleic acid is given.*

*Specificity of DNA synthesis is amazing and the sequence of amino acids in proteins as a result of DNA coding is most precise. Rather than being the master chemical, DNA is the servant of the cell. Thus its operation is repressed by the cell until needed.*

*Reasons for not being carried away by false hope of altering genes controlling our own body and mental traits are given, most important of which is lack of specificity of any irradiation or chemical mutagen. These all tend to be random in their effect. Thus we cannot "tell" a nitrite ion which of about 2500 adenine bases it should change to guanine.*

*As we continue to learn more of the complexity of the DNA-RNA system we should be ever more impressed by Psalm 139:14, "Man is fearfully and wonderfully made." Surely such a complexly integrated system could only have been created by a wisdom far superior to our own. Unbelieving man, willfully stubborn, prefers to believe this marvelous system could have evolved from properties inherent in the neutron. How much more reasonable to accept the clear proclamation "In the beginning God created . . ."*

First isolation of nucleic acid from the nuclei of cells, now known as deoxyribonucleic acid (DNA), was accomplished by a medically-trained Swiss physiological chemist, Friedrich Miescher, in 1869.<sup>1</sup> This work was performed in the laboratory of Hoppe-Seyler at Tubingen. Hoppe-Seyler was one of the outstanding chemists of that era, and Miescher's accomplishment was so significant that Hoppe-Seyler held up publication of results for two years until Miescher's work could be fully confirmed.

Because of their availability, Miescher used pus cells from discarded bandages as his source of cells. He first isolated the cell nuclei, and from these he extracted a grey-white powder which he later called "nuclein."

Miescher next turned to the sperm of Rhine salmon as a source of nuclein. He isolated what he recognized as a salt-like compound formed by the combination of a nitrogen-rich base and a phosphorus-rich acid, his nuclein. The base he called protamin", and he developed a method for isolating it. The purified nuclein had a phosphorus content of 9.6%, and after acid hydrolysis, all of the phosphorus was recovered in the form of phosphoric acid.

Miescher also investigated sperm of frogs, carp, and bulls. He detected nuclein in all of them. He pointed out that nuclein seemed to be the genetically active chemical which had been postulated as being present in spermatozoa.

From about 1875, other workers became active in this field, and by 1900 all of the major bases which occur in nucleic acid had been isolated. Later it became apparent that there were two types of nucleic acid, differing in origin and composition. The nucleic acid from yeast or from wheat embryo was hydrolyzed to yield four bases, adenine, guanine, cytosine and uracil,

phosphoric acid and a sugar identified in 1909 by Levene as the pentose, ribose.

From thymus was isolated the other type of nucleic acid, from which was obtained the four bases, adenine, guanine, cytosine, and thymine, phosphoric acid and a pentose sugar identified by Levene in 1930 as deoxyribose. Today the type of nucleic acid containing the base, uracil, and the sugar, ribose, is known as ribonucleic acid (RNA), and the other type containing thymine and deoxyribose is known as deoxyribonucleic acid (DNA).

During the decade 1940-1950, results indicated that DNA is almost always found in the cell nucleus as part of the chromosomes, while RNA is mainly found in cytoplasm. It is now known that cell nuclei, as well as the cytoplasm, contain both DNA and RNA. It was found that nucleic acid is a polymer consisting of thousands of sub-units. These sub-units are called nucleotides. The nucleotides are composed

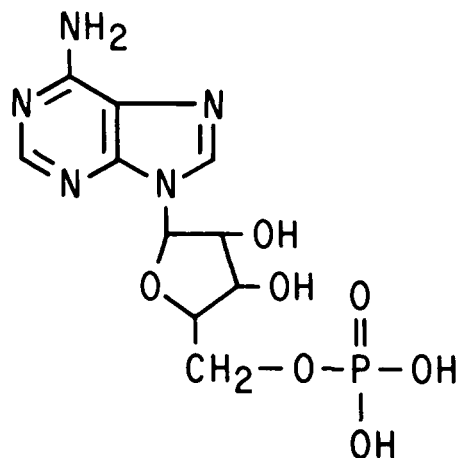


Figure 1. Adenylic acid, a nucleotide.

of a base, either a purine or a pyrimidine, linked to a sugar, either ribose or deoxyribose, depending upon the type of nucleic acid, and the sugar in turn is linked to phosphoric acid. One such nucleotide, adenylic acid, is shown in Figure 1.

The sub-units, or nucleotides, of nucleic acid are joined through phospho di-ester bonds, the phosphate being combined with the 3'-hydroxyl of one sugar and the 5'-hydroxyl of the sugar of the adjacent unit. This "backbone" structure is shown schematically in Figure 2.

Molecular weight values range up to 2,000,000 or more for RNA (tobacco mosaic virus RNA contains about 6600 nucleotides and has a molecular weight of 2,000,000) to 10,000,000 and higher for DNA.

The almost forgotten suggestion by Miescher that nucleic acid might play a central role in inheritance was confirmed by Avery and co-workers in 1944<sup>1</sup>. They extracted DNA from "smooth" or encapsulated pneumococcus bacteria and added it to the culture of "rough" or unencapsulated pneumococci. A new generation of "smooth" bacteria was produced which continued to produce the "smooth" type. The DNA from the "smooth" type had been incorporated into the genetic material of the "rough" type, converting it permanently to the "smooth" type. This established that genes are composed of DNA. This event gave great impetus to research into all aspects of DNA.

In 1950, Chargaff<sup>2</sup> recorded the fact that among the bases of DNA the amount of adenine was always equal to thymine and guanine was always equal to cytosine (in molar quantities). This observation provided one of the keys to the structure proposed for DNA in 1953 by Watson and Crick. In that year, Watson and Crick<sup>3</sup>, combining the data of Chargaff and X-ray crystallographic data, proposed for DNA the structure that is now widely accepted.

#### Watson-Crick Model

According to the proposal of Watson and Crick, DNA exists in the form of a double-stranded helix, the two helical chains being

coiled about a common axis. They proposed that one chain of the double helix is the complement of the other, with adenine in each chain pairing with thymine of the other, and guanine in each chain pairing with cytosine of the other. The two chains of the double helix are held together by hydrogen bonds between the purine bases (adenine and guanine) and the pyrimidine bases (cytosine and thymine).

A purine is always paired with a pyrimidine, because two purines would occupy too much space to allow a regular helix, and two pyrimidines would occupy too little. Because of stereochemical relationships, adenine always pairs with thymine and guanine with cytosine. The base pairing of a section of two complementary DNA strands is shown in Figure 3.

From the structure proposed for DNA implications could be drawn concerning its replication by the cell. These implications were published by Watson and Crick<sup>3</sup> a few months after their paper on the structure of DNA.

They proposed that prior to replication, the hydrogen bonds holding the double-stranded helix of DNA together are broken, and the two chains unwind and separate. Each chain then acts as a template for the formation onto itself of a new complementary chain, so that eventually two pairs of chains are formed where only one existed before.

After the two original strands have separated, along each of these intact chains are assembled free nucleotides (these nucleotides at this stage are in the form of triphosphates). This assemblage takes place according to the base pairing pattern described above. That is, every place in the intact chain where adenine occurs, a nucleotide containing thymine will become loosely attached by hydrogen bonds; where guanine occurs in the intact chain, the nucleotide containing cytosine will become attached by hydrogen bonds, etc.

When the nucleotides have been assembled in place along the intact chain, the enzyme DNA polymerase joins the free nucleotides together by forming regular chemical bonds between them to form the new DNA strand. The result is a

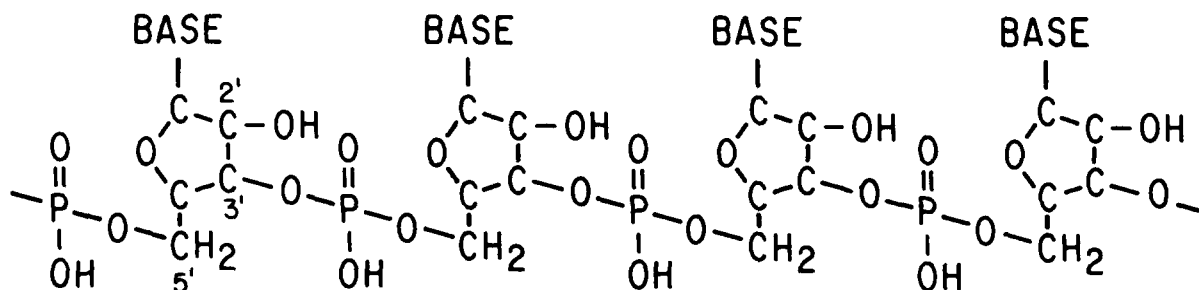


Figure 2. Schematic representation of nucleotide arrangement in nucleic acid.

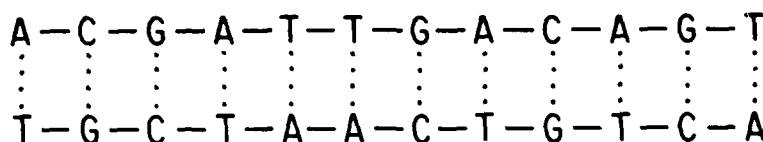


Figure 3. Base pairing in DNA (A=adenine, G=guanine, T=thymine, C=cytosine).

double-stranded DNA helix, one strand having been derived intact from the previously existing DNA and the second having been formed from the nucleotide sub-units.

### DNA Replicated by Cell

It should be pointed out here that DNA does **not** replicate itself. **It is replicated by the cell.** DNA does furnish important information for its replication in the form of the sequence of its individual nucleotides, but the complex apparatus in the cell is required to synthesize copies of DNA. The cell synthesizes the sub-units or nucleotides that are polymerized to form DNA.

The cell, through the complex apparatus designed for this purpose, supplies the energy required for the synthesis to take place. A certain concentration of magnesium is required and, of course, the presence of the enzyme DNA polymerase, in the absence of which no synthesis would take place, is an absolute necessity.

Here evolutionists are faced with a dilemma. The presence of a protein, the enzyme DNA polymerase, is indispensable for the synthesis of DNA. On the other hand, the information required for the synthesis of all proteins is contained in DNA. In an evolutionary scheme, which could have come first? Protein is required for DNA synthesis, and DNA is required for protein synthesis. Which preceded the other? The best answer seems to be that neither arose before the other, but both have existed together from the very beginning.

It is now believed that most genetic information resides in DNA. This information is contained in the form of a "genetic code" built into the DNA molecule. This genetic code is fashioned from the sequence of the bases in DNA. What this code is, and how this information is transmitted so that a protein with a fixed and specific structure is synthesized, I will not attempt to explain here. Nevertheless, there is a message built into each DNA molecule, and this message is used to dictate the structure of every other molecule in the cell.

### Complexity of Apparatus

I must emphasize the extreme complexity of the apparatus required to transfer the message or code in a structural gene into a specific protein molecule:

The code in the gene (which is DNA, of course) is used to construct a messenger RNA

molecule in which is encoded the message necessary to determine the specific amino acid sequence of the protein.

The cell must synthesize the sub-units (nucleotides) for the RNA (after first synthesizing the sub-units for each nucleotide, which include the individual bases and the ribose). The cell must synthesize the sub-units, or amino acids which are eventually polymerized to form the protein. Each amino acid must be activated by an enzyme specific for that amino acid. Each amino acid is then combined with another type of RNA, known as soluble RNA or s-RNA.

There is a specific s-RNA for each individual amino acid. There is yet another type of RNA known as ribosomal RNA. Under the influence of the messenger RNA, the ribosomes are assembled into units known as polyribosomes. Under the direction of the message contained in the messenger RNA while it is in contact with polyribosomes, the amino acid-s-RNA complexes are used to form the protein. Other enzymes and key molecules are required for this.

During all of this, the complex energy producing apparatus of the cell is used to furnish the energy required for the many syntheses.

A brief description as the one above may leave one more confused than enlightened, yet it does emphasize the tremendously complex apparatus that is required to synthesize a protein molecule in the living cell. Four types of nucleic acid are involved—DNA, messenger RNA, soluble RNA, and ribosomal RNA. In the synthesis proper, about 30 different enzymes are involved, and if we include the synthesis of the sub-units and of the energy producing apparatus, hundreds of different enzymes are required.

The specificity of the synthesis is amazing. The sequence of the sub-units, or amino acids, in each protein molecule is very definite and precise. Along the complex pathway from DNA to protein molecule, which involves the interaction of many different molecules and includes passage from the nucleus to the cytoplasm, where polyribosomes are found, the code contained in the DNA is perfectly transcribed into the structure of the protein molecule.

The DNA serves two purposes in the cell. In DNA is encoded the information which, on

demand of the cell, is converted by the cell into the message necessary for the production of other complex molecules and structures of the cell. The DNA also serves as the genetic unit of the cell, its replication serving as the means of transferring to the daughter cell all of the information encoded in the parent DNA.

#### **DNA: Master or Servant?**

What of DNA? Is it the "master chemical," the "secret of life?" Is it true, as claimed by Jukes<sup>6</sup>, that "the purpose of life is the perpetuation of a base sequence?" It seems inescapable to me that DNA, rather than being the master of the cell, is the servant of the cell. DNA is kept under strict regulation by the cell. Its operation or message is repressed by the cell until needed. Derepression follows, and when the need for the message, or the molecule produced by this message, is no longer needed, the gene is once more repressed.

When the cell replicates, and before cell division takes place, it reproduces a second set of DNA molecules and from this constructs a second set of chromosomes. The parent cell utilizes its replication of DNA to pass on to the daughter cell the genetic information contained in the parent cell. While DNA occupies a key position in the cell, it is only one of many important features of the cell. Commoner<sup>7</sup> has aptly stated that, rather than DNA being the secret of life, "life is the secret of DNA."

Williams<sup>8</sup> stated in his review of Juke's book, mentioned above, that in this book we have witnessed "the deification of a molecule." There is a widespread tendency today among scientists and laymen alike to prostrate themselves before an altar upon which is enshrined DNA.

Many believe that the solving of the genetic code will open up a marvelous new future for man whereby he will be able to "control his own evolution." Such a belief rests in ignorance. The solving of the genetic code would eliminate only one of many problems involved in understanding how the numerous features of life are uniquely determined. Even if we understood all of this, how to alter DNA specifically in order to bring about a desirable change would remain an insuperable difficulty.

The first problem involved in altering our genetic make-up is the fact that the carriers of the genes, the chromosomes, are located in the nuclei of the egg and sperm cells. In order to subject this material to treatment, some means must be devised for removing it from the egg or sperm and replacing it, after treatment, with retention of viability by the egg or sperm.

Today we have some understanding about the relative positions of a few of the many thou-

sands of genes in some microorganisms. By their linkage we can determine whether or not they occupy adjacent positions on the chromosome. We do not have the slightest idea where their actual positions on the chromosome are, however, and have no way at present of determining this. Even if we knew which gene is which, how could one particular gene be separated from among the tens of thousands present?

If, in the future, we could devise a method for removing a particular gene for treatment in order to alter it, several practical impossibilities would yet stand in the way of altering our genetic properties selectively.

In each gene there are thousands of nucleotides, or sub-units. A change in only one of these thousands of sub-units causes profound changes in the genetic properties of the gene. We do not have the slightest idea, however, what effect on an organism will be caused by a specific change at some point in the gene.

In a recent series of newspaper articles, Professor James Bonner of the California Institute of Technology was quoted as saying that in the future man will so control his own genetics that, for instance, if a person wants four arms, he can have four arms. Some of his speculations even went beyond this.

If we alter one of the genes governing the arms, however, what do we get—four arms, short arms, long arms, or no arms at all? The almost certain result would be some crippling effect, for in spite of the claims of evolutionists, all mutations are in the nature of injuries. If man ever begins to tinker with his genes, he had better construct many additional institutions to house the monsters that result.

It could also be pointed out that most, if not all, of our characteristics are polygenetic, that is, they are under the control of not one but a number of genes. For instance, eye color in *Drosophila* is under the control of 15 genes. The desirable alteration of a certain characteristic, if that is possible at all, most likely would require changes in more than one particular gene. Precisely coordinated changes in several genes would probably be required.

#### **Great Difficulty Remains**

If all the above problems were solved, which seems incredible, one insuperable difficulty would yet remain. In each gene there are thousands of nucleotides, but only four different kinds of bases. In a gene of 10,000 nucleotides, there would be, on the average, 2500 of each of the four different kinds of bases.

Let us say we knew that to bring about a specific desirable change, we had to change the adenine, at position 5263 of the chain, to a

guanine. If a chemical or irradiation or some other kind of treatment were used, how could the effect of that treatment be limited to position 5263 without affecting one of the other 2499 adenines in this DNA? It could not.

Chemical action, irradiation, or other mutagenic treatments are completely random in effect. We cannot "tell" a nitrite ion which base to attack. Since these treatments are by their very nature random in effect, it is obvious that they can never be utilized to bring about a specific change in the genetic material.

Other possible means of altering genetic properties could be discussed with much the same results. In spite of the bold claims of Dr. Bonner and others, man will have to get along with the two arms he has, as well as with the other features with which he is endowed. Man is "fearfully and wonderfully made" (Psalm 139:14), the product of the Master Planner. If we can learn to preserve that creation in reasonably good health for three score and ten, we will do well.

As we learn more and more about DNA and how it functions in the cell, we should view this great master plan with awesome wonder. Its complexities and intricacies are beyond our comprehension; the results of the plan, marvelous.

Who is it that conceived and brought this into being? Unbelieving man, willingly ignorant, prefers to believe it was inherent in the properties of the neutron. It seems to me immeasurably more reasonable to accept the clear proclamation of Scripture, "In the beginning God created. . .". The purpose of life is not, as Jukes claims, to perpetuate a base sequence, but the purpose of DNA is to perpetuate life.

