

## SYMPOSIUM ON VARIATION—X

## BIOLOGICAL VARIATION\*\*

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Received 1 October 1990; Revised 27 December 1990

## Abstract

A review is made of known factors, both nonhereditary and hereditary, in the production of new varieties among plants and animals. The origin of these new varieties *within* basic types is most obvious, but since Creation Week, the production of new *basic types* of organisms apparently has never occurred.

## Introduction

To the student of origins the process of biological variation is of tremendous importance. Fortunately, mankind seems born with more or less of an appreciation for variety in many things, both botanical and zoological. Our world is kaleidoscopic with varieties.

As we study variation in nature, we soon discover another universal fact—the discontinuity of diversity among plants and animals. Living things in their multitudinous varieties cannot be arranged in a continuous unbroken series from simplest in structure to most complex, nor can one variant be traced through a continuous series to a markedly different one. Instead, we observe that the variation is discontinuous. Rather than a graded series of individuals we find separate clusters of similar forms. This fact makes it possible with the greatest of ease to distinguish among our domesticated plants and animals. We know the cats from the dogs, the roses from the camellias, the corn from the wheat, the maples from the oaks. This discontinuity has made possible the construction of scientific classifications of living things, and the discontinuous clusters have been assigned the terms *Phylum*, *class*, *order*, *family*, *genus*, and *species*.

In our study of the problem of origins we need to acquaint ourselves with the processes of change which operate in living things so we can determine their quality and magnitude. We are very aware that variation does occur in life forms. This fact becomes obvious as we compare the differences between a Nordic and Hottentot, a Clydesdale and a pony, dent field corn and popcorn, Better Times and a wild rose. What mechanisms operate to produce this variation? Is there any limit to how far the changes can go?

Even though we recognize that the entire topic of variation among living forms is one in which the records of investigation are shot through and through with biased speculation, still creationists and evolutionists are agreed that variation among living things may be divided into two large classes: nonhereditary (environmental) and hereditary (genetic).

## Nonhereditary Variation

Nonhereditary variations are not caused by genetic difference but by environment, including variations produced by differential feeding, humidity, light, tem-

perature, training, etc. An example would be the contrast in appearance of a stunted spruce tree growing at timberline and a fine specimen growing at a lower level. Again, a human being exposed to much sunshine may develop a deep coat of tan. The ability to produce melanin pigment varies from the person who can develop a heavy layer of the pigment to an albino who can develop none. However, the heavily tanned person knows that his color soon fades when his skin is shaded from the sun. Even in generations of sun-tanned ancestors, the acquired tan is purely environmental, not inherited.

The phenotype (exterior appearance) of any organism is necessarily a result of the interaction of a genotype (genes present) with an environment; both are necessary. Some genes of the genotype of an organism may never, even though dominant, manifest themselves unless they experience just the right environment. To illustrate, sun-red corn may live from generation to generation as a yellow-seeded corn so long as, during growth, the husk shades the ear during the milk stage of its seeds. One must strip down the husk and let the direct sunlight fall on the seeds while in the milk in order to get the photochemical reaction which produces red pigment in the seeds. This same situation holds, more or less, for all factors in the genotype. The genotype sets the stage, but afterwards what actually takes place on the stage depends on the environment.

As an illustration of genotypic influence vs. environmental, breeders of agricultural plants look for even slight genotypic improvements in yield and quality, since they may be expected to recur again and again in the progeny of the improved variety. However, yields are influenced not only by genotype but also by environmental factors such as the quality of the soil, the amount of soil moisture, heat, light, and the quality of the fertilizer. Obviously one must know whether a difference in yield between several samples of seed is predominantly genotypic or environmental. Experiments are devised whereby the relative influence of genotypic and environmental factors can be determined.

## Hereditary Variations

Turning to hereditary variations, the changes with which the student of origins is most concerned, we note that these may come about in various ways, summarizable as (1) recombination, (2) gene mutations, and (3) chromosomal aberrations, sometimes called chromosomal mutations.

