DISCOVERIES SINCE 1859 WHICH INVALIDATE THE EVOLUTION THEORY

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Creationists of the later part of the Nineteenth Century such as Jean Agassig had far too rigid a concept of species, postulating that even varieties were created in the places to which they were best adapted.

During his voyage with the Beagle, Charles Darwin quite correctly saw that this extreme and entirely unbiblical idea of creation held by scientists of his day was simply not true. He quite correctly reasoned that the various varieties of finches (then called species) of the Galapagos Islands all came from one or at most several species migrating from the mainland. Clearly they were not created in their various forms each peculiar to a particular island. But in 1859, he carried this idea to the extreme of claiming that all *kinds* of plants and animals by the natural selection of beneficial variations evolved from one or a few original simple one-celled forms of life.

MOLECULAR EVOLUTION

Later scientists have extended this concept to include the idea of chemical evolution, various simple gases such as ammonia (NH_3) forming a sort of organic "soup" in the original "primitive" ocean. From this complex of amino acids proteins, carbohydrates, and finally desoxyrebose nucleic acid evolved. First, of course, only simple "naked" D.N.A. molecules developed the power of reproduction but finally these developed cell walls, united and over a billion years or so evolved into the complex of life we see around us.

Actually, this idea of chemical evolution is but a refined version of spontaneous generation. It is the only alternative to belief in creation ex-nihilo. From 1500-1860, few scientists doubted it. Aristotle, Newton, William Harvey, Descartes, van Helmont and Lamarck accepted spontaneous generation without question. Even many theologians such as the English Jesuit John Needham subscribed to this view.

Step by step in a great controversy that spread over two centuries, this belief was whittled away until nothing remained of it. First, Francisco Redi showed that when meat is placed under a screen so flies cannot lay eggs on it, maggots never develop. This was a serious blow to one of the basic proofs of spontaneous generation. Then Lazzaro Spallanzani showed that a nutritive broth sealed off from the air while boiling, never develops micro-organisms, and so never rots. Needham objected that the air above the broth had been vitiated, so could not support life.

Louis Pasteur, in 1860 by a simple modification of Spallanzani's experiment, showed the air was not at fault. He drew the neck of the flask out into a long S-shaped curve with its end open to the air. Thus, while molecules of air could pass freely back and forth, heavier particles of dust, bacteria, and molds in the air were trapped on the walls of the curved neck.

Even yet it was not easy to deal with so deeply ingrained and common sense belief as that of spontaneous generation. Pasteur's greatest help in disproving it was a noisy and stubborn opponent named Felix Pouchet, whose arguments before the French Academy of Sciences drove Pasteur to more and more rigorous experiments. When he had finished this remarkable series not a shred remained of the belief in spontaneous generation.

As George Wald [1] puts it we tell this story to beginning students of biology as though it represents a triumph of reason over mysticism. Actually it is very nearly the opposite. The reasonable view was to believe in spontaneous generation, the only alternative to belief in a single primary act of supernatural creation. There is no third position.

It is Wald's belief that a scientist has no choice but to approach the origin of life through a hypothesis of spontaneous generation. If one refuses to believe in a God with power to create ex nihilo, I heartily agree with Wald. He quite correctly states that Pasteur proved untenable the idea that living organisms now arise spontaneously under present conditions. He then endeavors to show that they may have so arisen under past conditions.

Naturally as he says, "Time is the hero of the plot." Given time enough and even the "impossible" becomes possible. Actually scientists such as Wald and Walter R. Hearn substitute time for power.

In discussing the possible spontaneous origin of life, Wald is more honest than most chemical evolutionists. He says that students of chemistry are usually told that when, in 1828, Friedrich Wöhler synthesized the first organic compound area, he proved that organic compounds do not require living organisms to make them. Of course it showed nothing of the kind. Organic chemists are alive! Wöhler merely showed that they (living organisms) can make organic compounds externally as well as internally.

Organic chemists now mix inorganic substances such as water vapor, methane (CH_4), ammonia (NH_3) and hydrogen together under the activation of an electric spark and find traces of glycine, alanine, and other simple amino acids. S. L. Miller, Sydney Fox and Walter R. Hearn [2] are quite excited over these discoveries and believe as stated above that given time enough life would arise in the sea from such spontaneously generated simple amino acids. Actually these men are only demonstrating that intelligent beings can make organic compounds from inorganic compounds. The complexity of the chemical apparatus used is such as to be a bit unrealistic in terms of their postulated primeval world free of oxygen. The strange fact that our planet appears to be unique in having water so necessary to life is taken for granted by them. A complete discussion of this modern version of spontaneous generation is too involved, but reference to Zimmerman's paper (pgs. 13-17) will show the many insurmountable problems involved.