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## SOME MOLECULAR APPROACHES TO TAXONOMY

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A method for studying the proteins of various turtles is given, based essentially on production of antisera by injection of turtle blood into rabbits or chickens. When mixed with serial dilutions of serum from various species of turtles, varying degrees of turbidity or precipitation are obtained. These results are shown to have a definite taxonomic value and do not support the present widely-held position that snapping turtles belong to a separate family related to the Kinosternidae, but rather are in the Emydid family group.

A method of comparing DNA of various species by studying the amount of pairing of DNA strands in agar in relation to a standard "reference" DNA is described. Since DNA consists of an "alphabet" of only four letters, until we can learn to read the "words" made by sequences of any three of them, it would seem that more progress in unraveling molecular taxonomy can be made by studying proteins, built from an "alphabet" of twenty letters or amino-acids. Rather than use evolutionary presuppositions, this research proceeds from the working assumption that the world of life is to be viewed as having arisen from certain stem organisms or "kinds" which in most cases need to be elucidated.

### Introduction

In order to detect the pattern of living things in nature, the earliest classifiers used the unaided eye in their study of *macroscopic* anatomy. The advent of magnifying lenses about four centuries ago made it possible to study *microscopic* anatomy (which included details of developmental anatomy or embryology). Most recent approaches, which had their beginnings at the turn of the 20th century, seek to determine relationships among living things using a molecular approach—what might be called "*molecular* anatomy."

Usually molecules can not be observed (even with an electron microscope) and so it has been necessary to utilize antibodies or various types of instruments to recognize similarities and differences among these molecules.

Molecular substances most commonly used have been the large or macromolecules, namely proteins, and then very recently DNA. Each type of organism has specific kinds of proteins and DNA, but proteins and DNA are found to differ when one group of living things is compared with another group.

Most of the available information on taxonomic biochemistry and serology, with exception of the latest DNA experiments, is summarized or at least bibliographically referred to in a symposium volume<sup>7</sup>.

In living things, DNA determines the "anatomy" of proteins, which in turn play roles of primary importance as structural and functional (including enzymatic) proteins in a multitude of chemical-physical conditions basic to the development, anatomy, physiology, and behavior of the organism. Therefore, when it is possible to characterize the proteins and DNA—for these chemical substances basically are responsible

for life as we know it—we should have a clear picture of the creative pattern in nature. An outcome of studies on macromolecules should be the characterization of nature and detection of homologies in Owen's sense of "essential similarity".

In initiating a program pointing in this direction, I began working with the reptiles, for they are considered by evolutionists to occupy an important position between amphibians, on the one hand, and birds and mammals, on the other. The reptilian order, Chelonia, which contains all turtles has been a neglected group; and, therefore, since it has been possible to obtain many types of turtles, I increasingly have utilized them in an expanding program aimed at clarifying their molecular taxonomy.

### Proteins in Turtles

Blood has been collected by cardiac puncture without serious trauma, and serum obtained from the blood has been injected into rabbits or chickens in order to produce antiserum against the turtle serum proteins. Antiserum was mixed with serial dilutions of various turtle serums; mixtures were incubated for 20 minutes at 37° C and then checked quantitatively for precipitation (turbidity) using light scattering (Leone, p. 537).

In preparation for the test for which results are shown plotted in Figure 1, *Chelydra s. serpentina* (common snapping turtle), serum was injected into rabbit #32; after several weeks antiserum for *Chelydra* was obtained from the rabbit and was mixed with doubling dilutions of serum from snapping turtle (reference antigenic material). The same antiserum also was mixed with serum from the following animals (cross-reacting antigenic material) whose scientific names are shown below the common snapping turtle (from top to bottom) on the

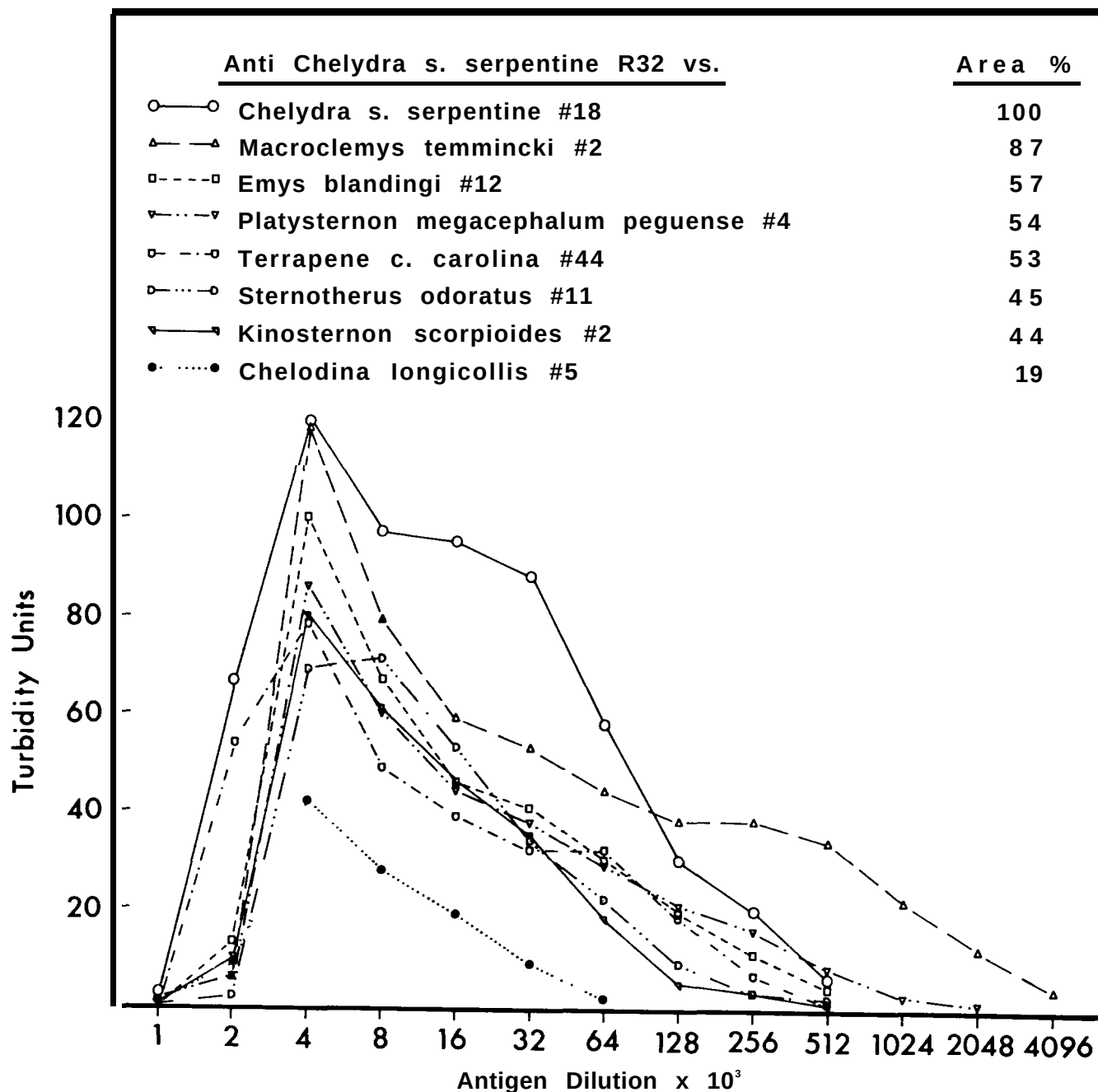


Figure 1. Plots of turbidity values over antigen reaction ranges after rabbit anti-snapping turtle serum was mixed with doubling dilutions of serum from each of 8 turtles.

graph: alligator snapping, blandings, big-headed, eastern box, musk (stink-pot), mud, and snake-necked turtles.

Relative areas under the graphs are expressed in the Area % column using the *Chelydra* area as 100%. These values express the order of relationships existing among serum proteins in these animals and when enough of these data are accumulated they help in determination of

the "kind" of turtle(s) ancestral to others.

Presently these results have a definite taxonomic value. They do not support a current widely-held position (q.v. e.g. Romer) that snapping turtles belong in a separate family which is related to the Kinosternidae family containing mud (*K. scorpioides*, 44%) and musk (*S. odorattm*, 45%) turtles. These results clearly show the snapper to be closer to the emydid

family which contains the blandings (*E. blandingi*, 57% ) and box (*T. c. carolina*, 53%) turtles.

The great advantage of these precipitation evaluations is that with a series of readings obtained from the results of two reacting solutions (one being serially diluted), an investigator is measuring the sum of many antigen-antibody (an-ab) reactions. When the an-ab fits are good, there is considerable precipitation, and when the an-ab matching is not as good there is less precipitation.

Apparently the method quantitates degrees of similarity of a whole spectrum of proteins; and this method, therefore, obviates problems of relationship which can arise when single proteins are compared either immunologically, or after study by certain analytical methods. Essentially the technic simultaneously is discriminating among "anatomies" of one or two dozen or more specific proteins. The systems which are acting actually can be determined by other methods including immunoelectrophoresis.

However, there are disadvantages. Without detailed analyses, we are not sure which an-ab systems are reacting in each case. What we have been calling quantitative comparisons are only *relative* values; for with other dilutions of the same antiserum, or with different antisera, other percentages will be obtained. In spite of these disadvantages, the values obtained usually are repeatable within 5% and show the same relative order when different antisera are utilized.

In addition to many other studies like the above, which utilizes precipitation in fluid systems, my results using solid media such as agar have agreed qualitatively with quantitative values as shown in Figure 1. Electrophoresis studies also have given helpful qualitative results<sup>9</sup>. In this type of study, the leading anodal component of reptiles appears to be more important as a taxonomic indicator than the proteins of larger size which group toward the cathode. In paper and cellulose acetate (barbital buffer, pH 8.6), kinosternids show fast-moving anodal components similar to human albumin whereas the leading component of serum from chelydrids and emydids is farther back from the anode. So here again, snappers are more like emydids.

In Figure 2 the five animals (top to bottom) are eastern box, common snapping, alligator snapping, eastern mud, and musk turtles. The leading anodal components (albumin) of the snapping turtles are seen to be positioned more like that of the box turtle than like mud and musk turtles. For a reference standard, the human pattern is shown; it is **not** for indicating relationships between man and turtles.

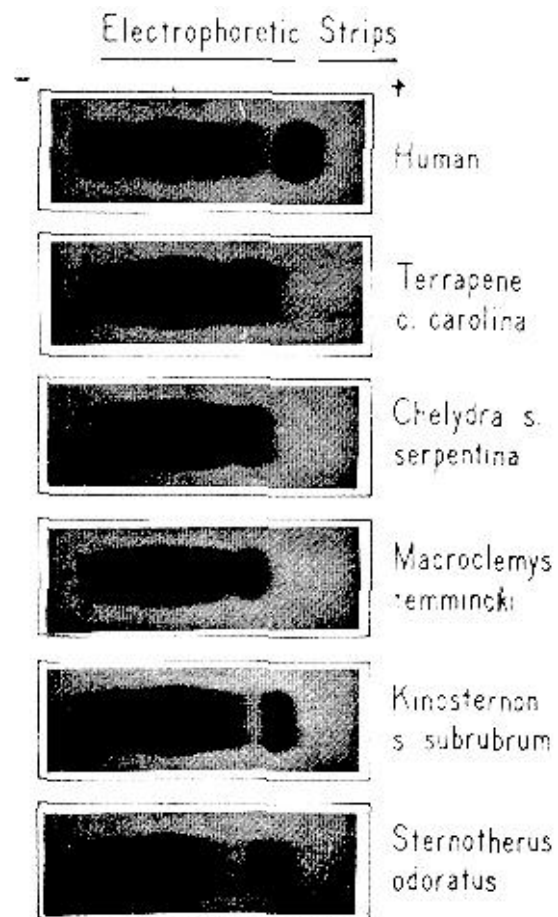


Figure 2. Results of electrophoresis of pooled turtle serums using cellulose acetate membranes. Serum was applied where marked just left of center; anode (+) at right; cathode (—) at left.

#### DNA—Use in Taxonomy

Because differing protein structures are determined by the base sequence in DNA, it has been felt that if we could read the DNA of each organism we would have a most basic approach to the study of organisms. DNA, believed to be responsible for the hereditary characteristics of living things is remarkably stable, and now it appears that cells even have the ability to repair damage caused to DNA by mutagenic agents.<sup>3</sup>

Considerable research is directed toward understanding DNA, but so far it has not been possible to read DNA "blueprints." However, within the past five years a technic has been utilized for obtaining relationships among living things based upon the degree of matching of separated strands of DNA from different organisms<sup>2,4,5,6,8</sup>. The technique involves the following steps:

1. High molecular weight DNA is heated to separate the two strands and then it is cooled quickly to prevent rejoining.

2. The single strands are embedded in agar which is then sieved, and the granules are divided into several equal portions.

3. Other samples of DNA from the "reference" material (DNA used in steps 1 and 2) and from what will be "cross reacting" material are sheared to much lower molecular weight.

4. The sheared material is heated and cooled to get single strands.

5. Quantities of sheared, single-stranded DNA from several origins then are incubated each with a portion of the agar particles containing DNA from the reference' material. The small filaments diffuse into the agar and join with complementary regions of the trapped longer filaments.

6. The agar is washed to remove small strands which are not paired with the longer trapped filaments.

7. Then the agar particles in the several groups are evaluated to determine the quantity of the several types of specific small strands which have duplexed with the large trapped strands from the reference material (Figure 3).

The method has been used in studies involving annealing not only of DNA-DNA but also of RNA-DNA. RNA has been found to be complementary to only one of the DNA strands, and DNA has been shown to possess regions complementary for transfer, messenger and ribosomal RNA.

Studies have been done of annealing reactions among various types of organisms as well as with different DNA species from the same cells. It appears that different DNA molecules exist within a single cell, as *Euglena gracilis*, where nuclear, chloroplast, and mitochondrial DNA may be distinguished by size and base composition. Some of the procedures used in this research have involved certain modifications of the aforementioned technic, for instance utilizing nitrocellulose membranes instead of agar<sup>10</sup>.

Cross-reacting values are compared with the value obtained in the reference reaction, and results are believed to indicate quantitative degrees of resemblance among the types of low molecular weight strands annealing with the high molecular weight reference material. Microorganisms have been utilized in most of the studies so far, but certain investigators have included even a variety of vertebrates as shown in Table 1. As would be expected from gross anatomical examination, those animals showing more overall structural similarities such as mouse

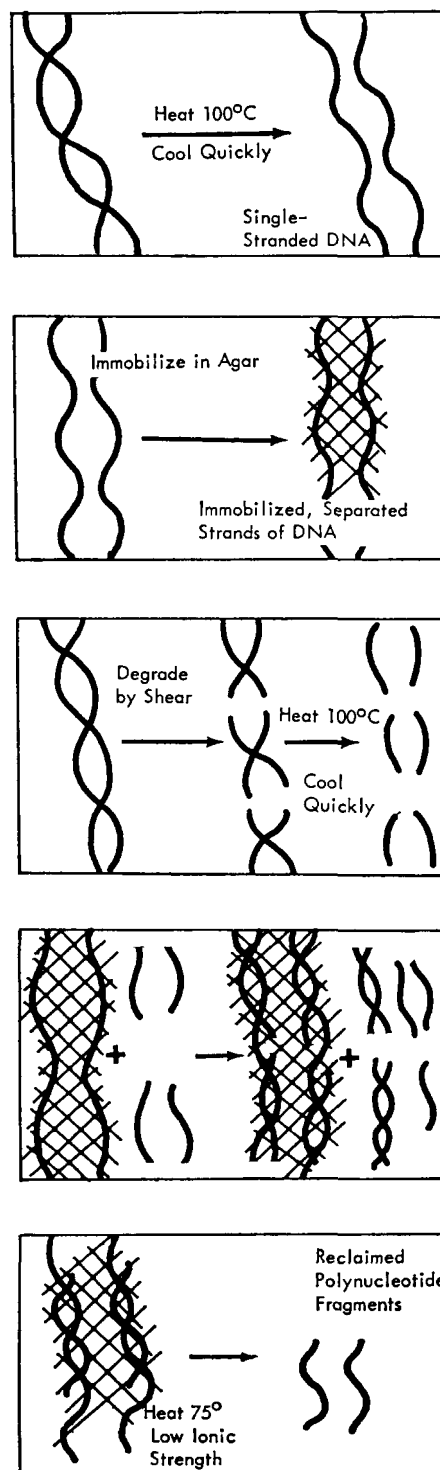


Figure 3. Diagrammatic representation of the principle of the DNA-agar procedure. (Reprinted by permission of Science and of Hoyer<sup>6</sup>, p. 960.)

and rat showed higher percentages of duplexing of their respective DNA's.

**Table 1. Percentages of human and mouse sheared single-stranded DNA (fragments) bound in agar to high molecular weight single-stranded DNA from various organisms. (From Hoyers<sup>3</sup>).**

| DNA Embedded<br>in Agar | Percent of Fragments Bound |       |
|-------------------------|----------------------------|-------|
|                         | Human                      | Mouse |
| Human                   | 18                         | 5     |
| Mouse                   | 6                          | 22    |
| Rhesus monkey           | 14                         | 8     |
| Rat                     | 3                          | 14    |
| Hamster                 | 3                          | 12    |
| Guinea pig              | 3                          | 3     |
| Rabbit                  | 3                          | 3     |
| Bovine                  | 5                          | 4     |
| Salmon                  | 1.5                        | 1.5   |
| <i>Escherichia coli</i> | 0.4                        | 0.4   |
| None                    | 0.4                        | 0.4   |

In our laboratory, Mr. John Cruzan conducted a study utilizing DNA which he had extracted from erythrocytes of some of the turtles shown in Figure 1 and certain others as well. So far, only emydid, kinosternid and chelydrid turtles have been used, but resulting hybridization values with the DNA have not been repeatedly different enough to permit differentiation among these groups. If more sensitive DNA methods can be applied, it may be possible to discriminate among these turtles even as has been done using serum proteins.