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\*\*Editor's Note: This article is adapted, with slight modification, from *Variation and Fixity in Nature* by Dr. Frank Marsh (see back cover). Dr. Marsh, now in his 91st year, continues to support Creation studies.

1. *Recombination*. As the term suggests, the members of a pair of genes present in a sex cell may, through the process of reduction division, become separated into different daughter cells, then through the process of fertilization, are united in new combinations, producing new characters. One example of a recombination is the birth of a red-and-white calf to a Holstein line which has been only black-and-white for a number of generations. Other examples are the appearance of walnut comb on a fowl with single and rose-combed parents and the production of gray rats by crossing a black parent with a yellow one. These effects are reversions or "throwbacks" and are not new differences. Although they constitute the commonest source of differently appearing individuals, still they can give rise to nothing really new. They come from arrangements of genetic elements already in existence; without doubt they have already appeared many times in the history of the animal or plant.

2. *Gene mutations*. A gene mutation is a heritable alteration in a single gene. In the complicated double helix of chemical substances, there is considerable room in which a mutation could occur. A gene mutation implies that the genetic material can undergo some sort of change that results in the production of an altered phenotype. According to Levine (1968, p. 154), "Gene mutations represent changes that have occurred at the level of one to a few nucleotides within the DNA molecule and below the resolution of the electron microscope." According to Dobzhansky (1970, p. 72), "Most [gene] mutations are caused by substitution of a single amino acid in a protein and of a single nucleotide in the DNA chain coding this protein."

As a rule genes are so stable that the natural mutation rate is very low. Many species have remained much the same for thousands of years. The brachiopods among animals, and seaweeds and *Ginkgo* among plants, are examples of organisms in which almost no changes are observed in present-day species as compared with fossils. The comparative rarity of such changes is a fortunate thing, because gross mutations are usually harmful to the organism, and the majority of mutations threaten the organism's survival. This is to be expected as we remember that the organism is a delicately adjusted mechanism, and a random change would more likely be injurious than beneficial.

There are three kinds of gene mutations: visible, biochemical, and lethal.

In *visible* mutations the phenotypic effects alter the organism's morphology. These visible mutations in the fruit fly may be either dominant, as bar eye, or recessive, as white eye. Other visible mutations are the short-legged or Anton breed of sheep; albino man and albino animals such as rabbits, rats, mice, guinea pigs, foxes, skunks, squirrels and birds; hornless cattle; double-eared cattle; pacing horses; many-toed cats; mule-footed swine; and bulldog-faced dogs.

Conspicuous gene mutations of the visible class in plants include the Shirley poppy, remarkable for its wide range of colors, which originated from a single plant of a small red poppy common in English cornfields; double petunias, roses, azaleas, stocks, carnations, daisies, and other plant clusters which arose from single-flowered plants; dwarf portulaca; striped sugar

cane, blotched leaf in corn; the Boston fern; red sunflowers; red sweet potatoes; spineless cacti and the Concord grape.

A second class of gene mutations may be called *biochemical*. They represent a loss of a specific biochemical function, since the mutant organism no longer has the ability to synthesize an essential metabolite such as an amino acid or a vitamin. Or this kind of mutation may be the cause of the loss of an organism's ability to make a specific protein, most often an enzyme necessary for the normal function of some essential process. Possibly such a loss or change is the underlying cause of most mutations, also visible mutations. In such a situation, of course, the biochemical mutations would cause death unless the organism is otherwise supplied with the metabolite it cannot synthesize.

*Lethal mutations*. These chemical changes appear early in development and cause the death of the organism in the embryonic stage.

Can mutations create new species? Biologists do not agree. Dobzhansky (1941, p. 78) says:

Most biologists were skeptical, and justifiably so, of the mutation theory of de Vries, who claimed that new species arise by sudden mutations. Likewise, when Morgan and his associates described mutant *Drosophila*, many biologists remained skeptical, because these mutants looked like a collection of freaks rather than changes fit to serve as raw materials of evolution. . . . Most mutations, large as well as small, are more or less deleterious to their carriers. Mutation appears to be a destructive, rather than a constructive, process. One should not forget, however, that a mutation is neither useful nor harmful in the abstract; it can be so only in some environment. If the environment is not specified, the statement that a mutation is useful or harmful is meaningless. A mutant that is harmful when its carrier is placed in one environment may be neutral in another, and useful in still other environments. Furthermore, a mutant gene does not exert its effects on adaptedness regardless of what other genes an individual carries; a changed gene may be harmful on some genetic backgrounds but useful on others.