There is no question but what this as a working hypothesis has much attraction to the modern "scientific" mind. At least the vocal majority of scientists believe it either in its entirety or in part. The question is should the Church again make the same mistake as it did in adopting the pagan concepts of Ptolemaic astronomy taught by leading scientists from Ptolomey (100 A.D.) to Copernicus (1473) ? There is considerable evidence that the concept of evolution has insidiously influenced the philosophy of not only biology, organic chemistry, geology, and paleontology but such disciplines as anthropology, archeology, sociology, psychology, history and even theology.

So then what really is the evidence for Darwin's extrapolation of his undeniably true micro-evolutionary observations into the general theory of evolution?

BIOLOGICAL VARIATION

First, *let* us consider variation, natural selection of which according to Darwin developed new species. He considered variation as essentially *unlimited* with those individuals most fitted to the environment being naturally selected. Again, the following generation, the same *range* of variability would occur. Thus, in the classical case of the evolution of the giraffe, quoting Darwin,[3] "So under nature with the nascent giraffe the individuals which were the highest browsers and were able during dearths to reach even an inch or two above the others, will often have been preserved, for they will have roamed over the whole country in search of food. These slight proportional differences, due to the laws of growth and variation, are not of the slightest use or importance in most species. But it will have been otherwise with the nascent giraffe, considering its probable habits of life for those individuals which had one part or several parts of their bodies more elongated than usual, would generally have survived. These will have intercrossed and left offspring, either inheriting the same bodily peculiarities or *with a tendency* to vary again in the same manner. By this process *long continued* combined with the *inherited effects* of increased use of parts (the longer neck) it seems to me certain that an ordinary hoofed quadruped might be converted into a giraffe." It should be noted that Darwin assumes " (1) continuous variation, i.e. each generation showing the same *range* in variation of neck length and (2) effects of continuous use (or disuse). In fact, he devised a scheme of pangenesis now disproven to explain this presumed inheritance of the effects of use or disuse.

J. B. Lamarck was the most noted proponent of the doctrine of the inheritance of acquired characters, i.e. changes in plants or animals due to the environment, use or disuse. That such characteristics are acquired by individuals during their life is obvious. However, as the physical basis of heredity became better known, the possibility of inheriting environmental effects became increasingly difficult to believe. First, August Weisman developed his germ plasm theory "Das Keimplasma" in 1892. He clearly showed that reproductive cells instead of being developed by gemmules assembled from various parts of the body as suggested by Darwin, formed a continuous line from generation to generation developing only from germinal tissue. The body or somatic cells are then the result of germ cell activity. His views were clearly shown to be correct by proof developed from 1900 to 1930 that the chromosomes carry the genes or factors determining the characteristics of the body. Since they are protected during cell division and gamete formation from most *normal* environmental internal or external influences, acquired characteristics cannot of course be inherited. More recently proof that deoxyribose nucleic acid molecules (D. N. A.) arranged in helical fashion actually form an information code by which the body develops according to a master template makes even clearer the reason why the effects of environment cannot be inherited.

Now what are the real laws governing the inheritance of variation? Working diligently in his garden the Austrian monk Gregor Mendel carefully crossed various strains of peas and found a definite statistical pattern governing the inheritance of such characteristics as tall vs dwarf growth habit. Tall (TT) habit was dominant to dwarf (tt) so that the first generation hybrids (Tt) were all tall. The dwarf habit of growth did not show up until the second filial generation or F_2 when 1/4 of the plants were dwarf in habit (tt). Such traits are called recessive and some are due to two factors so occur in only 1/16 of the F_2 population, and others due to three factors occurred in 1/64 of the F_2 plants. Later work has shown that most major factors such as tall have modifying factors. Accordingly, by selections slightly taller plants may be obtained. But the limits are soon reached and from then on selection is no longer effective since the strain has been thus made true breeding or homozygous for all of them. Variability is then *definitely limited* instead of being unlimited as Darwin thought. This is quickly shown in breeding for such characteristics as long bud in roses, where the ultimate in bud length is achieved in 5 or 6 generations. Yield in corn is another example — corn breeders making phenomenal progress during the first 20 years.