### Discussion

Most comparative studies proceed with the assumption that similarity indicates descent from certain common ancestors. This approach is very questionable in many cases as for instance at the molecular level when we are dealing with specific individual proteins (e.g. insulin and hemoglobin).

Therefore, many types of macromolecules should be included in the best type of comparative study seeking to determine relationships among organisms. At present the detailed structure of too few proteins is known for this to be possible<sup>6</sup>, and laborious procedures have been necessary for determination of amino acid sequences and other structural features. But progress is being made.

When techniques are perfected for conveniently sequentially cleaving off the terminal amino acids in polypeptide chains of various proteins, we will be able more readily to learn their structure. We will be able to compare the different proteins among living things, and be able to construct dendrograms showing the probable diversifications that have occurred since the beginnings of the various groups.

It seems to me that proteins offer us more hope of achieving a sound categorizing of nature than

does DNA, at least at the present time. In the case of DNA we are dealing with polynucleotide chains built from an alphabet of only 4 letters. If we were able to read the DNA "words", presumably sound comparisons would be possible.

Since this can not be done yet, it may be better for molecular taxonomists to concentrate on the proteins, for in proteins we process polypeptide chains built from an alphabet of about 20 letters. With the larger protein alphabet, we actually have a magnification of differences existing in DNA strands; and, even for this reason alone, protein studies may remain as our most fruitful molecular approach.

It is obvious that nature contains recognizable groups of extinct and extant organisms, and for this reason classification is possible. That categories exist in nature is obvious, but that they share proximate or distant common ancestors is far less obvious in most cases.

Rather than using evolutionary presuppositions in our research, we are proceeding with the working assumption that the world of life is to be viewed as having arisen from certain stem organisms which in most cases need to be elucidated. We do not genetically cross gaps unless evidence is compelling. This impresses me as a judicious way to approach nature.

It is unnecessary and probably unwise to maintain an evolutionary tension, which often is expressed by a compulsion to bridge taxonomic gaps while describing nature. This may result from conscious or unconscious antitheological feelings or from a desire to conform to what is believed to be well-established procedures.

Whatever the case, all scientists must be prepared to re-evaluate the hypothesis (or theory) which they are using in integrating data concerning relationships of organisms. In determining taxonomic groupings we need all types of data—physiological, behavioral, developmental, and anatomical (macroscopic, microscopic and molecular). Molecular data are more prominent than ever before.

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(Continued on page 47)

## DNA STUDIES IN RELATION TO CREATION CONCEPTS

SUBTITLE:

**The New Biology, Based on Molecular Structure, Shows No Proof of Evolution**

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*Finding no evidence for evolution in the DNA code, a new search is on for "the origin and evolution of the genetic mechanism." DNA, after all, is basic to all life. Evolutionists had a rude awakening when the fundamental nature of the DNA code, that defines and directs the inheritance of each living organism, proved to be equally large and complex for all genetic kinds. Statistics now show that the evolutionary theory has been postulated against ridiculous odds. "God does not throw dice" was the conclusion of Einstein about all this, and now this is spelled out in detail. Immutability of the kinds of animals and plants is conceded by those specialists who should know. Man's hopes cannot refute God's word. Faith and revelation are also required in the great new discoveries of Nature's laws. The latest supposed "proof" of evolution is contradictory, internally.*

### Introduction

To discuss the new questions of science and the Bible requires some background considerations. Man's general concepts of the formation of the earth and the living organisms in relation to their environment are subject to continual revision. Scientists have learned more and developed more new tools of research in the last forty years than in all time previous.

Once only organisms composed of millions and millions of atoms could be observed under a microscope. Now we can take pictures showing the pattern of position of single atoms. The behavior and details of an atom and its parts can be predicted with the precision associated with an automobile engine.

Most generally, discussions on the "theory" of evolution, or even the formation of the Earth, are pros and cons about scientific inferences that have long since been superseded with facts. Similarly, Bible students often insist on reading into the simple and clear language of the Bible, interpretations based on information more than ten years old. How convenient it was that God must have done things to match their ideas!

Or, in another respect, it is particularly difficult to estimate ages, now, that it is recognized how much radioactive decay is modified by cosmic rays. Cosmic rays are subject to action by the Earth's magnetic field, and the amount of water in orbit around the Earth. During the last reversal of the magnetic field, water and water producing ions could not help but be

swept down out of orbit. Such changes upset all radioactive dating; making isotope dating appear older in most cases.

With the above areas of misunderstanding out of the way, I want to assert that no one can point to a single fact of science, history or archeology that conflicts with a literal reading of the Bible. We have asked avid evolutionists to come forth with factual evidence. We have seen only trivial misrepresentations of both science and the Bible. These have been well exposed in papers by Lammerts and others in various issues of the Creation Research Society publications.

### Scientific Knowledge Incomplete

Lest someone think that the latest science is inferred to be complete in its knowledge of the Bible and God's Creation, I must point out that Planck's length derived from Planck's constant, (a very basic unit of real significance to science), is so small, that the ratio of what we know of "inner space," to what we know is to be known, is much less than the proverbial drop in the bucket. It is less than one part in  $10^{60}$ .

Even now scientists like G. G. Simpson of Harvard, conclude in *Science*, April 22, 1966, page 472-8:

However, in my opinion nothing that has so far been learned about DNA has helped significantly to understand the nature of man or of any other whole organism. It certainly is necessary for such understanding to examine what is inherited, how it is expressed in the

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developing individual, how it evolves in populations, and so on. Up to now the triumphs of DNA research have had virtually no effect on our understanding of those subjects. In due course molecular biology will undoubtedly become more firmly connected with the biology of whole organisms and with evolution, and then it will become of greater concern for those more interested in the nature of man than in the nature of molecules.

In fact at the level of molecular structure and interaction, information storage and transfer, energy transactions, and other defining characteristics of life, man is hardly significantly *different from a bacterium*—another illustration of the fact that that level of study is not particularly useful in considering the nature of men. (Emphasis added)

and R. V. Eck concludes in *Science*, April 15, 1966, pages 363-6:

Such ancient systems are extremely conservative because so many diverse later reactions have become intricately dependent on them that *they are no longer "free" to evolve*. A mutational change which might be beneficial in one way, in almost every case would be at a strong disadvantage in many other ways. When such a mutation occurred, the process of natural selection would therefore reject it. This conservative principle enables us to comprehend why ferredoxin from a living organism could still retain detectable details of its ancient origin.

Thus, in organisms still living there may exist biochemical relics of the era encompassing the *origin and evolution of the genetic mechanism*. Determination of the sequences of proteins such as ferredoxin and of nucleic acids such as transfer RNA, whose prototypes must have functioned at this early time should make possible a detailed reconstruction of the biochemical evolutionary events of this era. (Emphasis added)

### Top Scientists Concede Immutability of DNA

Many scientists recognize that the study of molecular biology lends no support to the evolutionist stand. Even now, they know that the DNA molecules of the various kinds of living beings are structurally all alike. Also, scientists know that DNA molecules are quite immutable and resist the conversion of one kind to another, in spite of observed mutations from radiation and variations according to Mendel's laws.

Some scientists look for new discoveries of the science of the future to try to explain unplanned and unguided deterministic "evolution" of the first DNA molecule with the genetic mechanism of any one living organism. There is no "Higher" or "Lower" any more.

The amoeba, the algae, or man each has a DNA code of the same atomic complexity, with about a million atoms each in the same kind of arrangement. Just think of the information written into that DNA slate of only about a million atoms. Man knows how to distinguish about 2,000 atoms, the various isotopes of our 100 natural and synthetic elements.

Only about ten of these are found in the DNA; and yet, each DNA code for man is nominally the same though we know that this structure, far too small to see under the optical microscope—has in it the information that differentiates you, your voice, your manner, your color combinations, your basic skills, your inherited susceptibility to various diseases, and of course also, your general appearances, from billions of other human beings.

It is comforting to know that there are at least a bucket full of spaces for factual observations for every drop that we now have. Similarly, oceans of facts reach out into space from which our spacemen are recovering an ever increasing number of pearls of wisdom. That immensity of space also contains facts to be discerned by new methods and apparatus. It is a grand new horizon for exploration, among facts and properties to which we are blind at the present. Certainly the average atom of the DNA must have associated with it no less than one millionth of the information to be coded. How is that possible?

While identical twins are as much alike as one can measure by all the tests known, ordinary twins and other persons differ from one another by at least 100 detectable variations. With at least 10 billion people past and present to differ from, one can safely say that there are a million million differences to be found among the million atoms making up the DNA of human beings, which are nominally alike as far as molecular structure and composition are concerned.

So each one of the million atoms of the DNA must somehow, on the average help to convey one million traits and characteristics. While we know a lot about each element and isotope, a million properties are beyond our science by say 10,000 fold.

### New Explanations Are Likely

All this would be a conundrum if we did not know that there is much more than this that is to be known, based on Planck's length, which is about  $10^{20}$  (a hundred billion billion) times as small as the nucleus of the atom. Planck's length can be derived mechanically by accepting Maxwell's equations and Einstein's relativity and principle of equivalence (now a proven law), that matter is energy and visa versa.

If an electron and a positron are allowed to fall toward one another until they obtain the relativistic mass and density of a nucleus (which is also the threshold energy for electrons to interact with a nucleus for pair formation), then the separate charges moving at the velocity of light, produce a magnetic field equal to their new mass. Much heavier nuclei can also be explained this way. The gravitational constant can be derived from the attractions of such dipoles. Newton's laws of motion are also explained since these charges rotate about one another at 0.91 times the velocity of light. A change in the velocity of displacement causes a relativistic increase in mass, exactly matching the requirements of Newton's laws. The separation of the paths of the charges become the distance of Planck's length and can obtain information in the pattern of their weave.

Therefore, we see that there are many steps available for defining details we could not possibly enumerate. Theoretically, the individual atom can carry in its nucleus—if composed of the required number of such couples of plus and minus charges (309 for each neutron, 308.5 for each proton)—more information than is in all the books of the biggest library.

The steps of differentiation are each small in energy content so that they are able to receive and transfer the information with the available electromagnetic power involved in thought. So we do not deal with the "extremely unlikely" in these concepts.

#### **Statistics Show Odds Against Chance Assemblies**

The DNA assembly uses only 20 out of 64 possible sub-assemblies. The basic units are called nucleotides. They are arranged in a spiral rope, ladder-like structure, made of a purine, pyrimidine, sugar and phosphate unit, each group of four forming one of many rung sections.

The 15,000 or more atoms of the individual sub-assemblies, if left to chance as required by the evolutionary theory, would go together in any of  $10^{87}$  different ways. (This is ten billion with 77 more ciphers behind it). It is like throwing 15,000 dice at a time to determine what specific molecule to make; and, then, to test each one for the survival of the fittest until the one out of  $10^{87}$  different possibilities is proven by the survival of the fittest to be the right one.

Just think, only 20 of all these possible amino acids are actually used in nature to form, describe and prescribe all the kinds of life known. And only a small amount of each individual cell of each living organism is made up of the DNA molecule. Theoretically, each cell could be multiplied and grown into the living whole just like growing a plant from a slip.

Now, let us try to locate, and hold for assembly, the sub-assemblies of 20 kinds out of the  $10^{87}$  kinds that should form at random, if any did form. Lo and behold! The dice are loaded.

Not all the types of sub-assemblies expected at random are available in the same numbers. One of them is more than  $10^{61}$  (100 billion plus 50 zeros behind it) times as predominant as the average because of its greater thermodynamic stability—as determined by well established laws of equilibrium concentrations.

This is governed by the same kind of scientific facts as those used in the oil industry to get the best kind of much smaller petroleum molecules out of a refinery process. Even this predominant one is available only one in more than a thousand, billion, billion. But while you may want two of that predominant one, for finding each of the other units you have to wade through more than  $10^{61}$  (more than 10 billion multiplied by itself six times).

Fortunately, one can find five more kinds of molecules that are used in the DNA for every 100,000 or so of the first. But, then, the picking gets that much leaner for the other 14 kinds out of the  $10^{87}$  possible ones, diluted by the predominant ones, which are there and reform in the equilibria that must be maintained, if any of them are in position to form. Obviously, the creation of order out of random positions and rotations in each of the six degrees of freedom calls for the reversal of the laws of thermodynamics on a fantastic scale in addition to the required activation energies.

No wonder Einstein said about theistic evolution "God does not throw dice," long before this extreme complexity was known. Nobel Laureate Dr. Harold C. Urey explained that there is not enough matter in the universe to make the many kinds of sub-assemblies that would form at random, if any do.

Let us now assume we have overcome the laws of chance generation which would call for the production of more than  $10^{87}$  kinds of amino acids to pick and test from for the survival of the fittest and to be put together in one specific way out of  $4^{10000}$  alternate ways (yes, that is four multiplied by itself ten thousand times), for each and any one species. We find that this is for asexual reproduction.

Sexual reproduction requires that the same unique macro-molecular composition would appear (a) at the same place, (b) at the very same instant, (c) twice, (d) with exactly the correct temperature, (e) velocity, and (f) direction to meet and stay together, (g) without interference from others for long enough time to entwine together to make the first DNA pair in (h) a specific nutrient medium that is then

protected somehow by, (i) a membrane, which permits (j) the RNA-smaller than DNA and (k) the hundreds of enzymes to (l) function together simultaneously (m) in a complex pattern of action, (n) somehow pre-trained or by "inherited" self-control.

### **Creation Required Specific Plans and Control of Individual Atoms**

Now, if the exact kind and number of amino acid molecules were counted out and confined and somehow, *against the laws of nature*, also protected against "the survival of the fittest" in a thermodynamic equilibrium, one would still have only one chance out of  $10^{21}$  (10 billion with 21 ciphers added) to obtain the one combination for any one species as a dead agglomerate.

To put life into this assemblage would be like expecting a fantastically large and complex organ to assemble itself from its parts; and, then, somehow start playing the most perfectly harmonious and varied music, new and original, continuously—all by itself. "Only metabolism" comparable to the chimney draft due to the sun would be available to furnish the energy. That organ represents merely a tiny part of the DNA code in a single cell of any one living organism.

Instruments are even now available that listen to this music for us in the form of electron spin resonance, Mossbauer effect, nuclear magnetic moment and resonance measurements. They detect the difference between the living and dead matter very easily.

The great fact so clearly established now is that this is the minimum organization for a living organism. It is as basic as the proof of Pasteur that only life begets life in answer to the notions about spontaneous generation of about a century ago.

Even now, this unsupported theory of spontaneous generation is still being promoted so that great scientists like Vannevar Bush have to define the problem of proving it all over again and point out the trivial support for such teachings. He states, "Science, when understood properly, makes man humble in his ignorance and smallness." (*Fortune Magazine*, May, 1965)

All this says that it would be as near infinitely times as improbable to convert one kind into another by spontaneous generation, as it is for the first kind to form from the elements in the first place. Who would have predicted this from the coarse measurements of the past?

It is the new tools that show that each DNA code from that of the lowest to the highest organism differs, but also has the same atomic complexity. Even the data on the amino acid sequence for small proteins like the cytochrome C

gene differs for each of the mammals. It is like having to use a different kind of oil in each car.

Read the reference particularly by George G. Simpson in *Science*, February 21, 1964, Vol. 143, p. 769-775, in view of the above, Simpson is the leader in promoting evolutionary concepts in the United States. He acknowledges in this reference that evolution requires the suspension or breaking of very basic well established thermodynamic laws, and as well: "It requires an attitude of hope if not of faith to assume that the acquisition of organic adaptability was deterministic or inevitable—"

He also recognizes, that, granted macromolecules, (by spontaneous generation ) then: "The further organization of those molecules into cellular life would seem to have a far different, very much lower order of probability."

He points out additional hurdles, and limitations of the theory, even mentions Creation as an alternative to having hope and faith in long time intervals for chance and accidents to occur that are "so incredibly intricate "and" extremely unlikely."

Dr. Simpson also discusses the conditions that cause the fixity of species or kinds, but does not express it as positively as Thomas H. Jukes, who concludes a very learned review by saying: "One cannot imagine amino acids detaching themselves from a protein, combining with sRNA, and lining up in order to synthesize a messenger strand which would return to the nucleus to make a new gene." ( From *American Scientist*, 53, p. 487-8 1965) Similarly Hinegardner and Engelberg regard the production of merely "a new enzyme by the mutation of the genetic code —incredible." (*Science*, 22 May 1964. p. 1031)

You can see from this that it would be much less of a miracle for God to create what He wants than to do that next to impossible job of selection and assembly called for by evolutionists, This says nothing about the RNA and enzymes that must be ready to do their job at the same time in cooperation with presupposed sustenance for metabolism.

Even before all these newly reported hurdles to spontaneous generation were understood, George G. Simpson, the leading evolutionist in the United States for many years had arrived at the following conclusion: In spite of the information that there are likely to be as least 100,000,000 other planets in the universe as suitable for our type of life as the Earth, it is extremely unlikely that life could have "evolved" by natural causes in any proposed time period to produce a being of some form that could plan and communicate. He would be the last to claim evolution as inevitable. You can then

see why G. G. Simpson also allows for the possibility that it took a Superior Power.