3. *Chromosomal aberrations (chromosomal mutations)*. Composing this type of change there are two major classes: (a) changes in chromosome number (ploidy), and (b) changes in the chromosome structure that result in alterations of gene order or number.

Three kinds of ploidy are recognized: *Haploidy*, where the chromosome complement contains only a single member of each normal chromosome pair; *polyploidy*, where each chromosome complement contains more than two entire individuals of each chromosome; and *heteroploidy*, where a chromosome is subtracted from or added to the normal set. The situation in which a pair of each of the chromosomes is present is diploidy and is considered to be the normal arrangement.

How many chromosomes do different organisms have? The chromosome count of radiolarians (one-celled marine animals) runs to several hundred. As many as 208 are found in each cell of the crayfish

*Cambarus immunis*. In a large sample of 2413 species of plants, over one half had less than 12 chromosomes as a haploid number. Twelve chromosomes in the haploid set was the modal point where 391 species out of the 2413 were grouped. Eight in the 2413 had the same number as man, 23 in each haploid set (Dobzhansky, 1941, p. 224). The correlation between chromosome number and gene number is very low, longer chromosomes commonly having many more genes than shorter ones. Note that identity in chromosome number does not necessarily have any relation to the crossability. Some of the creatures having the same chromosome number as man (diploid 46) are: marmoset monkey, meadow mouse, shelduck (*Tador-na*), water snake, worm lizard, six-lined racerunner (lizard), an Old World lizard, and four bony fishes (Altman and Ditmer, 1962, pp. 1-5).

Returning now to the haploids, these individuals occur normally in the reproduction of such animals as bees, wasps, certain moths, and rotifers in which unfertilized eggs develop into males. In some animals, e.g., starfish, frogs, salamanders and rabbits, the eggs may be induced artificially to develop into haploid individuals. Often in such cases the diploid number is restored through a division of chromosomes not accompanied by cellular division. Haploids have been found in several plant species, for example, Jimson weed, tobacco, tomato and wheat. Such individuals may be induced by cold, radiation, or other external changes. But because of their rarity and infertility these forms probably play little part in adding to the supply of new natural variants.

The second kind of ploidy, *polyploidy*, appears to be more important. A number of leading evolutionist geneticists hold that this process of variation is the most promising in the matter of generation of new species. Two types of polyploids are recognized: *autopolyploids*, where there has been a multiplication of the basic chromosome number characteristic of a *single* race; and *allopolyploids*, where the individuals have arisen from a fusion of gametes having more than the reduced or haploid number, but which have come from *different* races, species, or genera.

Autopolyploidy may occur spontaneously in nature or may arise from adventitious buds arising at grafts or after decapitation in tomato and nightshade plants. Some of the shoots which develop from these buds in callus tissue formed at the cut surface are polyploid. Flowers on these shoots may perpetuate the condition through sexual reproduction. Treatment of buds and seeds with the alkaloid colchicine from the autumn crocus is a simple way of inducing polyploidy experimentally. Under the influence of this alkaloid, splitting of chromosomes occurs, but the cell fails to form two daughter cells at the time, thus doubling the chromosome number.

Of particular interest to us is the fact that autopolyploids may possibly occur naturally in the field. Muntzing (1935) lists 58 such apparent examples in Europe. Some very intriguing cases in our country among species of spiderworts (*Tradescantia*) are described by Anderson and Sax (1936). *T. occidentalis* is distributed over the prairie states from the Rocky Mountains east to the Mississippi River. Plants having twice the normal number of chromosomes (tetraploid)

are found over most of this area. The range of *T. canaliculata* lies mostly east of that of the former species, and its individuals are also largely tetraploid. However, there is a fairly broad strip just west of the Mississippi in which both species grow. Tetraploid developed in this area and spread outward, *T. canaliculata* going chiefly east and northeast, while *T. occidentalis* spread to the north and northwest. The thought is that the tetraploid races were better adapted to those environments than the diploid races.