But then these inbred lines of corn used to produce the famous high yielding hybrid corn seed could no longer be further improved since all the major factors for high yield had already been accumulated. Now corn breeders' time is mostly spent in maintenance of these inbred lines and breeding for increased disease resistance, local adaptation and other related problems. All of our experience shows that *contrary* to what Darwin believed the variability potential of each species is definitely *limited.*

ON THE NATURE OF MUTATIONS

What then do present day evolutionists appeal to for the mechanism of evolution? The answer is mutations which occur with varying frequency in plants and animals. Actually they are the result of a "mistake" in the process of gene reproduction or more specifically the duplication of the deoxyribose nucleic acid or D. N. A. molecules which either are or house the genes which determine the characteristics of plants and animals. Various agencies such as cosmic radiation and chemical mutagens cause mutations, but there is considerable evidence that a basic percentage are spontaneous. i.e. the reproductive mechanism simply does not *perfectly* reduplicate itself each time.

Can these chance "mistakes" or defects really explain the origin of the complex variation we see around us? Elliot G. Watson, British zoologist writing for the *Saturday Evening Post* [4] lists four examples of life histories that simply cannot be explained by orthodox evolution theories. Thus the coral reef crab has claws so small as to be useless as weapons. But their backward curving teeth grasp the slippery bodies of small sea anemones. detaching them carefully from their hold on the rocks without injury. They are then held close to the pirate crab's mouth and continue to operate their tentacles so as to capture small creatures. These the crab with his free front pair of walking legs removes as dainty tidbits, leaving those he dislikes for the anemones which are finally released unharmed.

Are these adaptations to be explained by chance mutations? Did a chance modification of the claws due to a "mistake" in the duplication of some D. N. A. molecule prompt some ancestral crab to detach an anemone for the mere fun of it and by chance hold it near its mouth? If so, the crab passed on to its offspring this behavior tendency, and so through natural selection the crab species developed their close association with various anemones, the species differing, of course, to make the problem more complex for each species of pirate crab. This, Watson says, he simply cannot accept and I agree.

My scientific colleagues who are evolutionists make much of the undoubted fact that under unusual new environmental conditions some mutations are advantageous. Thus, when bacteria are catastrophically exposed to high levels of penicillin or streptomycin, most of them die. But occasionally one lives because of a mutation to tolerance of these antibiotics. In penicillin this resistance is a step by step phenomenon, i.e. by increasing dosage rate increasingly resistant strains appear. In streptomycin the change to maximum resistance is effected in one mutation. But Pratt and Dufrenoy [5] point out that these resistant types are lower in metabolic ratio and at a *disadvantage* in cultures free of antibiotics. Are we then to believe in the strange concept that complex forms of life evolved by constantly stressing organisms in such a catastrophic manner? There is certainly no evidence that penicillin or streptomycin resistant bacteria continuously grown in high level antibiotic culture ever achieve a metabolic ratio superior to the original type.

Mutation merely increases the variability potential thus enabling a species to survive what otherwise would be complete annihilation. But this variability potential is definitely limited. Again my evolutionary colleagues argue that this only seems so because our time of observation is so short. But they for some reason fail to see that adaptation either by mutation or segregation of already existing variability (heterozygocity) *rapidly* occurs up to a certain level, and then stops.

Also the *more* complex the organism the less chance there is for mutations to occur of advantage even under new environmental conditions. Thus, my own Neutron Radiation experiments with roses resulted in hundreds of mutations, some of possible horticultural value. However, *without exception* all were either weaker or more sterile than the variety radiated. While a National Research Fellow at the California Institute of Technology, it was my privilege to see the wonderful array of mutations of the fruit fly Drosophila *melanogaster* obtained by Sturtevant, Bridges and Dobschansky who were then working with the great Thomas Hunt Morgan who first realized the experimental value of this "biological Cinderella." Though remarkable as chromosome markers in linkage studies, demonstrations of allelomorphism and other genetic problems, not one could he said to have a higher survival value than the normal type. Occasionally as described by Timofeef-Ressovsky some mutations such as eversae or singed have a slightly greater viability at higher temperatures.[6] But even these, if combined in one individual by cross breeding and selection, are reduced in viability and if combined with a third mutation have a lower viability than normal even at the higher temperature. And most certainly to effect significant changes in a species such as to warrant classification of it as a new one or place it in a different genus would involve the accumulation of *many* mutations. The possibility of such accumulation most certainly *has not* been demonstrated.

ORIGIN OF HIGHER CHROMOSOME NUMBERS

Much has been made of the voluminous experimentation attempting to show how species with higher chromosome numbers have been built up by what is called amphidiploidy. Before discussing this perhaps we should make clear what is meant by "species." Many are really only what Jens Clausen calls ecotypes or distinctive genetic or physiologic races. All have the same internal balance and there is no genetic obstacle to a free interchange of genes where such races meet and hybridize. The so-called snow Camellia C. *rusticana* found along the cold coastal mountain plateaus of Northern Japan is really only a race of C. *japonica.*

Others are ecospecies and have the genetic balance so distinctively intricate that genes of two ecospecies cannot *freely* interchange genes without seriously impairing the vitality of the hybrid offspring. The species of conservative taxonomists working along conventional lines are usually good ecospecies. Chromosome pairing appears rather normal but marked sterility is observed when these are hybridized.