### Popular Notions Behind Current Science

While many top scientists are very active in pointing out that no facts of science contradict the Bible speaking for itself, it is important to state that the references cited were taken from reports that are written in the vein of evolutionary theory. However, top scientists generally try their best not to overstate their opinions. They show more respect for the marvels of nature than most theologians do, simply because good scientists know how to ask many more and bigger questions than they can answer, while the novice does not know how little he knows.

Any indication of direction, pre-selection, or plan of action or design is strictly taboo since only the test of the survival of the fittest may determine final use. A case in point is the author of *The Molecular Basis of Evolution*, Dr. Christian B. Anfinsen. In the preface he just as much as disclaims evolution by saying, "We like to believe that Nature has been very wise and efficient in the design of the chemical compounds, however, large and complicated, which make up the structure and machinery of living things." Then he goes on to illustrate it.

Far from calling evolution a fact, he says, "it is unlikely that we shall ever have more than opinions regarding the origin of life." This is the best kind of genuine testimony free of prejudice in favor of the Bible. While the DNA of some mammals differs from others by only two of these 20 sub-assemblies, man differs from others by seventeen. It would shock the old fashioned thinking of evolutionists on observations about a million times more coarse than now, to know their nearest DNA relations.

On the other hand the story of creation must have been written for the space age, as well as for the Hebrews, because it took until now to knock out of our heads the last of each successive generation of man's speculations about the formation of the Earth, and all that was brought forth on it.

Now, we marvel at the wonder of how the old words like "the waters above the firmament" do convey what we now know from observations on Earth and in space around us. We even "agree" that life started on the surface, not in the water.

We just did not know enough facts to understand those specific words of Genesis 1, before this, so in our blindness some people condemned them to mythology. Nobel Laureate Glenn Seaborg, chairman of our Atomic Energy Com-

mission reads it for what it says, in awe of the significance. Many scientists share this awe. Some would-be-scientists think they know better.

The men to be pitied the most, however, are those biologists who have seen their mental image of evolution shattered so completely by the new science of molecular biology, now earning so many Nobel prizes. They even try to ridicule it in top journals as one did in *Science*, by calling DNA—the holy trinity.

### Basic Scientific Insights Result of Revelation

Even some of the tough theological points, long since ditched by modern rationalists and humanists are now related to and explained by phenomena encountered in the physical sciences. A recent Nobel prize winner, for the discovery of the maser, Provost and Professor of Physics at M. I. T., Dr. Charles H. Townes, in *Think for April, 1966* discusses "The Convergence of Science and Religion," emphasizing the role of faith and revelation. He stated:

Einstein spent the last half of his life looking for a unity between gravitational and electromagnetic fields. Many physicists feel that he was on the wrong track, and no one yet knows whether he made any substantial progress. But he had faith in a great vision of unity and order, and he worked intensively at it for thirty years or more. Einstein had to have the kind of dogged conviction that could have allowed him to say with Job, "Though he slay me, yet will I trust in him."

For lesser scientists, on lesser projects, there are frequent occasions when things just don't make sense and making order and understanding out of one's work seems almost hopeless. But still the scientist has faith that there is order to be found, and that either he or his colleagues will someday find it. . . .

Another common idea about the difference between science and religion is based on their methods of discovery. *Religion's discoveries often come by great revelations.* Scientific knowledge, in the popular mind, comes by logical deductions, or by the accumulation of data which is analyzed by established methods in order to draw generalizations called laws. But such a description of scientific discovery is a travesty on the real thing. *Most of the important scientific discoveries come about very differently and are much more closely akin to revelation.* The term itself is generally not used for scientific discovery, since we are in the habit of reserving revelation for the religious realm. In scientific circles one speaks of intuition, accidental discovery, or says simply that "he had a wonderful idea." (Emphasis added)

If we compare how great scientific ideas arrive, they look remarkably like religious revelation viewed in a non-mystical way.

Think of Moses in the desert, long troubled and wondering about the problem of saving the children of Israel, when suddenly he had a revelation by the burning bush.

Consider some of the revelations of the New Testament. . . .

Similarly, the scientists, after hard work and much emotional and intellectual commitment to a troubling problem, sometimes suddenly sees the answer. Such ideas much more often come during off-moments than while confronting data.

A striking and well-known example is the discovery of the benzene ring by Kekule, who while musing at his fireside was led to the idea by a vision of snakes taking their tails in their mouths. We cannot yet describe the human process which leads to the creation of an important and substantially new scientific insight. *But it is clear that the great scientific discoveries, the real leaps, do not usually come from the so-called "scientific method," but rather more as did Kekule's—with perhaps less picturesque imagery, but by revelations which are just as real.* (Emphasis added)

This has been recorded for all branches of arts and music; and, for physical sciences, particularly, in the case of Newton's theory of gravitation, Maxwell's theory of electro magnetism, Einstein's theory of relativity, Planck's theory of the quantum of action, and Heisenberg's uncertainty principle. All these have been established.

Townes continued:

Can religious beliefs also be viewed as working hypotheses, tested and validated by experience? To some this may seem a secular and even an abhorrent view. In any case, it discards absolutism in religion. But I see no reason why acceptance of religion on this basis should be objectionable. The validity of religious ideas must be and has been tested and judged through the ages by societies and by individual experience. Is there any great need for them to be more absolute than the law of gravity? The latter is a working hypothesis whose basis and permanency we do not know. But on our belief in it, as well as on many other complex scientific hypotheses, we risk our lives daily. . . .

We must also expect paradoxes and not be surprised or unduly troubled by them. We know of paradoxes in physics, such as that concerning the nature of light, which have been resolved by deeper understanding. We

know of some which are still unresolved. In the realm of religion, we are troubled by the suffering around us and its apparent inconsistency with a God of love. Such paradoxes confronting science do not usually destroy our faith in science. They simply remind us of a limited understanding, and at times provide a key to learning more. (Emphasis added)

Perhaps there will be in the realm of religion cases of the uncertainty principle, which we now know is such a characteristic phenomenon of physics. If it is fundamentally impossible to determine accurately both the position and velocity of a particle, it should not surprise us if similar limitations occur in other aspects of our experience. This opposition in the precise determination of two quantities is also referred to as complementarity; position and velocity represent complementary aspects of a particle, only one of which can be measured precisely at any one time.

Nils Bohr has already suggested that perception of man, or any living organism as a whole, and of his physical constitution represents this kind of complementarity. That is, the precise and close examination of the atomic makeup of man may of necessity blur our view of him as a living and spiritual being. In any case, there seems to be *no justification for the dogmatic position taken by some that the remarkable phenomenon of individual human personality can be expressed completely in terms of the presently known laws of behavior of atoms and molecules. Justice and love may also represent such complementarity. A completely loving approach and the simultaneous meting out of exact justice hardly seem consistent.* (Emphasis added)

But what loving parent has not appeared inconsistent to his child? God's well defined purpose, and generally also that of the parent, is to mete out justice, "for your own good and to prepare you for much bigger and more important responsibilities of the future."

The late Dr. W. F. G. Swarm, a great physicist and former director of the Bartol Research Foundation of the Franklin Institute, has left an expression of his views in the article, "Blueprint of the Universe" in *Science of Mind*, April, 1967, issue. After presenting proofs of purpose-design—plan—intelligence as evidenced in Creation, he presents a challenge to any materialistic scientist.

Any materialistic scientist, who wants to claim evolution rather than admit the truth of the proofs of design, is challenged to present one or more items in any part of the Creation which could be improved upon by the materialist, or

by “chance.” Near the close of his article, Dr. Swarm wrote:

... as an end thought, I picture our very materialistic physicist who has designed his universe, and then, as a hell, is condemned to live in it. (p. 16)

The materialistic physicist would surely forget some side effects, by which our great scientific technology has been plagued so very much. After writing that the existence of intelligence may be regarded as an observational fact, Swarm explained,

And when I speak of intelligent design I mean the kind of design which is sufficiently like that which one of our engineers might have aspired to achieve; but so far beyond the powers of any living engineer to achieve, that it must, of necessity, leave mankind extremely humble in the estimation of his own powers. (p. 13)

Recently, a most candid presentation of the best case noted so far for the evolutionary theory became available: *Chromosomes, Giant Molecules, and Evolution* by Bruce Wallace (W. W. Norton and Co., Inc., New York, 1966). I could point to many references of evidence for order, system, plan, direction, and efficiency in the author's use of genetic material; presented in an able way. For example, he states, “Is there any simpler solution to the problem of reproduction? I do not think that there is.” (p. 19) What a wonderful testimony for an all wise Creator!

Since when has anyone, any thing, any hap- penstance, any shaking of dice or alphabet blocks come up with any admittedly more efficient solution when “there are literally billions of ways in which nucleic acid code words could have been assigned to the twenty amino acids.” (p. 156) Yes, there was One Source that overcame His own laws of nature like making water run uphill, to create energy and matter, in fantastic simplicity and in beauty of complexity. Then He created the unique conditions and life on Earth, allowing us very endowed creatures, in these last great years, to unravel some of the mysteries of that perfect order, unity and efficiency of His creation.

Using the criteria presented by Dr. Wallace himself, as he wrote on page 5, “Search diligently for the adequate, reject the untestable—those are the recognized procedures of the laboratory, the classroom, the clinic, and the courtroom.” The subject can best be closed with his words:

At the very outset the following point was conceded: any person who is firmly and un- alterably convinced that each of today's species of plants and animals arose by an act of special creation will find no evidence in this book that will compel him to change his mind. There

simply is no such evidence, nor can there ever be. A Divine Being of infinite wisdom, we must all admit, could have created living forms in a manner that would have dribbled off as by-products all of these things we have gleaned as evidence for evolution. We can only say that He went about His task in a way that mimicked evolution in every detail; it is *unfortunate* that some event did not occur which would have clearly ruled out evolution- ary theory. (p. 76) (Emphasis added)

Fortunately, events have occurred which clearly do rule out this theory by the criteria pre- sented. It is “untestable” because “There simply is no such evidence, nor can there ever be.”

Second, the laws of chance, (which are well used by Dr. Wallace for his purpose of showing that it must be easier to modify an existing DNA code in a living cell than to start over from scratch), also show that they are not “adequate” to provide proof that any kind of **DNA** and its metabolism with RNA and enzymes in a nu- trient medium protected by a membrane could possibly be formed by chance in the first place.

Just think how much less likely it is, that Wallace's most “simple solution to the problem of reproduction,” “literally out of billions of ways,” starting with the four bases available in a cell, would be produced by chance actions.

Finally, what is the probability of chance actions to go counter to well established laws of thermodynamics? Being an honest scientist, Dr. Wallace does not claim this, nor have any other authorities. Not even the formation of only one new enzyme in a living cell is considered credible. (Hinegardner and Engelberg, *Science*, 22 May 1964, p. 1031.)

Dr. Wallace also is true scientist enough to report (p. 20) the reason for such failures: “Each protein consists of tens, hundreds, or even thou- sands of amino-acid molecules attached to one another in a specified order; slight alterations in the sequence in which amino acids are strung together can destroy the biological function of a protein molecule.”

It is also well known that the mere insertion of the correct base unit in a reversed position leads to death. And yet there are those who have faith in **chance**, enough to believe the admit- tedly unprovable. Somehow accidental changes should suffice to provide the basis for a new species in one DNA strand of the many parallel strands and change the whole by a miracle.

Are we to believe that the same very complex accident can occur in the same position on all the DNA strands in both the male and the fe- male chromosomes which then “happen” to mate?

The alternative way for producing a new species could be by virgin birth. This is proven to occur under the most rigid laboratory conditions, among carefully controlled strains of mammals used for research.

The chances would be enormously increased, but still, would be too hard to swallow. And yet with direction, plan and control, its occurrence is more likely, and may well be established through intensive research someday. Just to be able to produce a new, genetically perfect pair from the same flesh, might open our eyes to the great depth of shared thoughts and feelings and

the intimacy with the Creator of such a couple.

On the other hand, there are thousands of people, including the present writer, who experience and live by the guidance of the Creator, and have been privileged to see and live through critical turning points in their lives far ahead of the time of decision. Though blessed with enough adversity to keep them struggling, they carry on with that guidance that has not failed them. Since science has verified statement after statement in the Bible, then for us to accept as our personal Guide, our Creator, is a small act of faith indeed.

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## THE EVOLUTION OF COMPLEX ORGANIC COMPOUNDS FROM SIMPLER CHEMICAL COMPOUNDS: IS IT THERMODYNAMICALLY AND KINETICALLY POSSIBLE?

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*Present sources of energy for conversion of inorganic molecules to various organic molecules are given. Electrical discharges, used by Miller and Urey, are shown to be relatively minor ones, compared to the sun's energy which is so effective in destroying organic compounds.*

*Even though set up as a closed system, so as to force the reaction to the product side by selectively removing and accumulating the products, only slight amounts of various organic compounds, such as glycine, resulted. Quoting Hull as estimating the half-life of glycine as only about 30 days, 97% of it would be decomposed before reaching the earth.*

*Considering the possible 3% which falls into the ocean, Hull concludes that ultraviolet radiation would decompose it in the upper 100 meters in a half-life of about 20 years. The physical chemist guided by proved principles of chemical thermo-dynamics and kinetics cannot offer any encouragement to the biochemist who needs an ocean full of organic compounds to form even lifeless coacervates.*

*Miller's experiment is an excellent one, scientifically-speaking, and when properly interpreted leads to the conclusion that life could certainly never originate spontaneously.*

### Introduction

One of the necessary steps in the supposed process of evolution is the formation of complex organic compounds from the reaction of simpler chemical compounds such as  $\text{NH}_3$ ,  $\text{CH}_4$ , and  $\text{H}_2\text{O}$ . The hypothesis of spontaneous generation of life would fall apart if such chemical reactions were impossible for there would be no organic compounds available for life.

Even if the reactions would occur, the production of extremely large amounts of organic compounds is also necessary. Thus, if any reaction is possible, it must produce high yields of organic compounds or spontaneous generation would be very unlikely.

In the July 31, 1959 issue of *Science*, S. L. Miller and H. C. Urey published an article entitled, "Organic Compound Synthesis on the Primitive Earth" outlining the evolutionary posi-

tion on this subject. In answer to this paper, D. E. Hull wrote an article entitled, "Thermodynamics and Kinetics of Spontaneous Generation," that appeared in the May 28, 1960 issue of *Nature*. The position put forth in Hull's paper is that the production of complex organic compounds from simple chemical species is impossible under the conditions given by Miller and Urey.

This paper is simply a review of both articles, and frequent reference is made to the above papers.

### Use of Electrical Discharges

Oparin<sup>1</sup>, taking the evolutionary viewpoint, thought that the spontaneous generation of the first living organism could have taken place, if large quantities of organic compounds had been present in the oceans of the primitive earth,

Miller and Urey<sup>2</sup> state that the greatest progress in the formation of organic compounds under supposed primitive conditions has been made by utilizing electrical discharges as a source of energy. This energy would come from lightning and corona discharges from pointed objects. It is interesting to consider the table given by Miller and Urey<sup>2</sup> showing the present-day sources of available energy for a postulated evolutionary process.

**Table 1. Present Sources of Energy Available for Evolutionary Processes Averaged Over the Earth<sup>2</sup>**

| Source                                                                      | Energy<br>(cal-cm <sup>-2</sup> -yr <sup>-1</sup> ) |
|-----------------------------------------------------------------------------|-----------------------------------------------------|
| Total radiation from sun                                                    | 260,000                                             |
| Ultraviolet light—portion of sun radiation<br>(wavelengths less than 2500Å) | 658.5                                               |
| Electrical Discharges                                                       | 4.0                                                 |
| Cosmic Rays                                                                 | 0001.5                                              |
| Radioactivity (to 10 km. depth)                                             | 0.8                                                 |
| Volcanoes                                                                   | 0.13                                                |

It should be noted that the most readily available and abundant sources of energy are not considered as promising as this minor source (electrical discharges), simply because experiments utilizing ultraviolet light have successfully produced only very small yields of organic compounds.<sup>3,5</sup> The largest available laboratory, our planet, utilizes radiation from the sun. However, on the postulated primitive earth, no photo-synthetic organism had yet evolved.<sup>2</sup> Also most of the sun's energy is in the range of wavelengths that would be more effective in destroying organic compounds than in aiding their development.

#### Experiments Conducted Under Reducing Conditions

Since oxidizing conditions are now present on the earth, many attempts were made by scientists to synthesize organic compounds under oxidizing conditions.<sup>6</sup> Most of the experiments were unsuccessful, and if any organic compounds were produced, the yield was very small.<sup>2</sup>

Since these experiments offered no promise, the primitive earth must have had a reducing atmosphere to allow for the formation of organic compounds. This was suggested by Oparin.<sup>1</sup> Miller's experiments<sup>7</sup> were run under reducing conditions.

Miller's experimental apparatus<sup>2</sup> was a closed system of glass, except for tungsten electrodes used to discharge the electrical arc. Water was boiled in a 500 ml flask, and the water vapor and gases were mixed in a five liter flask where the electrodes were located. The products of the discharge were condensed and then brought through a U-tube back into the 500 ml flask.

It should be noted that the well-known principle of increasing the yield of a reaction by selectively removing the product from the reacting mixture has been utilized in this experiment.<sup>8</sup> In other words, the reaction has been forced to the product side of the supposed chemical equation. An analysis of the products is given in Table 2.