It would appear that the systemic effect of polyploidy is similar to that of mutation. Any change from the normal condition which might be produced by polyploidy could be favorable for the organism under some environmental conditions and unfavorable under others. However, since either addition or loss of chromosomes, possibly through disturbance of the normal finely adjusted balance among the genes which achieves the amazing phenomenon of each living thing, usually lessens the vitality of the offspring, the reproductive powers of the new individuals would more frequently be impaired. This would be a limiting factor in the usefulness of ploidy in the production of variation.

Some interesting allopolyploids have been produced in the laboratory. One of particular interest is the intergeneric hybrid between radish, *Raphanus sativus*, and cabbage, *Brassica oleracea*, made by Karpechenko. Both parents have nine pairs of chromosomes, and individuals of the first hybrid generation have 18 univalent. The individuals of the first hybrid generation are nearly sterile; most plants produce no seeds at all, but some do produce a few. These seeds give rise to individuals with 36 chromosomes in each cell (tetraploid). These plants are irregularly fertile. Unfortunately, this hybrid had a root like the cabbage and a top like the radish. This feeble and variable plant, which must be pampered in order for it to continue, has been named *Raphanobrassica*, a fusion of the generic names of the radish and the cabbage.

The production of allopolyploids in the laboratory reveals a mechanism in nature which *may* have functioned to some limited extent in producing complexity within original kinds. However, these forms usually show such great irregularities in the distribution of their chromosomes, accompanied with prevalent infertility, that very likely they would not be able to compete successfully in nature and thereby survive. Thus a laboratory demonstration of the effectiveness of ploidy in the production of new species is still largely lacking. The evidence for the service of ploidy in producing variation still remains chiefly of the subjective type. What are technically new species, because they do not interbreed with the parent form, have been produced. Their low fertility and limited change from parental forms make it unlikely that these supply the amount of variety evolution requires.

Numerous examples of plant species appear to be cases of allopolyploidy. The origin of the marsh grass *Spartina townsendii*, as suggested by Huskins (1931), apparently illustrates such a case. This species was discovered occupying a single locality in southern England in 1870. A rapid spread of this grass was recorded a short time later. By 1902 it occupied thousands of acres along the English coast, and in

1906 it had appeared on the coast of France. Because of its desirable agricultural properties it has now been introduced into many parts of the world. Systematists have decided that because of its morphological characteristics it must be a hybrid between *S. stricta*, a native European species known for 300 years, and *S. alterniflora*, a native species of America which had been introduced into England and become common in some localities. The chromosome number of the former is 28 pairs, whereas that of the latter is 35 pairs. This would mean that an allotetraploid of these two species would have 126 chromosomes. *S. townsendii* actually shows  $126 \pm 2$ . Thus it seems reasonable to assume that *S. townsendii* may have arisen as a tetraploid hybrid of the other two species. The superior adaptability of this possible hybrid is demonstrated by its overrunning both *S. stricta* and *S. alterniflora* when meeting them in natural competition.

The results of cytogenetic investigations on species of wheat (*Triticum*) and the related genus *Aegilops* (goat grass) made by Sax and Sax, Sapehin, Watkins, Bleier, and Kihara are interesting in this connection. The 15 described species of wheat fall into three classes: viz, the *einkorn* group of three species each of which has seven pairs of chromosomes (diploid), the *emmer* group of eight species, composing the "hard" wheats, which have 14 pairs each (tetraploid), and the *vulgare* group of four species, commonly called the "soft" wheats, each member of which has 42 chromosomes (21 pairs and hexaploid).