Cenospecies are those entirely unable to exchange genes with one another The chromosomes do not form pairs at the reduction division even though sterile hybrids may occur.

It is by the crossing of these cenospecies with subsequent doubling of the chromosome number that amphidiploidy is presumed to have occurred.

The question then is, how much evidence is there for the origin of cenospecies or compariums of them usually equivalent to "genera"?

When amphidiploids were first produced "it was tacitly assumed that simple doubling of the chromosome number would in some miraculous way render any sterile hybrid fertile and vigorous." [7] Forty-five years of cytogenetic research has shown this is simply not true, though many even recent research men seem unable to realize the limitations imposed. Successful amphidiploids arise only from vigorous interspecific hybrids. If they are to remain so during succeeding generations, the original balance must remain unchanged. This means that only interspecific hybrids between cenospecies of one comparium have a chance of being successful amphidiploids.

Perhaps the most famous one is Raphanobrassica hybrid first produced by Karpechenko in 1927.[8] As reported by him, a uniform F_3 population was obtained, all 36 plants being quite fertile having $2n = 36$ chromosomes.

Richaria and Howard[9] in their later, more thorough and detailed studies obtained quite different results as follows: (1) The F_1 hybrids formed a variable number of bivalents at the reduction division usually 2 to 3 per cell; (2) Many of the F_2 plants had less than 36 chromosomes and those with 36 showed variable pairing at IM with univalents, and quadrivalents occurring. Seventeen to 19 chromosomes were found in the pollen mother cell nuclei and accordingly even in the F_4 plants varied in chromosome number from 33 to 37 chromosomes. (3) The F_2 plants were only partially fertile and even in the F_4 fertility varied from 5 to 42%! Howard quite correctly believes that this formation of quadrivalents in F_2, F_3 and F_4 follows from the fact that bivalents are formed in the F_1. In fact, Howard points out that Karpechenko's published F_1, IM figures show only 16 or 17 chromosomal bodies in some cases instead of the 18 one would expect if no pairing occurred. As a result, 40% of the F_2 plants grown by Karpechenko were partially sterile, due to incomplete chromosome complement or loss of genes due to chromosomal fragmentation during the F_1 reduction division.

Another widely accepted amphidiploid is that of Galeopsis artificial Tetrahit reported by Arne Muntzing (1930, 1932) [10,11] Galeopsis *pubescens* n = 8 x G. speciosa n = 8 when crossed gave an F_1 population of 7 plants. These mint species showed some chromosome homology since 5 to 8 pairs of chromosomes were observed at the reduction division. A diploid F_2 generation of 197 plants was grown. This segregated for many characteristics and had an average fertility of 22%. One F_2 plant was triploid and almost completely sterile. Hand pollination of this gave no seed, so it was left among the other F_2 plants. Also, one of the wild type G. *Tetrahit* plants was only 60 to 90 feet away as was G. *pubescens.* Now, only **one** seed was harvested from this sterile plant and it grew into the artificial Tetrahit which as illustrated by Muntzing (1930) is *identical* to G. *Tetrahit.* He suggests that a triploid egg cell of the F_2 hybrid was fertilized by a pollen nucleus of *G. pubescens,* i.e. 16 G. *speciosa* +8 G. *pubescens* chromosomes from the F_2 and 8 from G. *pubescens* resulted in the 16 II F_3 plant. Were this actually the case, one would expect some quadrivalents since 5 to 8 11 were found at F_1 IM. None are reported in Muntzing's cytological study. What then is the explanation of this hybrid?

A paper published by R. E. Clausen and Lammerts (1929) [12] disclosed that among hybrids of N. *digluta* x the recessive white N. *tabacum* ♂, the unusual white plant, was a haploid resulting from a pollen grain nucleus stimulating the cytoplasm of an N. *digluta egg* cell to grow into a plant even though the female nucleus did not function. Unusual diploid N. *tabacum* hybrids were similarly explained as due to the functioning of diploid pollen grais. Since then many similar cases have been found in rose and especially camellia hybridizing.

Thus. the Captain Rawes camellia is shown by Lammerts (1959) [13] to have so originated. Also, plants of C. japonica (n= 15) x C. *reticulata* (n = 45) which are practically identical with C. *reticulate* and have 45 pairs of chromosomes are clearly shown to be the result of diploid merogony.