**Table 2. Analysis of Yields from Sparking A Mixture of CH<sub>4</sub>, NH<sub>3</sub>, H<sub>2</sub>O, and H<sub>2</sub>, (710 mg of Carbon was added as CH<sub>4</sub>)<sup>2,9</sup>**

| Compound                   | Yield (moles) |
|----------------------------|---------------|
| Glycine                    | .00063        |
| Glycolic Acid              | .00056        |
| Sarcosine                  | .00005        |
| Alanine                    | .00034        |
| Lactic Acid                | .00031        |
| N-Methylalanine            | .00001        |
| α-Amino-n-butyric Acid     | .00005        |
| α-Aminoisobutyric Acid     | .000001       |
| α-Hydroxybutyric Acid      | .00005        |
| β-Alanine                  | .00015        |
| Succinic Acid              | .00004        |
| Aspartic Acid              | .000004       |
| Glutamic Acid              | .000006       |
| Iminodiacetic Acid         | .000055       |
| Iminoacetic-propionic Acid | .000015       |
| Formic Acid                | .00233        |
| Acetic Acid                | .00015        |
| Propionic Acid             | .00013        |
| Urea                       | .00002        |
| N-Methyl Urea              | .000015       |

#### Thermodynamics of Spontaneous Generation

Hull<sup>8</sup> in his paper quantitatively considered the formation of the very simple amino acid, glycine. This basic constituent of proteins is believed to be coded by the DNA triplet of nucleotides: adenine, cytosine, cytosine. Other amino acids are more complicated in that one of the hydrogen atoms attached to the central carbon atom in glycine is replaced by some other combination of atoms, such as CH<sub>3</sub> in alanine. Thus, other amino acids are more complex.

It should be obvious that if it is difficult to form simpler compounds, it would be almost impossible to form more complex compounds. Hull used the concentrations of raw materials as given by Miller and Urey<sup>2</sup> in his calculations. He worked within the supposed favorable reducing atmosphere.

Miller and Urey<sup>2</sup> were very concerned in showing that raw materials would be available for the formation of organic compounds, and assumed that their experiment would show that these raw materials would react to form the organic products. They applied thermodynamics to find the equilibrium concentrations of the raw

materials, but did **not** apply thermodynamics to the synthesis of the organic compounds.<sup>2</sup> Hull did the latter,

Consider the reaction:

$2\text{CH}_4 + \text{NH}_3 + 2\text{H}_2\text{O} \rightleftharpoons \text{NH}_2\text{CH}_2\text{COOH} + 5\text{H}_2$   
which leads to the formation of glycine with the reactants used by Miller.<sup>9</sup> The equilibrium constant (K) for this reaction is  $2 \times 10^{-40}$ . Based on principles of physical chemistry, the larger K is, the more products will form (reaction tends to the right); the smaller K is, the fewer products will form (reaction tends to the left). For the reaction,

$$K = \frac{a_{\text{NH}_2\text{CH}_2\text{COOH}} \cdot a_{\text{H}_2}^5}{a_{\text{CH}_4}^2 \cdot a_{\text{NH}_3} \cdot a_{\text{H}_2\text{O}}^2}$$

where "a" is the activity of the substances involved in the reaction. Rules<sup>10</sup> for expressing these activities for dilute solutions are:

$a_A = N_A$  (mole fraction) if A is the solvent (for pure solvents, solid or liquid,  $a_A = 1$ );

$a_A = C_A$  (concentration) if A is a solute (concs. to be expressed in moles per 1000 grams of solvent; or, what is nearly the same thing for dilute aqueous solutions, in moles per liter of solution);

$a_A = P_A$  (partial pressure) if A is a gas (pressures, or partial pressures, to be expressed in atmospheres).

Miller and Urey<sup>2</sup> calculated for a primitive atmosphere that

$$a_{\text{CH}_4} = P_{\text{CH}_4} = 4 \times 10^3 \text{ atm.}$$

$$a_{\text{NH}_3} = P_{\text{NH}_3} = \frac{P_{\text{NH}_3}}{P_{\text{N}_2}^{1/2}} = 0.04$$

$$a_{\text{H}_2\text{O}} = P_{\text{H}_2\text{O}} = 10^{-6} \text{ atm.}$$

$$a_{\text{H}_2} = P_{\text{H}_2} = 1.5 \times 10^{-3} \text{ atm.}$$

Using these values and the value for K, the aqueous concentration of glycine was found to be  $10^{-27}$  moles per liter.<sup>8</sup> Similar calculations for more complex amino-acids yield smaller concentrations.<sup>8</sup> Therefore, at equilibrium conditions, there is little chance of having available enough organic compounds suitable for any evolutionary process. Hull<sup>8</sup> states, "It is possible that, in an energy-rich medium, steady-rate concentrations can be maintained far from equilibrium. In such cases the expected concentrations depend on the available mechanisms for synthesis and decomposition." Assume that concentrations much greater than  $10^{-27}$  moles per liter of glycine could be formed. Once formed, would anything in the supposed primitive atmosphere cause decomposition of the organic products? To answer such questions the kinetics of spontaneous generation processes must be considered.

### Kinetics of Spontaneous Generation

From Table 1, it is seen that ultraviolet light is an important source of energy for any natural process occurring on earth or in the earth's atmosphere. It must also be considered from the standpoint of decomposition of organic compounds. The atmosphere proposed by Miller and Urey<sup>2</sup> is transparent to ultraviolet radiation down to 2250A.<sup>8</sup> Hull<sup>8</sup> states,

A glycine molecule formed in such an atmosphere is immediately vulnerable to radiation up to 3000A, adsorbing in a part of the solar spectrum far more intense than that which produced it. Decarboxylation of activated glycine would presumably occur with a quantum efficiency of the order of unity. Thus, any glycine formed would be rapidly decomposed.

Hull estimates that the half-life of any glycine molecule is about 30 days; and, this is a much shorter time than the half-time it would take the glycine molecule to descend to the surface of the earth from the stratosphere, where it would be formed. This transport half-time is estimated at three years from fall-out data.<sup>8</sup> Therefore, 97 per cent of the glycine would be decomposed before it reached the earth.

Recall that the supposed source of energy for generation of these organic compounds is electrical discharges in the atmosphere which is a minor energy source. Such a source, operating at maximum efficiency, could not generate much product. The greater source of energy, ultraviolet radiation, would have a destructive influence on any organic material formed.

This destructive energy source is hundreds to thousands of times more abundant than the electrical energy source.<sup>8</sup> Table I shows only ultraviolet light available below wavelengths of 2500A. However, all ultraviolet radiation wavelengths which are destructive to organic compounds must be considered.

Suppose that three per cent of the initially formed glycine did fall into the ocean without decomposing. Would it begin to concentrate there in such quantities so as to favor other spontaneous generation processes? Ultraviolet radiation penetrates the ocean to considerable depth. Ten per cent of the light radiation with a wavelength of 2600A can penetrate sea water to a depth of six inches, and can penetrate fresh water (which is more like the proposed primitive oceans) to a depth of three feet.<sup>11</sup> Hull<sup>8</sup> states,

In the mixed layer above the pycnocline, about 100 meters deep, glycine would have a half-life to ultraviolet destruction of about 20 years. Even assuming it to be mixed to the bottom of the ocean, with an average depth of four km., the half-life is only 1000 years. These

short lives for decompositions in the atmosphere or ocean clearly preclude the possibility of accumulating useful concentrations of organic compounds over eons of time.

Eventually the rate of formation of glycine would equal the rate of decomposition, and no further glycine would form. Thus, the build-up of high concentrations of glycine would be impossible.

Groth and von Weysenhoff<sup>4</sup> exposed mixtures of  $\text{CH}_4$ ,  $\text{NH}_3$ , and  $\text{H}_2\text{O}$  vapor to ultraviolet radiation (1165-1470Å). After an exposure of  $10^{21}$  quanta, glycine could barely be identified in the product. If 0.1μ grams of glycine can be detected, then the yield can be calculated.<sup>8</sup>

It is found that the partial pressure of any glycine that would be formed would be only  $10^{-14}$  atm. If three per cent reached the ocean, and considering its life there, the maximum concentration in the sea would be  $10^{-12}$  molar.<sup>8</sup> Hull<sup>8</sup> states:

This concentration is far from equilibrium. The actual concentrations realized would probably lie between  $10^{-27}$  and  $10^{-32}$  molar; but even the highest admissible value seems hopelessly low as starting material for the spontaneous generation of life.

### Summary

Hull's conclusions are quoted:

The conclusion from these arguments presents the most serious obstacle, if indeed it is not fatal, to the theory of spontaneous generation. First, thermodynamic calculations predict vanishingly small concentrations of even the simplest organic compounds. Secondly, the reactions that are invoked to synthesize such compounds are seen to be much more effective in decomposing them.

Further, it must be remembered that both lines of argument become quantitatively of an overwhelmingly greater magnitude when organic compounds other than the very simplest are considered. From thermodynamics, the equilibrium concentration of glucose is  $10^{-134}$  at unit activities of the component reactants. The values for the simplest proteins must be unimaginably small. Also, in agreement with the thermodynamic prediction, the kinetic steady-state concentration falls rapidly with increasing complexity of organic compounds, because (1) the quantum yield for their formation decreases; (2) at the same time their stability against thermal decomposition decreases; and (3) their opacity to ultraviolet radiation and decomposition by this means increases. The physical chemist, guided by the proved principles of chemical thermodynamics and kinetics, cannot offer any encouragement to the biochemist who needs an ocean

full of organic compounds to form even lifeless coacervates.

Miller's experiment is an excellent one, scientifically speaking. However, mixing water vapor with gases and sparking them in a closed glass system, then selectively removing the products certainly does not approximate any supposed primitive earth atmosphere.

The experiment simply proves that if these gases and water vapor are mixed in a closed glass system, sparked, and the reaction product removed to force the reaction to the right, then small amounts of simple organic compounds can be formed. The extrapolation of this up to a primitive atmosphere is not valid.

If the reacting mixture had been exposed to large doses of ultraviolet radiation, and the products left in the reacting chamber, the experiment would have more closely approximated supposed primitive conditions, but it still would be foolish to extrapolate it to a system the size of the earth's atmosphere.

If the postulated primitive atmosphere was reducing and electrical discharge energy was utilized to form certain simple amino acids, these compounds must randomly drift around in a hostile atmosphere of destructive ultraviolet radiation until eventually some of the product possibly could escape to the ocean to reach a limiting concentration there. Miller's experiment does **not** approximate this.

Many evolutionists, when faced with the second law of thermodynamics, state that the universe or living organisms are open systems; and, thermodynamics can only be applied to closed systems, which only exist in theory or can be approximated in a laboratory. The writer hopes to deal with these objections in a later paper, but for now it should be realized that Miller's experimental apparatus is a **closed** system.

The processes observed in this closed system are simply *assumed* to be possible in this part of our "open" universe (the earth) many years ago. Why reject unfavorable thermodynamic results in closed systems, and accept favorable results in other closed systems as being applicable to a natural situation? Even the favorable results are not so favorable when examined closely.

The line of reasoning of evolutionists can be seen from the various experiments conducted on organic compound synthesis:

For instance, since the earth's atmosphere is oxidizing, then experiments were run trying to synthesize organic compounds under oxidizing conditions. These were not successful, but experiments run under reducing conditions were successful. Then the "primitive" earth must have had a reducing atmosphere.

An energy source is needed and, if experiments utilizing the most abundant sources of energy are unsuccessful or unfavorable, then tests must be run employing the minor sources of available energy. If these are successful in the laboratory, then these must have been the processes occurring in spontaneous generation.

Well-trained men, given enough time and funds, could, through continual laboratory experimentation come up with a seemingly "experimentally proved" process of evolution. Laboratory conditions may never even closely approximate any natural situation that ever existed, but men of an evolutionary bent will **interpret** the results to suit themselves.

If men will not admit to a creation by God, then they will continue to look for experimental results that will suit their assumptions. Such men will accept only those results that aid their cause, or, will continue to look for experimental results that seemingly fit their theories. Men are in rebellion against God, and this rebellion is reflected in all of their activities, including scientific work.

The paper by Miller and Urey is very honestly written. They state their assumptions and direction of effort readily. The opening statement of the paper is as follows:<sup>2</sup> "Since the demonstration by Pasteur that life does not arise spontaneously at the present time, the problem of the origin of life has now been one of determining how the first forms of life arose, from which all of the present species have evolved."

This statement admits that uniformitarianism does not hold a satisfactory answer to the origin of life. Therefore, to explain the origin of life a scientist must look beyond present known scientific processes. For instance, although the atmosphere of the earth is oxidizing, experiments have shown that spontaneous generation could only have taken place under reducing conditions, another violation of uniformitarianism.

Scientist who believe in creation by a direct act of God, and believe in a universal flood are ridiculed because of their dependence on miraculous events and on catastrophism. Both direct creation and catastrophism are violations of uniformitarianism.

However, to explain evolution at key points, scientists must deviate from present known conditions and from present scientific processes. This is necessary in both the origin of life and the origin of the universe. This is catastrophism in reverse. Some fortunate or blessed event happened at the necessary time to help the process of evolution in its upward climb.

When a reducing atmosphere on the earth was necessary, it must have been there. When

any spontaneously-generated organic material fell to the earth or into the ocean, a non-equilibrium condition must have existed to have allowed concentration of large quantities of these chemical compounds, so that the process of evolution could have continued to another stage.

The evolutionist needs these blessed events to explain his theories. The uniformitarian approach offers no help, and, in fact, present scientific processes allow only for reactions and mechanisms that are destructive to evolution.

Many people think that scientists go into an experiment unbiased as to the results that will be obtained. Miller and Urey<sup>2</sup> state: "Our discussion is based on the assumption that conditions on the primitive earth were favorable for the production of the organic compounds which make up life as we know it." This is a purely evolutionary approach, and all results will be interpreted according to this assumption. How can anyone come up with experimental results other than those that favor evolution with such an experimental bias?

It is also thought possible that many of the reactions necessary for spontaneous generation were catalyzed by the adsorption of organic compounds on clay and mineral surfaces.<sup>2</sup> It would indeed be unusual if adsorption processes on these materials did not catalyze at least some of the many reactions necessary for chemical evolution.

It has been found that the polymerization of aminoacetonitrile to glycine peptides is accomplished in the presence of acid clays.<sup>12</sup> But this does not say that this actually happened, or could it ever be proved that it did happen. Research of this nature will turn up facts not related to evolution. Yet, these facts could be utilized by some biased scientists to explain theoretical evolutionary processes, but actually they prove nothing.

This trend of thinking and scientific investigation will continue in the same direction as long as men are determined to rule out God in their lives. Only when a man accepts the Lord Jesus Christ as his personal Savior, and yields his life to Him, will he begin to realize the uselessness of scientific investigation into the origin of life and simply believe the Genesis account of Creation.

We can learn much of the creation through scientific research and many beneficial advances can be made, but science can not legitimately be used as a tool to refute the Biblical position that God created the physical universe and all that is in it.

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## MUTATIONS REVEAL THE GLORY OF GOD'S HANDIWORK

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*Mutations have been studied through three levels of investigation: (1) their original discovery and proof of inheritance according to Mendelian principles; (2) the artificial production of them by radiation and mutagenic chemicals and parallel with this work, the study of their actual behavior in natural populations; and (3) the molecular genetic approach.*

*In spite of great enthusiasm and many claims, no investigator has shown as yet that **any** mutation is so advantageous as to spread through an entire species population of plants or animals. Molecular geneticists, such as Seymour Benzer, conclude, "in the DNA of living organisms, typographical errors are never funny and are often fatal."*

*The technique used by Benzer in analyzing *T<sub>4</sub>* bacteriophage virus mutations is described, and it is shown that all mutations in this phage are either deletions of varying length, nucleotide base changes, or addition or loss of a base. When either an addition or loss of a base occurs the remainder of the code becomes a nonsense code and the combination is non-functional.*

*Molecular genetics shows the DNA code to be a marvelously complex one. Surely in studying it we are coming close to understanding how God is daily at work maintaining and preserving all creatures.*

For many years mutations, or suddenly appearing changes in either the appearance or behavior of individual organisms, have been considered the material basis of evolution. However, as more is learned about the exact nature of mutations, the less likely do they seem as building blocks for the origin of even varieties, let alone species of plants. Indeed, cyto-genetic research, and especially molecular genetics, has revealed an ever-increasing complexity of the physical basis of inheritance called the "gene."

### First Level of Investigation

The study of mutations has involved probably three levels of investigation. First, after their discovery by such pioneers as Hugo DeVries, there was the painstaking work of T. Hunt Morgan and his associates, Calvin Bridges and A. H. Sturtevant. These men patiently accumulated information on the naturally occurring changes, or mutations, in eye color, wing form, eye structure, bristle arrangement and numerous other features of the fruit fly, *Drosophila melanogaster*.

Careful intercrosses and back-crosses showed that these mutations could be grouped into four

linkage groups corresponding to the four chromosomes of the species. Within each chromosome the mutant genes were located serially, like beads on a string. The order of their sequence was determined by crossing-over studies; those far apart showing much recombination, while those close together, very little. As a result "chromosome mapping" could be done with fair precision, though odd "clumping" of genes in certain areas remained puzzling. Similar detailed chromosome maps were made in corn, tomatoes, flour beetles, and various grains, such as wheat.

Meanwhile the *process* of mutation was greatly speeded up by X-ray irradiation of the fruit fly. Muller first made this discovery in 1928. Here was a way by which biologists could, in a few years, obtain more mutations than Morgan and his associates found in a lifetime of patient observation. Thus quantitative studies as to the percentage of harmful vs. neutral, or possibly advantageous mutations, could easily be made.

Here was the first disappointment for evolution-minded biologists, for most mutations found

were harmful. In fact only about one in a thousand seemed to be even neutral or showed **slight** advantage under laboratory methods of nutrient agar culture. Unfortunately X-rays did not prove very effective as regards inducing variations in plants though some success was obtained by pollen irradiation in such plants as corn.