In this case, with few exceptions, the hybrids between species with the same chromosome number are fully fertile. The hybrids between the members of the *emmer* and *vulgare* groups are pentaploid, showing 14 bivalents and seven univalent at meiosis. Crosses of *emmer* and *einkorn* have four to seven bivalents and from seven to 13 univalent. The *vulgare*-*einkorn* cross produces from none to as many as 10 bivalents, seven being the usual number, at least in certain crosses. These relationships have been interpreted to mean that the *einkorn*, *emmer* and *vulgare* groups have, respectively, one, two and three sets of seven chromosomes which are different from each other. It has been thought that the species of the *vulgare* group are allohexaploids, their origin being due to a cross with a species of *Aegilops*.

The case is an interesting one in that it serves as an illustration of the chromosome relations within the members of a related group. That several modern species have come from a few can be sensibly concluded. These variation changes of wheat are possibly of two kinds: species formation through new combinations of chromosome sets, and these in turn combined with gene mutations and new arrangements of genes. The very greatest apparent changes here have done no more than to erect additional species within the kind of grass involved in the crosses.

With regard to the third kind of ploidy, *heteroploidy*, it has been studied in detail in the Jimson weed (*Datura*), in the evening primrose (*Oenothera*) and in the vinegar fly (*Drosophila*). Heteroploid forms, it will be recalled, are those which differ from the normal members of the species by one or possibly two chromosomes more or less. This means that in some way at least one member of the usual diploid

complement is lacking entirely or that there may be three members in a "pair" instead of two. These forms appear sporadically and show numerous and generally slight departures from the wild or normal type in many characters. Because they never breed true and are of lower fertility than normal diploids, they probably do not become established as new types in nature.

That polyploidy may be widespread among plants is indicated by an examination of the chromosome numbers of various genera. The case of species of wheat with their 7, 14, and 21 pairs has been mentioned. Some other genera with the chromosome number of included species are *Chrysanthemum*, 9, 18, 27, 36 and 45 pairs; meadow rue, 7, 14, 21, 28, 35 and 42 pairs; roses, 14, 21, 28 and 35 pairs; *solanum* (nightshade), 12, 18, 24, 30, 48, 54, 60 and 72 pairs. Various cultivated varieties of garden flowers, vegetables, crop plants and fruit trees appear to be polyploids. Apparent triploid and tetraploid varieties are known and cultivated among hyacinths, tulips, lilies and others. Some varieties of these kinds of flowers were experimentally produced. Polyploidy is of considerable economic value in cultivated varieties of cotton. Quite likely some of the "new" forms developed by Burbank in his outcrossing experiments, if examined for their chromosomal composition, would turn out to be polyploids.

The abundance of apparent polyploids in plants and their relative scarcity among animals is one of the most striking differences within the variants in the two kingdoms. About the only authentic instances of tetraploidy in animals is in brine shrimps (*Artemia*) and the nematode worm *Ascaris*. Indications of ploidy are found in a study of the chromosome numbers of flatworms, leeches, and a few other annelids, all of which are hermaphroditic (bisexual). The reason there is apparently much less polyploidy in animals than in plants may be that many "higher" plants are hermaphroditic, while animals are usually of two sexes differentiated by the diploid mechanism of segregation and combination.

I now discuss part (b) of chromosomal aberrations, those changes in the chromosome structure that result in alterations of gene order or number. These changes consist of deletions, duplications, translocation and inversions. Deletions (deficiencies) and duplications appear to involve losses or multiplications of single genes or of a part of a gene, or they may affect larger regions of the chromosome so that several to many genes are modified. Therefore such changes are basically distinct from the latter two, which merely change the arrangements of the genes and not their number. Addition or subtraction of genes is usually accompanied with effects which can be seen, while translocations and inversions may not be apparent on the surface.

Illustrations of effects produced by demonstrated deficiencies are the notched wing of *Drosophila* described by Bridges and Mohr and the waltzing gait in mice explained by Gates. Mice with this deficiency in this gene complement cannot run in a straight line and usually whirl about in small circles. Study of *Drosophila* has shown that most deficiencies are lethal. According to Sturtevant and Beadle (1939, p. 149),

Duplications in *Drosophila* have phenotypic [visible] effects more or less in proportion to their lengths. Short ones may be very slight effects. Longer ones have progressively stronger effects—usually in roughening of the eyes, changes in the shape of the wings, modification of bristles.