G. *artificial Tetrahit* also probably resulted from such a diploid pollen grain and so in reality was G. *Tetrahit!* Its identity of appearance to that species and lack of quadrivalent formation are thus explained. Also, and more important, the strange *reduction* in size of the F_3 flower is thus accounted for. As is well known, real amphidiploids combine the characteristics of their F_1 parents and do not so radically depart from them in appearance as does G. *artificial Tetrahit.*

Though I urged Arne Muntzing to repeat this cross and verify his conclusions, he never saw fit to do so. Since in science it is axiomatic that experiments should be made in such a way as to be verifiable, I cannot accept his claim of the experimental origin of artificial Tetrahit because of the much more likely explanation by diploid merogony.

I have gone into this case at considerable length since for some reason there has beeen a tendency to accept evidence for the experimental evolution of plant species, which would not be acceptable in other more exact sciences.

Thus, it is obvious that for any amphidiploid to qualify as a species (1) the original F_1 hybrids show no pairing, yet give a reasonable percentage of diploid gametes, (2) the experiment should insure conditions such that ONLY self-fertilization could occur, and (3) fertility and vigor of the F_2 should be at least comparable to that of the diploid species.

Judged by these criteria even Jens Clausen's cases of experimentally produced amphidiploids from crossing Layias and Madias leave much to be desired. All were either so sterile or weak that they could not compete under natural conditions with the parental species.

It does indeed appear that the tobacco of commerce N. *tabacum* originated from the hybridization of N. *sylvestris x N. tomentosiformis,* each of which have 12 pairs of chromosomes. The sterile F_1 has 24 unpaired chromosomes. Greenleaf [14] by decapitating the stems caused callous tissue by application of hetero-auxin. Shoots from this tissue had 2411 of chromosomes like N. *tabacum.* Though most of them are female sterile, recently D. R. Cameron (successor to Dr. R. E. Clausen) has obtained fertile ones. Jens Clausen suggests this synthesis must have occurred long before the discovery of America by Columbus. Since Indians undoubtedly must have chopped down old tobacco plants, the idea that naturally occurring hybrids so cut down developed fertile shoots from naturally developed callous tissue is not too far fetched. However, this sort of thing would certainly not occur *naturally* without man's intervention.

The many recently reported cases of amphidiploids produced by colchicine treatment such as Towner's Tagetes [15] involve such complicated procedures that surely the authors of these experiments cannot imply these would occur under natural conditions.

TOWARD A MORE REALISTIC APPROACH

Considerable lack of critical judgment has been shown by some cytologists who infer relationship of species from the observation of occasional loose pairing of chromosomes in the F_1 hybrids. As both McClintoch [16] and Lammerts [17] have clearly shown. pairs of chromosomes are frequently found in both haploid corn and N. *tabacum.* In the case of N. *tabacum* variety coral haploid as many as six bivalents or pairs were observed. Since N. *tabacum* has been shown to be the result of chromosome doubling of N. *sylvestris x N. tomentosiformis* as above described, these pairs certainly are not the result of homology. In fact, pachytene studies showed they were clearly the result of nonhomologous association since unlike chromomeres were aligned together in the paired strands. Also. and more important, strands often folded back on themselves to form pairs! As I state in the paper cited above, "homologous attraction of chromomeres is due to a regulatory mechanism in some way causing an orderly alignment of the threads when the cell as a whole is timed for synapsis. When true homologies are not present this tendency for two by two association expresses itself in part by non-homologous pairing."

In view of such clearly shown facts why do cytogeneticists still infer relationship of species simply because occasional pairs of chromosomes are found? Clearly they are motivated by a preconceived concept of evolutionary divergence from a common ancestor. I am, of course, not referring to clear cut cases of regular pairing such as the Drosera type found in the hybrid of N. *tabacum (2411) x N. sylvestris* (12II) $\not-$ where 12II are regularly formed.

Fortunately, a trend toward a realistic approach is now evident. Thus, Lennart Johnson [18] gives an excellent appraisal of the chromosome pairing he finds in the intergeneric crosses of Oryzopsis, Indian Mountain Rice and Stipa the Spear grass. He clearly shows that the number of pairs is *proportional* to the number of chromosomes involved. Accordingly, they must be due to non-homologous association of chromosomes. Relationship of the plants as expressed in homology of the chromosomes is thus not the cause of pairing in his and many other cases.

C. J. Bishop in his recent "Reviews in Genetics and Cytology I Plant Breeding" (March 1963) [19] is quite candid in pointing out the failure of the older chromosome homology and pairing concepts to hold up as regards practical plant breeding. Thus, he says it was postulated that frequency of multivalent chromosome association was a major factor in determining the degree of fertility of the individual plant. Recent research has failed to reveal any *fully consistent relationship* between *chromosome association* and *plant fertility.* Some plants with regular bivalent formation may be quite infertile.