Here again most mutations were semi-sterile types and many proved to be the result of translocation so that portions of chromosomes formerly separate were now attached, and reciprocally, portions previously in one chromosome were transferred to another. These reciprocal translocations were in fact quite common and may schematically be represented as follows:

|                     |                     |
|---------------------|---------------------|
| .....               | .....               |
| <b>Chromosome 1</b> | <b>Chromosome 2</b> |
| .....               | .....               |
| <b>Translocated</b> | <b>Translocated</b> |
| <b>Chromosome 1</b> | <b>Chromosome 2</b> |

There was considerable enthusiasm for a while that translocated chromosomes might explain the origin of new chromosomal arrangements, but soon it was found that all were lethal when homozygous.

The era from 1920 to 1945 might well be termed the period of great discovery and freedom to speculate that biologists were finding the "real" physical basis of evolution. Mutations were considered by many biologists as really *new* entities, useful as building blocks so to speak by the process of natural selection.

Then came mathematical treatises, by such masters at the art, as J. B. S. Haldane, R. A. Fischer, and Sewell Wright. They argued most convincingly that even though only one in a thousand mutations were advantageous to the extent of even a 1% advantage, these would slowly accumulate under the pressure of natural selection in a population and lead to evolutionary change.

Thus Patau showed that a mutation with a 1% advantage would increase according to the pattern shown in Figure 1. Increase from .01% to .1% of the population would occur only after 900,230 generations in a large population. Though millions of years would be needed to effect the transformation of the small five-toed, dog-sized Eohippus to the modern large one-toed horse, still geologists claimed abundant time was available, so all seemed well with the general theory.

### Second Level of Investigation

Then came what might be called the second level of investigation. Population geneticists decided to study the actual way in which mutations did or did not accumulate under actual

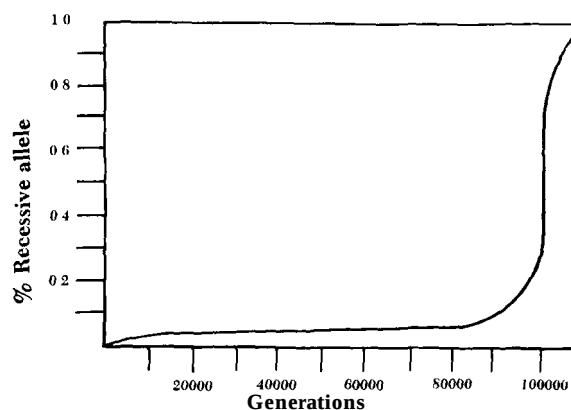


Figure 1. Showing very slow increase of a recessive mutation with advantage of 1 in 1000.

natural, field conditions. And parallel to these intensive studies of other means of inducing mutations were conducted which involved use of gamma radiation, neutron radiation, and various mutagenic chemicals.

Thus, as I reported in the 1965 *Creation Research Society Annual*,<sup>1</sup> neutron radiation of axillary leaf buds, or "budding eyes" of roses, was a highly effective way of obtaining mutations. In fact more mutations were obtained by the radiation of 50 rose "budding eyes" than one could find in a field of a million rose plants in a whole lifetime of patient searching for "sports."

Here was a splendid tool also for measuring the vigor and viability of mutations. For, as a measuring stick so to speak for calibration, we had the original unvarying variety easily propagated by budding. Accordingly, by rebudding the mutant forms *at the same time* as the original variety, and growing under comparable hot-house conditions, accurate comparison as to vigor, pollen fertility, and other characteristics could be made.

An interesting feature of this work is as follows: although some mutations showed useful horticultural variation, such as an increase in petal number, or loss of the unpopular magenta coloration, **ALL** without exception were weaker than the variety originally radiated. This was true even with the remarkably vigorous variety, Queen Elizabeth. Some fairly vigorous and interesting coral and white mutations were obtained, but these failed commercially since they were not vigorous enough under varying garden conditions.

Similar results were obtained by other workers using gamma radiation, and it is now quite clear that mutations in plants are usually significantly weaker, or have a reduced fertility, in terms of either the percentage of good pollen, or number of seeds produced per plant. Arti-

ficial induction of mutations is useful horticulturally because sometimes a mutation may show some much-needed commercially desirable characteristic. Thus, even though somewhat more difficult to grow or giving less seed, such a variety is worth using. This is particularly true of ornamental plants. Some of the neutron-induced rose variations may prove useful if the original variety is super-vigorous but lacks petal number. A mutation from it with enough petals to be commercially desirable would be worth growing even though less vigorous than certain overly vigorous types such as Queen Elizabeth.

In recent years, enthusiasm for demonstrating evolution by a study of induced mutations has about died out, since clear-cut cases of obviously advantageous mutations simply do not occur.

Meanwhile such population geneticists as Band<sup>2</sup> were showing what natural selection can and cannot do. Her work was with fluctuations in naturally occurring out-door populations of the fruit fly, *D. melanogaster*, so carefully studied under laboratory conditions from 1947 until 1962. One of her most remarkable conclusions was that natural selection does not increase the most viable or best true-breeding lines or homozygotes in natural populations!

Most pertinent were observations made following the unusually severe winter of 1960-61 at Amherst, Massachusetts. September temperatures were the highest on record and the samples were collected then. In 1962 collections were made during the driest season on record. The results of genetic analysis of variability and viability in 1961 and 1962 were compared to the more normal season of 1960 and the earlier ones of 1947-49. Her conclusions follow:

- 1) Natural selection is highly efficient in maintaining population fitness during stress as in the summer of 1962. The effects are shown only in the heterozygotes.
- 2) Stabilizing selection has led to the retention of most components of genetic diversity.
- 3) There is no evidence of improvement in viability of the homozygotes (those showing the mutation and breeding true for it.)
- 4) No decrease in genetic load was shown. This is because most load components (recessive mutations) remain concealed in the random heterozygotes.
- 5) Hence joint effects of directional selection and stabilization are directed to the interaction of genes and gene complexes in the heterozygous condition.
- 6) A slight reduction in total genetic diversity resulted from stress conditions.

Band does not stress the most interesting conclusion: namely, that there is no evidence that selection has been primarily directed to the elimination of harmful variations or mutants. Neither do such variants appear to reduce the viability of the heterozygote. Her Figure 1 is fascinating in that it shows no improvement in average viability of the homozygotes mutations, or any reduction in the magnitude of the genetic load.

From the viewpoint of evolving new characteristics these conclusions are indeed pertinent. The only source of new and distinctive features leading possibly to species formation are mutations. These must gradually be accumulated in true breeding or homozygous conditions, since of course species and even varieties differ from each other in various traits which are *constant*.

Yet Band's research shows that even the most viable homozygotes do not increase in number. Furthermore *no improvement* in their viability occurs. Since even drastic mutations show no harmful effect, if recessive in the heterozygous condition, there simply is no mechanism for eliminating them. Now the ratio of "harmful" to "useful" mutations is at least 1000 to 1. Quite obviously, if a species really did evolve by natural selection, the genetic load of drastic or harmful mutations would become so high in a few hundred generations as to result in all offspring having some defect, because of chance mating of identical genotypes and resulting homozygosity. The fortunate fact that this is not yet true, in the human race or in most plant and animal species, argues strongly for the special creation of the species unit, and especially for its existence for a *relatively short time* instead of hundreds of thousands or millions of years.

### Catastrophic Selection

With the discovery, that strains of bacteria resistant to penicillin, aureomycin or chloromycetin always showed up, when these drugs were used to effect cures of various diseases, great enthusiasm was aroused for a while among evolution-minded biologists. Here at last was "proof" that beneficial mutations really did occur.

But enthusiasm was short lived, for it soon became clear that these mutations did not arise as a result of exposure to penicillin. Rather they seem to occur at a *constant rate*. Associated with the resistance, there always is a decrease in viability under *normal* conditions. Accordingly, under normal conditions, they are soon "swamped out;" and, either are completely eliminated, or are carried along as heterozygotes in a very small number of individual bacteria. Now most bacterial cells appear to be haploid, but there is increasing evidence that sexuality does

occur; hence some cells are, for a time at least, diploid; hence heterozygosity does occur even in bacteria.

When a strain is exposed to antibiotics, either the mutation rate for these otherwise defective resistant mutations is so high that sooner or later one occurs, or an already established one is given the starting advantage of having no normal competitors. Soon the entire population is of the resistant type, and new medication is necessary. However, as soon as treatment is relaxed, the normal type bacteria take over, and the resistant strain is either eliminated or reduced to a minute fraction of a percentage of the population.

The story has been remarkably well presented as regards the housefly in a recent issue of *California Agriculture* in an article entitled "Housefly Resistance To Insecticides."<sup>3</sup> The conclusions on the housefly parallel those based upon studies of bacteria. Thus, the article author writes:

It is now well established that the development of increased ability in insects to survive exposure is not *induced directly* by the insecticides themselves. These chemicals do not cause the genetic changes in insects; they only serve as selective agents, eliminating the more susceptible insects and enabling the more tolerant survivors to increase and fill the void created by destruction of susceptible individuals.

There are several fascinating observations:

1) Resistance to DDT and dieldrin continued at a high level *in an area where these sprays were used*, in spite of the flies not having been sprayed with either chemical for about ten years. In other words, once established, resistant strains maintained themselves without selection pressure.

2) Flies at a cattle feed lot and at a nearby poultry ranch showed little resistance to any organophosphates or carbonates, since they had not been sprayed very often with them. Yet *agricultural crops* in the area had been treated regularly. Evidently the resistant strain of flies, though able to maintain itself once established, *is incapable of spreading* through the whole range of species even in a given area such as Blythe, where this observation was made. Surely flies in the nearby agricultural area became resistant from frequent spraying of the crops, yet feed lots and poultry farms had a low level of resistance. Also in no instance were 100% of the flies, even *in the most exposed areas*, resistant to the chemicals used.

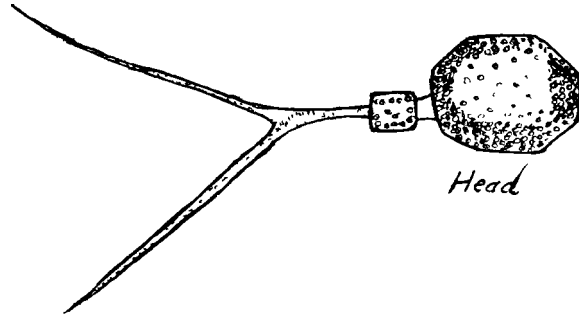


**Figure 2. Diagrammatic representation of T-2 Bacteriophage magnified 500,000 diameters. Weighs 100 million times the hydrogen atom. Head has 1 chromosome with 200,000 base pairs (After electron micrograph, Benzer, p. 71.)**

### Third Level of Investigation

An explanation of just why most mutations were harmful, or once established, tended to maintain themselves at various percentages of the total natural population without further selection pressure, was so far wanting. With the advent of molecular genetics the third level of understanding has now been reached.

Thus Seymour Benzer<sup>4</sup> has found that the T<sub>2</sub> bacteriophage, which infects the colon bacillus, is a most useful organism for mapping in detail the molecular limits of gene structure. In a 20 minute experiment by use of a single test tube, a quantity of genetic data can be obtained, which would require the entire human population of the earth, if such a complex organism were used for study!

Phages are virus organisms characterized by a hexagonal-looking head, and a complex tail by which they attach themselves to the bacillus wall. (Figure 2) Within the head is a long-chain molecule of DNA having a weight of about 100 millions times that of hydrogen. After attachment, the DNA alone moves into the bacillus cell and takes over reorganization of the cell machinery to manufacture 100 or so copies of a complete virus and the bacterial cell then bursts open liberating these virus organisms.

It is estimated that the DNA contains about 200,000 base pairs. Each base pair is one letter of a minimum three letter word which may specify which of the 20 odd amino acids is to be linked up into a polypeptides chain. Sometimes an entire "paragraph" of such "words" is needed to specify the *sequence* of amino acids needed for *just one* polypeptides chain and several such chains are needed for a complex protein.

Now "typographical" errors may occur in the replication of the DNA molecule. Transpositions, deletions, additions, or inversions may occur. As Seymour Benzer says, "In a daily

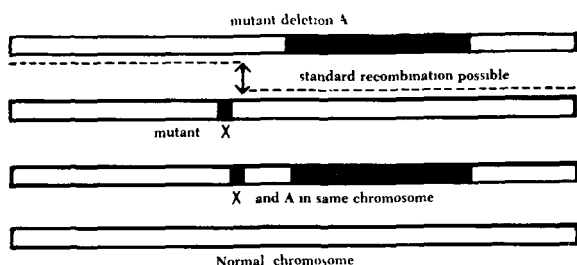


**Figure 3. Showing how deletions are used to test location of mutants.**

newspaper the result is often humorous. In the DNA of living organisms, typographical errors are *never* funny and are often fatal.” (Emphasis added)

However these “typographical” errors or mutations can be used to analyze a small portion of the information carried by a  $T_4$  bacteriophage, and thus reveal the amazing complexity of not only the DNA code, but the very processes of cellular activity as well.

One group of mutants called rH mutants can be identified quite easily by the appearance of the plaques or clear regions they form on the surface of a culture in a glass dish where phage particles have multiplied and destroyed the bacterial cells. The shape and size of these plaques are hereditary characteristics of the phage that can be easily identified and scored. A plaque produced in several hours will contain about 10 million phage particles, the progeny of a single phage particle.

Now the  $T_4$  phage can produce plaques on either host strain B or K. This standard form gives rise to rH mutants easily recognizable by a distinctive plaque on B cultures. But these mutants cannot form plaques on bacterial strain K. This is the “key” to the whole mapping technique used by Benzer; for an rH mutant can grow on bacterial strain K, if the cell is simultaneously infected with a particle of the standard type. The function of the standard type phage has been traced to a small portion of the  $T_4$  phage genetic map known as the rH region.

As mentioned before, various different-appearing plaques or mutants arise spontaneously in this area. These may be crossed with each other by adding each of them to a liquid culture of B cells. This gives an opportunity for the progeny to recombine portions of genetic information from either parent.

If the two mutants resulted from typographical errors in different parts of the DNA molecule, some individuals of the standard type will be regenerated. A sort of “crossing-over” occurs. (See Figure 3) These reconstructed standards will produce plaques on the K strain, whereas

the original mutants cannot. In this way one can detect a single recombination among billions of offspring. This allows the resolution of two rH mutants that are only *one base apart* in the DNA molecular chain.

The exact mechanism of recombination is not known. However, it seems that two defective DNA molecules may actually break apart to form one non-defective molecule which then is replicated; or, in the course of replication, there may be “copy choice,” such that only good portions of the two mutant molecules are “copied.” This appears to me as granting quite a remarkable power of selectivity to some “curative” agency in the  $T_4$  phage cell.

At any rate, the results of a long and elaborate study of hundreds of non-reverting rH mutants shows that **all** can be represented as containing deletions of one size or another in a single linear structure. By contrast, the rH mutants discussed above behave as if their alterations were localized at single points. By testing against the non-reverting segments at this particular area of the  $T_4$  phage DNA molecule, all mutants located within a given segment will not recombine when tested against it. (Figure 4)

By use of about 80 such non-reverting segment mutations, the rH point mutations may be assigned to the proper one. Finally, those localized in one small segmental deletion length or segment are tested against each other. Those showing recombination are obviously at different sites; and, then, each site is named after the mutant indicating its location. Finally, the *order* of the sites within a given segment can be established by measuring the recombination frequencies.

Of an estimated 350 sites in this small area, about 250 have been located, and only a hundred or so remain to be found. All are defective. Furthermore, certain chemicals, such as 5-bromouracil, increase the mutation rate at certain sites by a factor of 10,000 or more, yet affect no change at other sites. All of these also are defective changes.

Where then are the “good” mutations, needed for evolutionary progression?

The reason for this state of affairs is clearly shown in a paper by F. H. C. Crick<sup>3</sup> in the *Scientific American* for October of 1962. He shows that the sites discovered by Benzer correspond to changes in the DNA base nucleotides. Mostly, the defects are the result of adding or deleting one base, or at most a small group of bases, and are not merely the result of altering one of them. Such addition can be produced at random by compounds called acridines. Just how this chemical works is not fully understood. However, since the resulting changes can be combined or

broken up, there seems little doubt as to the fact that they are additions or deletions.

As has been explained by Duane T. Gish,<sup>6</sup> the simplest code by which 20 amino acids could be specified involves at least three nucleotide pairs, or a triplet of "letters" such as ATT, GCA, TCG, ACC. (A-adenine, C-cytosine, T-thymine, and G-guanine) The "message" evidently begins at a fixed point at one end of the gene, and is read three bases at a time. Then, if for some reason the reading starts at the wrong point, the message would fall into the wrong sets of three, and so would be incorrect. For each *correct* reading of the code there are two incorrect ones.

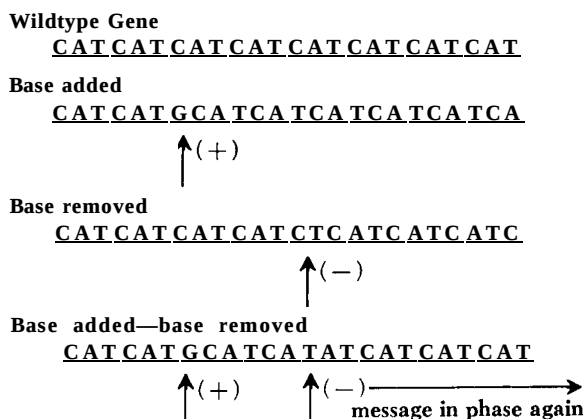
That is why the addition or deletion of a base in most parts of the gene makes it completely non-functional. The reading from that point onward would be totally wrong. Experimentally, this meant that if an additional base of plus mutation is combined with a plus, the combination is non-functional.