Translocation have actually been seen in the cells of *Datura* (e.g., Jimson weed), corn, *Drosophila* and other organisms. Among plants in which these changes have occurred are peas, bellflower, onions, tulips, peonies, many grasses, spiderworts and evening primroses. Very few such changes have been found in animals. In several species of seed plants wild populations may contain chromosome sets that differ from one another by reciprocal translocation. It is also clear that related species sometimes differ in this respect and that translocation has been of importance in accomplishing diversity within groups.

Genes appear to be strung along end to end in the chromosome. Thus translocation which would not be expected to break exactly between genes would suggest position effects. If genes were entirely independent in each instance, it would make no difference if their arrangement in a chromosome were 123456 or 123654. But owing to evident position effects, changes in the serial order of genes are important in the development of variants from a normal form. Usually no appreciable reduction of the reproductive power takes place in the individuals in which inversion has occurred. Some situations appear to indicate that in *Datura* races show circles or chains of chromosomes at meiosis (mitosis with halving of number of chromosomes) in addition to bivalents.

#### Hybridization

Hybridization deserves an important place among those factors which produce variants among plants and animals. However, it has limits. The fact that crossing cannot occur across basic types but is in each instance confined to the members of a single kind, makes it of no further service than to increase the complexity of variants within separate kinds. Isolating mechanisms in nature never permit more than an increase in the diversity within the original kind.

#### Discussion

With this brief treatment of hereditary changes in the basic mechanisms of heredity, I wish to emphasize one outstanding fact. Even if it be allowed that all these known processes of variation accomplish the *greatest* changes that investigators claim for them, mutations in vinegar flies merely resulted in new variants *within* the type. No one has ever conceived of the results as being anything other than vinegar flies. Autopolyploidy in spiderwort resulted in additional variants within the spiderwort type. Allopolyploids in marsh grass were additional variants of marsh grass.

Among animals, tetraploid in roundworms and brine shrimps merely produces new variants of roundworms or of shrimps. Heteroploidy in evening primroses merely produces varieties of primroses. Deletions and duplications merely produced waltzing mice from normal mice and notched-wing vinegar flies from normal vinegar flies. Translocation in Jimson weed

and corn merely resulted in new variants of Jimson weed and corn.

It is thought that inversions of genes within the chromosome may have been active in the development of the fruit fly genus *Drosophila*. Sinnott, Dunn and Dobzhansky (1970, p. 294) state that "pericentric inversions have been active in the evolution of this genus (*Drosophila*). Similar evidence exists for grasshoppers and, less directly, for some other animals and plants." However, if inversions have produced some of the species of the genus *Drosophila*, then, by evolutionist definition, here is a case where macroevolution has occurred. This would be true if we were to define macroevolution as "interspecific variation," i.e., the production of new species. However that this cannot be accepted as a definition of macroevolution (which in current usage refers to the assumed appearance of *new basic types*, i.e., organic evolution) is obvious when we recall that all the species of the genus *Drosophila* are 100 percent vinegar flies. Therefore, all inversion in vinegar flies has done is merely to produce new variants of bonafide vinegar flies. *This kind of development could never result in organic evolution.*

What, then, has been accomplished by inversion? Just this: variation within a basic type (vinegar flies), no more. And that is *microevolution*. According to all demonstrable evidence, no change greater than variants *within* a basic type has been observed. The term *macroevolution* should be reserved for such speculative, assumed, and undemonstrable cases as the development of new basic types. After all these processes have achieved their greatest possible changes, we still have nothing newer than vinegar flies, spiderworts, radish-cabbage hybrid, marsh grass, primroses, roundworms, brine shrimps, corn and Jimson weeds. Thus, nothing higher than microevolution has been achieved by all these processes of change. The crucial point is: *Each of these basic kinds is set off from every other basic kind by some "residual part" which no amount of gene change can erase.*