The possibility that some diploids with high chromosome numbers arose from the tendency of auto-tetraploids to progressively favor bivalent formation was early suggested by Muntzing (1936) [20] The view that this is a slow progressive development has not received general support. Recent discovery of a single gene controlling bivalent formation in wheat (Riley and Chapman, 1958) shows clearly that diploid behavior is genetically controlled and not the result of lack of homology, whatever that term has come to mean.

The human mind tends to think of species with higher chromosome numbers having risen from adding chromosomes of two species with lower number. As shown above, most such experimentally produced amphidiploids combining the chromosomes of the basic diploid species would hardly survive under natural conditions. Recently an increasing number of diploid monoploids or polyhaploids have been isolated from tetraploid lines. Several Hindu (Indian) students have recently found that certain forms of Rubus classified as species are really polyhaploid derivatives of octoploid species, i.e. a reduction to the tetraploid level.

Very possibly we may find that many so-called "species" are really derived from pre-existing complex species of higher chromosome number and in a sense are degenerate offspring of a formerly much more intricate species pattern.

Thus, a recent paper on the rainbow and cutthroat trout by Simon and Dollar (1963) [21] indicates that the rainbow trout with 60 chromosomes was rather recently developed from the cutthroat trout having 64 by two centric chromosome fusions involving a centromere shift. This occurred since the last glacial period of the Pleistocene since the species were not isolated until the continuity of the Snake River and thus North Pacific drainage with the now extinct Lake Bonneville ended. The Provo strand line indicates a date less than 55,000 years ago, even on the basis of the very questionable orthodox ecological dating techniques.

Harlan Lewis, in a recent paper on catastrophic selection, [22] comes to the conclusion that reorganization of the species chromosome genomes or makeup is a rapid process in which all the differences become consolidated within a few generations. In the genus Clarkia, which is his specialty, all the derivative diploid species are better adapted to xeric or dry conditions. The history of the genus is one of response to increasing aridity and change in seasonal distribution of rainfall. Lewis' concepts are in marked contrast to the usual evolutionary one which postulates that structural and quantitative changes in chromsomes accumulate as homozygotes one by one over a long period of time through random fixation or by selection of those with presumed slight selective advantage. He rather clearly proves that Clarkia *lingulatu* is of recent origin. It has an additional chromosome not present in C. *biloba* (n= 8) homologous to parts of two chromosomes of C. *biloba.* In other words, part of the basic genome of C. *biloba* is duplicated in C. *lingulata* (n= 9). The genomes also differ by a large translocation and at least two paracentric inversions. Hence the hybrids between them are *always sterile.*

Lewis suggests interspecific hybridization or a mutator gene similar to that reported by Ives[23] in Drosophila as the mechanism of chromosome reorganization.

From the viewpoint of creationism and flood geology, Lewis' concepts are most interesting. Certainly there is abundant evidence that since the Flood great areas of the word, including much of the Pacific north and southwest have become increasingly arid. As mentioned above, Lake Lahontan, once a vast inland body of water, is completely dried up and Lake Bonneville has shrunken to the Great Salt Lake.

He does not, however, show how translocations or inversions became established. Dobzhansky has clearly shown that translocations in homozygous condition are inviable. Of four translocations involving the second and third chromosome of D. *melanogaster* only one could be established in homozygous or true breeding condition. It was definitely less vigorous than the wild type.[24] Muller earlier had reported the same thing and work by Meta Suche Brown involving translocations between the third and fourth chromosomes resulted in her conclusion that "No completely fertile strain could be isolated." [25] Inversions are, of course, merely translocations within the same chromosome and involve breakages and resulting injury also.

We are thus left in the strange dilemma of wishing to believe that changes such as postulated by Lewis could occur, since it would make an explanation of how the world became repopulated by so many distinct and obviously adapted species much simpler. Similar adaptation of species of roses, apples and other deciduous plants to the cold weather brought on by glaciation as a result of the Flood is quite obvious and must have been as Lewis postulates for Clarkia quite rapid, also.

Though not “scientific” in the usual sense, I suggest that we are constrained to believe that these reorganizations or transformations are the result of intelligent design. Those of us who believe in the power of God should have no difficulty in believing that following the Flood, as the surviving basic species repopulated the world, God used such mechanisms as translocation, inversion and duplication as means to adapt species to the changed environment. This phenomena is much like that in mankind where the languages were *suddenly* and *rapidly* developed following the confounding of tongues at the Tower of Babel. In mankind, little in the way of chromosome variation or cross sterility of races has as yet been demonstrated. The pattern, however, is much the same since the obvious physical, psychological and adaptive features of human races are obviously fully as great or even more so than the one slight morphological differences separating Clarkia *biloba* from C. *lingula,* i.e. the much narrower shape of the petal!