Likewise a minus with a minus is non-functional. But, if a plus is combined with a minus close to it, the function is restored. This is because, starting at one end of the rH region of the B cistron, or gene, the message would be read correctly until the extra mutation-causing base was reached. Then, the message would not make "sense" until the location of the minus mutation or missing base is reached, after which the message would come back into phase or make "sense" again.

In other words, the function of the rH part of the B gene does not seem to be important. Accordingly, the message can be "wrong" for a short distance, and still be functional. But, if the distance is very long between the plus and minus mutations, the combination will not function. This is shown in Figure 4, adapted from Crick's paper.

Now, if only a sequence of three bases is needed to specify an amino acid, 64 could be specified instead of the actual 20 available. Off hand, it would seem that most "messages" are nonsense messages or triplets. However, the experimental results show that most of the 64 possible triplets, or codons, are not nonsense, but actually stand for amino-acids. Hence probably more than one codon can "call" for the same amino acid.

The picture emerging from the work of molecular geneticists is a marvelously complex code which will stand mighty little in the way of alteration, either addition, or subtraction, or change of *any* of the nucleotide bases. Only because the rH region is *relatively* unimportant in function was it possible to accumulate the large number of mutations, making possible the detailed



The imaginary message is CAT, CAT . . . Adding of a base shifts the reading to TCA, TCA. Removing a base makes it ATC, ATC. Addition and removal puts the message in phase again. The reading is from left to right in triplets of 3 nucleotide bases.

Figure 4. Showing effect of mutations.

analysis of this rather minute portion of the T<sub>4</sub> phage DNA molecule. Now evidently, most portions of this molecule code message is so important, that even a *short* portion out of phase causes a completely non-functional "message," hence mutations do not survive.

The virus organism has only one chromosome; yet, "higher" animals, including man and, of course, all of the plants except algae, have many chromosomes—each one made up of organized protein and DNA molecules. How did this organization come into being?

The only solution so far offered by evolution-minded molecular geneticists is a sort of molecular level "polyploidy." They picture an organism such as a bacterium, which has a single circular chromosome, as giving rise to one with two chromosomes. Then, presumably, mutations could accumulate in the "extra" chromosome, and be shielded by the normal genes of the original one. But, sooner or later, sexual union or conjugation of two bacteria would occur. Then, some of the resulting descendants would have only a pair of the "new" chromosomes, and no original normal genes to shield them from the possibility of having a lack of balance in the plus or minus mutations, which occurred during the time before conjugation.

Surely, it is stretching credulity a bit to picture these "new" chromosome pairs as having such a finely balanced set of plus and minus mutants as to have "correct" messages for all needed functions. In fact, it is difficult to see how any really new functions, such as the change from single celled organisms like bacteria to even the simplest multicellular green algae, such as a *Pleurococcus*, could ever come about by accum-

ulation of such defects as are so far reported by molecular geneticists.

It is true that the very nature of such experiments, as those of Benzer, where the K strain is used to reveal recombination, would tend to concentrate attention on defective changes. Still, since these are picked up as changes in appearance of plaques on the B strain, some should be of a positive nature and grow on the K strain better than the standard type. Such seem never to have been found or at least remain unreported.

From the creation viewpoint, we could of course expect the DNA system to be a marvelously intricate one. Since designed to accomplish very complex tasks even in the "simplest" organism such as a T<sub>4</sub> phage virus, it obviously could stand little in the way of tinkering. In fact, in light of the picture of just how DNA, RNA, the ribosomes, and the cytoplasm interact to form the needed proteins, we cannot but marvel at the complexity of all these reactions taking place at one time in a single cell.

Surely, the ingenuity of man is taxed to find ways of experimentally solving the exact way in which even a "simple" type of phage operates.

Should we not then be filled with a feeling of reverent awe at the glory of God's handiwork as shown by this revelation of the complex way in which His created organisms carry on, their tasks? Truly the calling of a molecular biologist is a great one. Let us hope, that some of our young creation minded students approach this field, realizing that here they are coming close to seeing God at work as He daily maintains and preserves all creatures.

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## IS DNA ONLY A MATERIAL CAUSE?

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*By means of philosophical considerations and, secondly, through specific examination of experimental facts, the author investigates the notion that DNA is "the secret of life."*

*An objection is raised that use of the word "code" in references to DNA involves nothing more than a metaphor. This and other objections are studied regarding DNA as a material, efficient, and formal cause. Objection is raised against the idea that memory is the encoding of experiences in DNA.*

*Examination of experimental data brings out denial of the normal expectation that complicated organisms would have larger amounts of DNA than less complex forms. Facts indicate that DNA is influenced by environment as well as heredity.*

*Comparisons are presented between results of **in vitro** and **in vivo** experiments involving DNA.*

*The author concludes from his theoretical arguments and from experimental evidence that DNA is not the whole cause of life and heredity. DNA is a material cause, but the author asserts there still must be a formal cause.*

The one thing that most distinguishes living beings is their ability to reproduce themselves. In so doing, they are, of course carrying out God's command to "Be fruitful, and multiply. . .," (Genesis 1:22).

It is true, perhaps, as has sometimes been remarked, that things which are not living, for instance crystals under suitable circumstances, may "grow." Be that as it may, certainly the things which are not living do not show the

same striving to reproduce themselves; if the crystals ever received a commandment to multiply they have not yet done much about it.

A second difference is that the living things are alike "after their kind" (Genesis 1:24); much more so than those that are not living. A snowflake, for instance, is a common crystal, or collection of crystals. Whether or not it be true, as is so often said, that no two snowflakes are alike, certainly there is much variety among

them, much more than there would be among bees in a swarm.

A third feature of living beings is nutrition. Metaphorically, it is true, we say that a fire is "fed;" we might say the same about a crystal growing from a solution. But any unprejudiced person would say that there is a difference; a living being uses its food in a discriminating way: some goes to its growth, some to maintenance, and some to act as fuel to keep life going. This is quite different from the "feeding" of a crystal in which material merely happens upon certain sites and sticks there. The crystal, in a sense is an effect of the solution and of the circumstances; the living being, on the other hand, is in some way a cause.

This brings up a fourth point. The word "cause" suggests action with a purpose: the kind of action which we do as a result of thought. Thought, so far as we know, does not exist apart from life (not necessarily corporeal life); it might not be going too far to say that life does not exist apart from the action with a purpose which, in us, would be considered as or related to thought.

### Kinds of Causes

Since we have had to consider causes, let us look into that notion a little more. We may distinguish four kinds of cause, as Aristotle did: material, formal, efficient, and final.<sup>1</sup> Of a statue (to use Aristotle's own example), the material cause is the marble; the formal, the pattern of the finished statue, which was in the sculptor's mind before it was in the statue; the efficient, the sculptor and his tools; and the final, the sculptor's fee and his fame as an artist. We shall shortly use these distinctions profitably.

What we want to investigate is the notion that DNA is the "secret of life." First of all, what does such a statement mean? Presumably it means that it is the presence and activity of DNA that gives living beings their abilities. Is such a statement true? That is what we have to investigate.

Since the common theory has been discussed for several years, and is considered elsewhere in this Annual, there is no need to describe it at length here. It is enough to notice that molecules of DNA are supposed to be duplicated, an existing molecule acting as a template for a new one, as if, in the building of a house, a brick acted as a mould for making another brick. Thus the appropriate proteins are built up. Also, enzymes are formed, which somehow influence the larger features of the growing creature. The whole proposed "mechanism" is often spoken of as the "genetic code."

### Objection to DNA As Code

Here an objection must be raised. So far, the word "code" is nothing more than a metaphor, and there are codes and codes. Until more has been said, nothing will really have been explained.

Is the "code" something like the Morse code? But this would require an intelligent being to read the code, and to do something about it with suitable organs. Is it like the punched cards of a Jacquard loom? This would require a mechanism to be operated by the code, a mechanism, moreover, much more complicated than the code, if our experience with automatic machines is at all applicable. (And if it is not, we are using words without meanings.)

The DNA would, it would seem, be considered in some sense a cause of the growing organism. But in what sense? Which of the four causes would it be? To elaborate on the distinctions between them, as Aristotle said<sup>2</sup>, "cause" means: (1) that from which, as an immanent material, a thing comes into being . . . (2) the form . . . , (3) that from which the change, (here the production) first begins . . . , and (4) the end.

Of these we may remark that: (2) the form is immaterial, for "the soul is the place of forms"<sup>3</sup> (3) the efficient cause does not remain in the effect; and, (4) the end is surely not DNA. It is true that someone once said that "a hen is an egg's way of producing another egg," but actually to believe such a thing is not only to put the cart before the horse, but also to mistake the cart for the horse.

So, the remaining possibility is that DNA is a material cause. Of course, a material, to be a material cause, need not be the only material, or even the one used in the greatest amount. A tiny amount of a crucial material may have a very large effect.

A striking example of this is the effect of iridium or antimony, added to the extent of maybe only a few parts per million, on germanium for making transistors. Again, the design of a masonry structure might depend on the kind of mortar to be used; and an examination of old wooden buildings will show how their design was influenced by the use of pegs rather than nails.

### Further Objections to DNA

Let us now consider some more objections to the notion that DNA could be an efficient or formal cause. (For this is what the common theory really means, although it is not put into these words. Supporters of this theory usually do not even consider finality.)

It has been common to imagine huge automatic machines, capable of many intricate tasks,

and to say that living things are somehow like them.

Elsasser<sup>4</sup> has investigated this question, and points out that if a molecule of DNA, or a whole germ cell for that matter, somehow causes the whole organism, in the way alleged by the common theory, it must contain a tremendous amount of information. In fact, the information required could be stored only by assigning meanings to various dispositions of atoms. Even so, there would not be room for much redundancy (over-abundant, excessive amount) of information.

On the other hand, the disposition of individual atoms is (to say the least!), a very ephemeral thing. Any stability of information requires enormous redundancy, which, as we just saw, could not be fitted in. Thus, Elsasser concludes, any mechanistic theory which makes heredity depend on mechanically stored information simply will not work.

Another quite apt illustration may be drawn from the "degeneration of workmanship." Suppose that a man had a machine shop, equipped with new machines. Using those machines, he could build a second lot of machines, a second "generation" so to speak, nominally duplicating the first generation. But only nominally, for inevitably errors, tolerances, etc., will combine to make the second generation a little worse than the first.

And if the second generation of machines is used to build a third generation, it in turn will be yet worse, and so on. After a certain number of generations the machines would be so "bad" as to be almost useless.

It is hard to see how living things, if they depend on a material "code," would not undergo a similar degeneration. Now though some degeneration, as expressed by mutation does occur, the most harmful mutations are soon eliminated by natural selection.

Of course, machines do not degenerate from generation to generation, because the toolmaker intervenes. For instance, he can make a surface plate—a plane surface—independently of the accuracy of any machine. He does this by making three plates, and scraping them until any two will fit together over their whole surface. Then they are all truly plane. Notice, though, that he did this by referring to the form of the plane surface which was in his soul.

Another point which Elsasser has made is that if information be stored corporeally at all in living beings, it is stored in the softest and apparently most unstable parts. If a lobster, for instance, stores information, it is in the soft parts of his body, not in his shell.

Nor is the chemical storage of information, which has sometimes been suggested, in any better position. For most of the reactions in the body are close to equilibrium, and thus very subject to fluctuations.

Incidentally, the soft and delicate parts of the organism, in which information is supposed to be stored, are just those in which metabolism goes on most strongly. This means that the components are changed very frequently, which, again, does not fit in well with any corporeal storage of information. No one would print information needed permanently on the scratch pad beside the telephone.

### Is Memory Encoded in DNA?

Heredity and the maintenance of the body during a being's life (so that, for instance, a man's fingerprints remain the same although his skin changes many times) would seem to be closely related. Memory, in the ordinary sense of the word, has at least some similarity to these things. So it has been suggested that memory is the encoding of experiences in DNA.

However, recently, this has been challenged. It had been reported that planaria, which had learned to do certain tasks, were fed to other planaria, which then showed the same abilities. But it now seems that nine laboratories, which have been trying to duplicate these alleged results, have been unable to do so.<sup>5</sup>

Moreover, mice, into whose brains had been injected drugs which inhibit the synthesis of RNA and protein, were still able to learn and to remember. In fact, there seem to be difficulties in the way of any theory of memory which makes it a purely corporeal thing.

No doubt the brain has something to do with memory. Yet, it seems that memory itself (as distinguished from the ability to act on memory), is not harmed by the removal of some of the brain. Moreover, memory itself does not seem to be localized in particular parts of the brain.<sup>6</sup>

It is, perhaps, not certain that memory, heredity, and the development of the individual are all connected. There is though, one consideration which seems to point in that direction.

We ourselves, when we set out to make something, rely on memory; even if there is a pattern before us we have to remember how to read it, how to use the tools, and, indeed, even that we set out to make such and such a thing.

Now memory in this sense is certainly conditioned by the mind; we are not always thinking about how to read a blueprint, but can turn our attention to it when we wish. So an activity of the mind is involved here. And mind, in the strictest sense, seems to be incorporeal.

In support of this view, we can perhaps do no better than recall Aristotle's argument that as for corporeal functions, including the senses in so far as they are corporeal, (and the same could be said of muscular activities), a strong exercise of the function leaves it impaired for a while. For instance, one is temporarily blinded by a strong light. But the exercise of the mind on something which is highly intelligible leaves it more, rather than less, able to deal with other matters.<sup>7</sup>

### Examination of Experimental Data

So far, this discussion has been rather philosophical. Indeed, that is nothing to be ashamed of; for to discuss a thing philosophically is to try to know what we are talking about, and to talk sense about it. On the other hand, we can reason about anything only by starting from some premises, and if the question has to do with experimental facts some of the premises should come from experiment.

So let us consider some experimental facts. Many of these are collected in the writings of Commoner, who is one of the strong contenders against the view that the whole "secret of life" is contained in DNA.<sup>8-11</sup>

First of all, while we certainly should not underrate the humbler creatures, yet anyone would agree that a man is much more complicated than an amoeba. Now, as Commoner has pointed out, if the development of the creature is governed by DNA, it would be natural to expect the more complicated creature to have the larger amount of DNA.

Is this, in fact, what is found? It is not. Man's cells, for instance, contain about 7 picograms of DNA each; but those of the African lungfish contain about 100 picograms, and the cells of *Amphiuma*, a primitive amphibian, about 168 picograms.<sup>12-14</sup>

On the other hand, there is a case in which two very similar species of insect, although morphologically indistinguishable, differ by 50% in the amount of DNA in their cells.<sup>15</sup> This would suggest that, at least in part, the function of DNA is something other than to serve as a "carrier of structural information,"

Another fact pointing to this same conclusion is the evidence that the formation of DNA is itself a more involved thing than the copying of templates. The static specificity of DNA, (i.e., its nucleotide sequence), is, it seems, regulated not only by the nucleotide sequence of the template, but also in part by the specificity of the polymerase enzymes which catalyse DNA synthesis.<sup>16,17</sup>

In other words, DNA, the supposed "vehicle of heredity," is itself influenced by environ-

ment as well as by heredity. Indeed, the sharply enhanced rate of mutation, which has been observed in bacteria under conditions of extreme thymine deprivation, suggests: (1) that an alteration in the nucleotide sequence of the DNA occurs under these conditions, and, thus, (2) that the specificity of the DNA synthesis may be partly controlled by the concentration of available free nucleotides.<sup>18-22</sup>

### Experiments on Synthesis of DNA

Some experiments in which DNA is synthesized *in vitro* have a bearing on our question. Three things are involved: some DNA put in as a "primer," the necessary enzyme, the DNA polymerase; and the necessary deoxynucleotides. Some experiments in which DNA primers from various sources were used along with polymerase from *Escherichia coli* showed that the nature of the resulting DNA was affected by the polymerase as well as by the primer.<sup>23</sup>

If the DNA primer and the enzyme are from the same organism the new DNA will be the same as the primer DNA within 5%. But, if the primer and the enzyme are from separate differing species of organisms, the disparity of sequence of the new DNA and the primer DNA is as much as 17.25 percent! The precision of protein synthesis also depends on *both* the DNA code and the specificity of the synthetic enzyme. Also the pH, magnesium content or concentration, and temperature affect the reaction system. As Commoner sums it all up, "Self duplication and biochemical specificity is a property of an intact whole cell, which is an inheritably complex system, and not the property of one or another molecule. We can ignore this fact only at the price of self-delusion."

On the other hand, *in vivo* experiments have shown that the precision with which an intact *E. coli* cell is capable of regulating the specificity of the proteins, which it synthesizes, depends not only on the specificity provided by the DNA genetic agent, but also on the amino-acyl RNA synthetase which is involved.<sup>24</sup>

### DNA as Other Than Code

There are other observations which it is difficult to fit in with the notion of a "code," but which favour another interpretation. For a wide range of creatures, the amount of DNA in a cell is about proportional to the volume of the cell. (That is to say, the ratio of amount of DNA per cell to the volume of a typical cell is about the same for a wide variety of creatures.)

Moreover, the rates of consumption of oxygen, and of metabolism, are about inversely proportional to the amount of DNA per cell.<sup>8</sup> Commoner suggests that this is because

DNA synthesis and the resultant sequestration of the catalytic nucleotides which are active in the oxidation electron transport system will tend to reduce the rate of catabolic degradation of the metabolites. In turn, this may be expected to increase the relative proportion of the available metabolites which enter into the anabolic process and thereby contribute to the synthesis of cell substance . . . one may anticipate a positive correlation between the DNA content and the overall size characteristic of the mature cell and a negative correlation between DNA content and the cell's characteristic rate of oxidative metabolism.<sup>8</sup>

Which, in other words, means that DNA is here acting as some sort of material cause. On the other hand, as Commoner concludes, in another place, "The unique precision of the chemistry of intact biological appears to be conditioned, in some as yet unknown way, by the inherent structural organization of the cell."<sup>10</sup> To which one might add: "that is to say, by the form—the formal cause."