ASSUMPTIONS INVOLVED IN AGE ESTIMATES

The statement is so often made that our observational time scale is too short to verify evolution. Given several hundred thousand or a million years and changes on the specific or genetic level could easily be effected. It is very easy to appeal to such unverifiable assumptions. But science is or should be demonstrated facts, not imaginary possibilities. So often the statement is made, for example, that radioactive dating by observation of the half-life of uranium, actinium, and thorium as they give off alpha particles and slowly change through a series of radioactive chemicals to radium and finally to the stable lead 206, 207, and 208 prove that the earth is about 1.5 or more billion years old.[26] But surely a little reflection will show that several basic assumptions must be made before any conclusions from half-lives of radioactive elements have any meaning. Four of these are: (1) in the specimen of mineral used only uranium and none of its degeneration products were present at Time = 0; (2) no loss of uranium by leaching or loss of radon gas occurred; (3) there was never in the past a time when the rate of alpha particle loss was much greater than now; and (4) in the creation of uranium the reactions went the whole way. Or stated more precisely, how can we be sure that in the build up of uranium from ‘hydrogen nuclei as physicists now conceive of the creation of the elements some lead 206 and radium did not simply remain as such instead of all being converted to uranium and then disintegrating giving the series of derivatives now used by the uniformitarian school of thought as being evidence of such great age? Morris and Whitcomb [27] give a thorough-going critique of radioactive dating in *The Genesis Flood.*

The same may be said of the so called astronomical evidence of such a great age of the universe. The red shift is interpreted as indicating that the various galaxies of stars are speeding away from each other, or the universe is supposed to be expanding at a speed close to that of light as regards the most distant stars. Some astrophysicists now consider this as merely a “tiring effect” resulting from light photons traveling such great distances. Also, it has recently been pointed out that much of the red shift effect may be simply due to the effect of dust particles in space distorting the quality of light observed. Finally, touching on this subject of astronomy in relation to time, we should remember that evidently water is a unique feature of the earth found nowhere else in the solar system (Genesis 1:2). Thus, the data of Explorer II show that Venus once considered the “watery planet” does not have any so could not support life.

THE SIGNIFICANCE OF “LET THERE BE LIGHT”

The first spoken word of creation was “let there be light.” As is now clear, light is only one form of energy. Most probably all forms of energy were called into use or being during this first creation day. The various stars and galaxies were then created by conversion of energy into mass according to the formula $\frac{\text{e (energy)}}{\text{c(speed of light squared)}} = \text{m}$ or $\frac{\text{e}}{(3\text{x } 10^{10})(3 \text{ x } 10^{10})}$ = 1 gram of mass. Thus $9 \text{ x } 10^{20}$ ergs of energy became 1 gram of mass. Since one joule = 10^{7} ergs of energy, $9 \text{ x } 10^{13}$ joules of energy were used up in the creation of only 1 gram of mass. In more commonly understood electrical terms, since one watt is equal to one joule per second, this may be expressed as $9 \text{ x } 10^{13}$ watt second or $9 \text{ x } 10^{10}$ kilowatt seconds. Dividing by 3600 seconds this gives $25 \text{ x } 10^{6}$ kilowatt hours of energy. Now Niagara Falls generates about 415 thousand kilowatts per hour or about 9960 thousand KW per day. If one uses a rough figure of 10,000 thousand (10^{7}) kilowatts per day for Niagara Falls, it is startling to realize that the amount of energy used in thn creation of **only** 1 gram of mass is almost equal to 2.5 times the amount of energy generated by Niagara Falls in one day! The creative effort involved in the creation of the universe really staggers even mathematical concepts of power.

Obviously all of the light photons connecting all of the various orbital centers making up the galaxies were also set up at this time, i.e. the whole universe was one vast system of light and energy since one cannot from the viewpoint of physics conceive of visible light as distinct from other forms of energy. By the fourth day the conversion of energy into mass evidently reached a concentration in the various gravitational orbits high enough to "activate" the various systems of atomic furnaces we now recognize as the sun and stars. It should be emphasized that, however vast the universe may be, light photons from the most distant stars would be immediately visible since the stars were made by conversion of light into closed orbits of energy we call mass.

A crude analogy is that of filling a large tank with water under pressure through a hose several hundred feet long. Once the tank is full the flow immediately reverses when pressure is discontinued. No matter how long the hose, water pours out *immediately* at a rate determined by the tank pressure. Astronomers of the uniformitarian school would have us starting with an empty hose. Then, of course, the time taken by the water to travel through the hose would be a measure of the length of the hose. So they assume stars beginnings to shine with no photons of light connecting them with the earth or other stars. But if the stars are conceived as being created by the flow of energy into them, then as soon as they begin to shine by virtue of this accumulated energy, a reversal in flow of light photons would immediately be visible here on the earth.