There are other points which might be mentioned. There seems to be evidence to show that in special cases certain features can be inherited independently of DNA. And more important, even though it were established that DNA somehow arranges the growth of cells, no one seems even to have suggested a way in which it could control the pattern of a flower, say, or the structure of a bird's feathers. To say that it is "by enzymes" is just to imitate the dear old lady who said that machinery works "with screws, somehow." Moreover, it is undoubtedly true that living beings, as they grow, adapt themselves to the circumstances to some extent. It is hard to see how this could be if their development were completely controlled by a "code," like the working of an automatic screw machine.

### Conclusion

Now to conclude this discussion. Theoretical arguments and experimental evidence have been given to show that DNA is not the whole cause of life and of heredity. Indeed, anyone who holds the doctrine of the four causes would not have expected otherwise. And if anyone doubts that doctrine, it is suggested that he try to think of a case in which he knows that there are not the four causes (as distinguished from not knowing what they are).

On the other hand, DNA seems to be a cause in some sense, and an immanent one. So it must be a material cause. But a very special and crucial material; hence it is not surprising that

it has a great effect on the development of the creature.

But there must still be a formal cause, and that can be only in a soul, or that which stands in the same relation to a single cell as the soul does to the whole creature. (It is sufficient here to take the word "soul" in Aristotle's sense; the Christian sense includes and goes beyond that).

The two other causes exist, but this argument is not especially concerned with them.

An account such as this, then, which satisfies the biology without doing violence to the metaphysics, seems to be what we set out to find.

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## UNIVERSITIES AND COLLEGES HAVING THE CREATION POINT OF VIEW

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So often letters are received from parents who wish to know where they can send their boys and girls for a genuinely Christian and "old time" Creationist point of view. Therefore, we feel it would be a fine service to our members, if each issue, we featured such a college.

Since many of us on the editorial board are members of Lutheran Church—Missouri Synod Churches, we are deliberately bypassing for the moment such fine colleges as Concordia Senior and Junior Colleges, which will be presented in future issues. Also, by not mentioning a college in this series, we do not necessarily mean that it is theistic evolutionary in its point of view.

Accordingly, we are very pleased to begin this series with the Bob Jones University. Two of their present faculty members: Emmett L. Williams and George Mulfinger, either have or will soon have written articles for our publication. Director of Admissions David Christ kindly sent me the following data regarding their position on Creation and evolution.

Bob Jones University stands without apology for the "old time religion" and the absolute authority of the Bible. The University creed is as follows:

I believe in the inspiration of the Bible, both the Old and the New Testaments; the creation of man by the direct act of God; the incarnation and virgin birth of our Lord and Saviour Jesus Christ; His identification as the Son of God; His vicarious atonement for the sins of mankind by the shedding of His blood on the cross; the resurrection of His body from the tomb; His power to save men from sin; the new birth through the regeneration by the Holy Spirit; and the gift of eternal life by the grace of God.

Regarding the science department, the following is a statement of their position:

The Genesis account is not a detailed description of creation but is abundantly clear about several things:

1. The account describes a *series of acts* occurring in a short period of time and not a *process* occurring over millions or billions of years.

2. There were many original kinds of immediately created organisms as opposed to one or a few mediately created or evolved ones.

3. Man in particular was immediately created and intended by God to have dominion over the other creatures.

As a result, it is felt that the Scriptures and evolution are irreconcilable and diametrically opposed. The following examples seem to be an ample basis for this conclusion:

1. The Bible pictures man as having willfully fallen from an original state of innocence and therefore degenerate and in need of a Saviour, while evolution pictures man as getting better and better until he becomes some sort of a semi-god.

2. The Bible pictures Christ as the eternal Creator whereas evolution pictures Him simply as a product of the process of evolution.

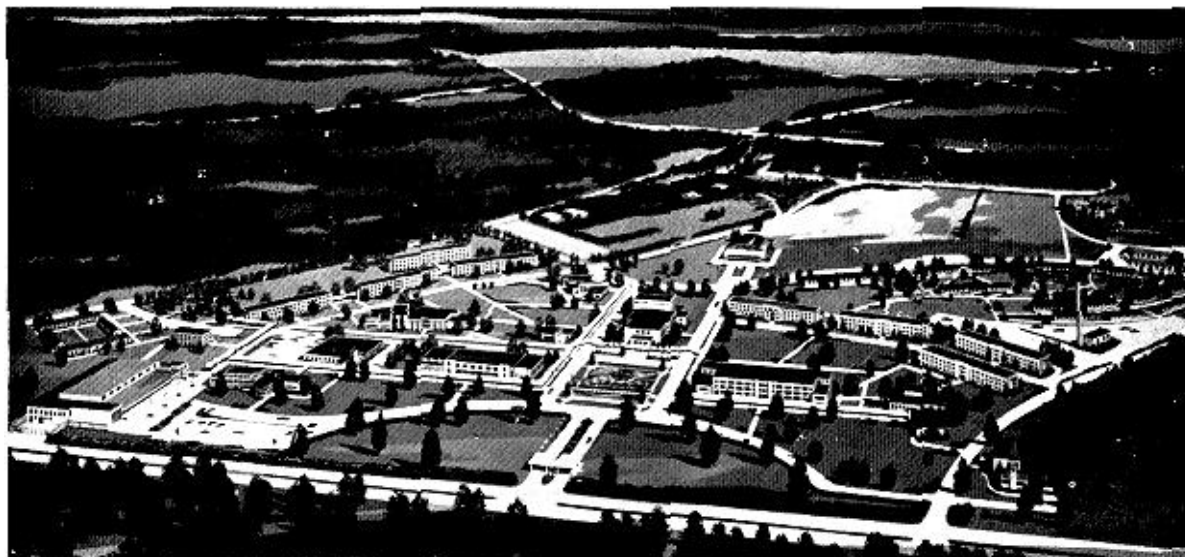
3. The Bible is believed to be the eternal, unchanging Word of God whereas, if evolution is true, then the Scriptures themselves are but a detail of this cosmic process of evolution.

It is the consensus of the science faculty that evolution is man's speculative and philosophical denial of God's claim on his life. Evolutionists' use of so-called scientific facts to prove evolution is an unwarranted extension of scientific observation and methodology beyond its reasonable limit into areas of interpretation and guessing.

Evolution is a position of faith just as surely as is our position of Biblical creation. Because of his faith that "In the beginning, God *did not* create . . ." the evolutionist is placing himself in the unenviable position of demonstrating a universal negative, which, of course, is impossible.

We agree with such evolutionists as Darwin, Spencer, Lyell, Huxley, Haeckel, and many others that there can be no reconciliation or harmonization between the Scriptural account of creation and that of evolution in spite of the attempts of many modern thinkers to do so through some scheme of "theistic evolution." It should be rather apparent that the name is a misnomer and that the idea is an anomaly.

No individual is forced into a position of evolution because of scientific facts, but rather he chooses this position because of his own presuppositions. We feel that the order of nature in general and the structures of organisms in particular are evidence of an intelligent



Campus of Bob Jones University

creative activity by God, rather than the result of the action of random chance through vistas of time.

We are very pleased with such a forthright and clear-cut statement, and are happy to recommend this fine university to our members.

Bob Jones University is in Greenville, South Carolina. The institution grants the doctors degree for advanced studies in various departments, details of which may be obtained from Mr. Christ. Tuition is only \$250.00 per year for 16 hours or less. Room and board per semester is \$409.50. There is also a matriculation fee

per semester of \$40.00. Various laboratory, business machine use, and other fees range from \$5.00 to \$20.00 for organ practice. These are certainly very modest fees. As may be seen from the University layout, which unfortunately we cannot show in color, the grounds are beautifully planned, and evidently set in a wooded area.

It is a joy to know that such a fine Christian motivated College and University exists and we hope in future issues to feature others so that a wide range of institutions in various parts of the country may be presented.

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(Continued from page 22)

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## COMMENTS ON SCIENTIFIC NEWS AND VIEWS

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An article in *Scientific Research*, pp. 26-30, January 1967, discusses some of the problems of the alleged fossil men in a surprisingly candid way, for something written by a person who (presumably) believes in evolution.

The occasion was the finding of a piece of skull, near Budapest, which is supposed to be about 500,000 years old, and yet quite like modern man. This seems to fit in with neither the alleged line of descent from the Heidelberg man, nor the recently touted *Homo habilis*.

It is pointed out that the drawing of elaborate conclusions from measurements made on skulls, or fragments of skulls, must be viewed with some suspicion. In fact, it is suggested that there is . . . not the slightest shred of evidence to justify the proposition that the skeleton is stable in an evolutionary sense . . . the bone-by-bone classification . . . may . . . collapse finally of its own weight."

Incidentally, the fiasco of the Piltdown man is actually admitted—with blushes, one might say—and a somewhat similar incident involving a skull found in Minnesota in 1936 by A. E. Jenks, which seems to have belonged to a Sioux Indian. In fact, it is suggested, it is not possible to distinguish between races, (whatever we mean by "race"), by the measurement of bones.

The article concludes by suggesting a polyphyletic (many tribes) origin of man, i.e., by the interbreeding of various ape-like creatures. It is admitted that chimpanzees, gorillas, etc., do not interbreed. Nor is there any evidence whatsoever for such an origin among humans as they exist today.

Nevertheless, the article concludes by saying that such an origin ". . . seems entirely possible . . ." Truly, hope springs eternal!

### Interesting Animal "Controls"

In *Scientific Research*, pp. 30-34, January 1967, is reported some of the proceedings of the second conference on genetics and behaviour at Rockefeller University, November, 1966. Much of the report on progress reads like the chapter on snakes in Ireland: "there is no progress to report."

Some information given by V. C. Wynne-Edwards might interest readers. He described a number of cases in which animals regulate their breeding and living habits in order to keep their numbers within suitable limits. This happens with many animals; a particularly striking example was that of the elephants in Africa,

which are limiting their numbers to fit the smaller territory now available to them. Thus, it was pointed out, ". . . most animals may not submit to the classical Darwinian checks on population . . ."

Somewhat akin to this is the example of the wolves on the islands of the Hebrides, who never kill off more than one sixth of the population of deer. Again, beavers in Scotland restrict themselves to cutting down about one tree in seven thousand (per day, evidently), which allows a cycle of about twenty years for new trees to grow.

It would seem, in the light of these and other examples, that Darwinian "competition and survival of the fittest" so over-simplifies a very complicated and delicate matter, that it can hardly be more than a caricature of the truth.

### Virus or Bacterium?

It is reported on p. 15 of *Scientific Research* for January 1967 that Eleanor Alexander-Jackson, at a recent meeting of the American Association for the Advancement of Science at Washington, D. C., told of finding that the Rous virus, which causes fowl cancers, is actually a transient form of a bacterium. The virus, in a suitable culture, transforms into a Gram-variable, acid-fast organism, probably of the bacterial order Actinomycetales.

Does this mean that a virus stands in somewhat the same relation to a bacterium that an egg does to a bird? If so, perhaps we shall hear the last of the suggestion that life originated somehow with a virus; unless, indeed, people want to maintain that the egg really did come before the chicken.

### Why Suitable Conditions Anywhere?

A. J. Cohen, in a paper presented at the meeting of the American Astronomical Society at Ithaca, 24-28 July, 1966, and of which an abstract appeared in *The Astronomical Journal*, Vol. 71, p. 849, November 1966, suggests,

The atmosphere, seasonal colour changes, and 'dust storms' on the Martian surface maybe all explained by various molecules, compounds, and complexes of permutations among iron, carbon, and oxygen . . . this model . . . would preclude even the most rudimentary life on Mars.

The evidence seems more and more to indicate that life is restricted to the Earth, as far as we can find out. We should probably not make

too much of an issue of it, for Scripture is not very much concerned with the point; yet, we Christians can consider that this is as we should have expected.

We are told how God created living beings on the Earth, and how He created the heavenly bodies “. . . to give light upon the earth . . .”, but nothing is said to suggest that the heavenly bodies were created to be inhabited. In fact, little is said about them. Maybe this would indicate that the present extreme interest in them is unhealthy, and that we ought to consider together Psalm 115:16, and Deuteronomy 29:29.

It is worth noticing how well this shows that the Earth was created as a place with special features “to be inhabited.” (Isaiah 45:18). In the past, the uniformitarian answer has been that “life arose where the conditions were suitable.” But now we must rejoin that the wonder is not that there is life where there are suitable conditions, but that there are any suitable conditions.

There is not another body in the Solar System that has the proper conditions of temperature, composition, water, atmosphere, day and night, gravity, and so on, to be a suitable home for living beings. As far as we know, there is none anywhere.

Surely it is too much to believe that this combination of favorable conditions arose by chance; can we not see that this is God’s work, and that it is “very good.” (Genesis 1:31)?

B. W. Hapke and T. Gold, in a paper presented at the meeting of the American Astronomical Society, at Ithaca, 24-28 July, 1966, and of which an abstract is given in *The Astronomical Journal*, Vol. 71, p. 857, November 1966, present evidence to show that the surface of the Moon is covered with fine dust at least several meters thick. The evidence is both from radar, and from the recent surveys by rocket.

It is interesting to consider that this might be something like the state of the primitive Earth, which, it has been suggested, may have been covered with soil to a very great depth. (See *The Deluge Story in Stone*, p 5; and *The Genesis Flood*, p. 100) While the Moon was apparently never intended to support living beings, yet it may well have been created somewhat like the Earth, and the Moon, as far as we know, never had a Flood.

### On Flashing of Fireflies

An article, “Biology of Synchronous Flashing of Fireflies,” by J. Buck and E. Buck, in *Nature*, Vol. 211, pp. 562 *et seq.*, 6 August 1966, may be of interest.

This is what is discussed. In certain parts of southeast Asia, fireflies gather in trees along the river, and flash in unison, usually at about two flashes per second. The flash in unison extends not only to whole trees, but to whole rows of trees.

Assuming that this is a “behaviour pattern, representing the product of countless millennia of evolution,” the authors try to relate it to the gathering of the fireflies for mating. However, the same objections can be raised against this assumptions as can be brought against the “evolution” of bees’ ability to make and store honey, or skunks’ ability to produce a bad smell: the ability had to be nearly perfect before it would be of any use at all, and could not help survival in its very early stages.

Further, the reason for the unison is not made clear. It is suggested that it makes the flashing more noticeable, but this is questionable; the analogy of a flashing neon sign may not hold. The flashing of the neon sign makes it stand out amid the steady lights, but in the jungle this is surely not the problem.

The authors also suggest that coincidence of the flashes increases the brightness of the tree. However, if there is any integration of brightness in the eye at all, this suggestion must be received with some caution.

What can a creationist say about these gatherings, and also of other animals for which it seems just as difficult to see a purpose? We know that God ordained them for reasons known to Him. Mating may be one purpose in some cases, but we know that God often works out several purposes together. Is it possible, (I suggest this in all seriousness), that this, and other activities of animals by communities, is a form of worship?

The notion of animals, and other creatures too, praising the Lord is certainly a scriptural one. It is found in the Psalms, e.g., 148:10; 145:10; 96:12, 69:34; and in Revelation 5:13. We may worship by emitting sound in unison; why could insects not do so by emitting light?

There is no reason why mating might not be combined with this purpose. We may not do so—we should have Baal-peor all over again—(Numbers 25:3) but perhaps they may.

Whatever may be the value of my suggestion, let us at least consider that animals—even insects—are not just reproducing machines. They have their own purpose in God’s plan, and surely this includes praising Him in an appropriate way, since for His pleasure they are and were created. (Revelation 4:11). May I remind the reader also of the story of *Le Jongleur de Notre Dame*?

The notion of animals—and all creation—praising God is expressed most eloquently in *The Song of the Three Children*. It is interesting also to read *Socrates and the Animals* by Elena Quarelli, translated from the Italian by K. Speight, published by Hodder and Stoughton, London, 1960, especially around p. 118.

### **Specific Doubts About DNA**

An article in *Scientific Research*, pp. 33 et seq., October 1966, describes some work by B. Commoner, of the Department of Botany, Washington University, from which he concludes that “DNA is neither a self-sufficient genetic code nor the ‘master chemical’ of the cell.”

Evidence includes the fact that enzymes which synthesize DNA can sometimes operate in the absence of a starting DNA molecule. Moreover, the total amounts of DNA in various organisms seem to have little relation to the

complexity of organism. And DNA molecules do not, in fact, reproduce themselves in the test tube. In conclusion, Commoner maintains that self-duplication is a property (would “activity” not be a better word than “property”?) of the whole intact cell.

While some talk of evolution is brought into the article, yet it would seem that the new theory, by making life depend on a more complicated thing, a cell instead of a molecule, would make the changing of one kind of creature into another seem even less likely than it did before. We creationists might well watch here for further developments.

Also, in view of all this complexity, we ourselves might stop talking about the “mechanism of heredity,” and encourage others to do likewise. Maybe there is no mechanism, in any meaningful sense of the word, for maybe the process is not mechanical.

Our Society of research scientists representing various fields of successful scientific accomplishment is 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. Beginning in 1964, we are publishing an annual yearbook of articles by various members of the Society and thereafter a quarterly review of scientific literature. Our eventual goal is the realignment of science based on theistic creation concepts and the publication of textbooks for high school and college use.

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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 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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