The creation account by stating that the sun, moon, and stars were not activated until the fourth creation day indirectly supports the Copernicus system of astronomy. For if as Ptolemy assumed the sun in its daily cycle around the earth caused Night and Day, how could there have been nights and days before the sun gave lights ? The answer, of course, is that the earth's rotation gives our diurnal cycles and always has since God said, "Let there be light." This light came directly from Him until the fourth day, by which time the sun was activated as suggested above.

Actually many astro- and geo-physical facts indicate the universe and solar system is in the order of thousands of years old. Space allows mention of but five:

(1) Rapid disintegration of comets. Since they are part of the solar system, the maximum age of the comets would correspond to that of the solar svstem. Unless one adopts the strange theory of Whipple that a reservoir of comets exists far out on the edge of the gravitational field, for which no real evidence exists, there is no other conclusion.

(2) A great annual amount of meteoritic dust, 14,300,000 tons, settles to earth each year. So in the presumed five billion years, a layer 54 thick all over the earth should have accumulated. No such layer is found on the ocean floor. Identification would be easy since about 2.5% of a meteor is nickel in contrast to .008% in the rocks of the earth.

(3) operation Mohole studies[28] show that instead of an average of 18,480 feet of sediments on the ocean bottom expected after a billion years of erosion, only about 1800 feet are found at the *maximum.*

(4) Tektites of glassy meteorites show maximum ages far less than even 1,000,000 years even granting the validity of the questionable argon method of age determination.

(5) Sulphates ($S0_4$) are being carried into the ocean at more than twice the rate of sodium and chlorine, yet there is more than seven times as much chlorine in the ocean as sulphate and four times as much sodium.[29] Evidently then both sodium and chlorine were abundant at T = 0. Since sulphates are fully as soluble as salt they must have been present, also. The earth then must be considerably younger than the 10,670,000 years it would take to accumulate the sulphates were there none at T = 0.

Only by tying the Biblical concept of an original creation with the various curses resulting in the transformation of many life forms, and ending in the final catastrophe of a world-wide Flood can we build an adequate explanation of the world we see around us. Whitcomb and Morris very effectively present the argument for a universal flood being the cause of the major portion of the fossil bearing water deposited strata in their recent book, *The Genesis Flood*. The after effects lasted for thousands of years as the earth's interior basins such as Lake Lahontan and Bonneville gradually dried up. Now the Caspian Sea is drying up at a rate causing such alarm to Russian agriculturists that an entire river is being diverted so as to empty into it. Southern California which enjoyed a winter rainfall in 1750-1850 great enough to fill the large Los Angeles and San Gabriel river channels is now practically a desert! Undoubtedly following the Flood rainfall was so great in many areas as to cause deposition of stratified rock several hundred feet or more in depth in a hundred years. In fact, the major mistake made by Sir Charles Lyell was his assumption that the rate of erosion and deposition of sediment then occurring (1830-1850) was a constant one. We can well liken the imbalance caused by the world-wide flood catastrophe to that of starting the swinging of a large pendulum. As the years go by the arc of action and reaction gradually lessen. However, the earth is still not entirely recovered from the strains due to weight inequalities which frequently adjust themselves by earthquakes. Not only during the flood but for a long time thereafter great lava flows occurred. The glaciers which once covered the upper half of North America have shrunken to pitifully small remnants of their former grandeur, Several students of geophysics predict that all of them will be melted by 2040, thus causing sea coast towns such as London and New York to be hundreds of feet under water!

As we are learning more about the deoxynuleic acid patterns which govern heredity, we are learning how a few such transformations were effected in bacteria. Only by a careful study of all the facts of science can we understand how God effected all these changes or better stated permitted them to come about. Though we can never hope to make this a perfect world, we can by the grace of God make it a better one. As Christian research scientists we have a twofold duty. The first is to God in that our science should ever more clearly show the glorious complexity of His creation. Though marred by the evils caused by man's sins, it still has much of its original beauty and when properly interpreted will give us a better understanding of the glory of that "new heaven and earth" which will be our home when our Lord and Saviour returns. The second duty is to our fellow man in that we must endeavor to make our scientific efforts of value to him. Also, we of all Christians in this age of skepticism and doubt must constantly remember that God's glory is shown in his wonderful creation and He expects us to reveal it to our fellowmen during our work in the laboratories, in our scientific papers, and generally in our lives.

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