Dobzhansky (1941, p. 52) states that even between species "it must be admitted that in no case have all the differences between two good species been completely resolved into gene changes." If this is true of species, what can be said of the differences which set off one group of species from another species group? If we stick to the facts, we must recognize that *no present-day natural process is capable of accomplishing the change necessary to bridge the discontinuity between kinds now so widely evident in nature.*

A study of fossil forms shows that representatives of the large systematic groups are just as complex at their "earliest" appearance in the rocks as are their descendants today. Sequoia, beech, hazelnut, cottonwood, oak, willow, linden and elm are as distinct at their earliest appearance as fossils as are the living trees today. In some cases the *species* of these fossil ancestors are not identical to our modern *species* within each respective kind. They may be as different from our modern species as two of our modern species of the same basic kind differ from each other. The same occurs among the animals. Credit can be given to the concept of evolution here only as it directs attention to these processes of variation. The

researcher may assume as many millions of years since the formation of fossils as he likes, *yet all the processes of change have not accomplished, even in a single case, the erasure of the discontinuity which marks off the different kinds of organisms.*

We need not become confused by the fact that processes of change apparently have operated in some variable basic types of organisms *since their creation.* These populations produced variants to which taxonomists have assigned the terms species, genera and even families. An example is Darwin's finches on the Galapagos Islands. David Lack (1939, p. 17) divides these finches into three genera (some taxonomists have assigned six and seven genera) and 14 species. The finch populations of all the islands have been placed in the subfamily *Geospizinae*, endemic to the Galapagos, of the world family *Fringillidae* (all finches). The inadequacy of the terms microevolution and macroevolution, as defined by evolutionists, is obvious in such cases. We should remember that, while taxonomic categories are arbitrarily chosen, the individual organism is the natural reality, and these individuals are grouped naturally into morphological-physiological groups which we may call basic kinds or types (baramins). We need not argue about the variously defined "species" or debate processes of microevolution and macroevolution upon such low-level, vague, fluctuating populations. The clusters we call species may be legitimate game for taxonomists, but the high-level, enduring basic types (including many "biological" species) lie clearly before the gaze of the physiologist and for the biologist constitute the true building blocks of the living world.

The student of Darwin's finches is impressed with the similarity of all populations of these birds. In most respects, other than beak differences, the individuals of these populations are "closely similar to each other," to use Lack's words (1939, p. 19). Although considerable change has apparently developed in the beaks of the different populations, still whatever processes of variation operated, they have done no more than produce an interesting community of finches. Is this microevolution or macroevolution? Since no new basic types have appeared, we must consider this another case of microevolution, even though taxonomists tell us that new species and even genera apparently developed.

Throughout the living world the greatest actual changes that the evolutionist has found are the mere production of additional variants *within groups already present and clearly set off in nature.* Nevertheless he is optimistic and has great faith in this theory. He commonly says, when presented with these difficulties,

"Just give the processes more time." However, the thoughtful scientist can see that such an attitude is not reasonable, because natural laws do not change with passing millennia. If we cannot lift ourselves by our bootstraps today, we could not do it in a million years. If processes of variation today are not erasing the differences between kinds, neither could they do it in millions of years.

How does the theory of special creation fare in the light of these known causes of variation? The creationist turns to Genesis and reads that each kind of plant yields seed according to its own kind (Genesis 1:12). He next turns to nature to see what Genesis means. He sees that both plants and animals still bring forth after their respective kinds. He finds that, even with all forces of change operating at maximum strength, vinegar flies still continue to bring forth vinegar flies and corn continues to bring forth corn. He finds in the fossil record that this same discontinuity has existed since the earliest natural record; all the work of all the scientists can demonstrate only minor differences which have come in by microevolution since the origin of basic biological forms. Thus the scientist who accepts the Genesis creation record owes no one an apology.

### Conclusion

Popularly the claim is made that creationism is only religion, evolution is natural science. However, due to the fact that the origin of a new basic type has never been observed in nature or in the scientific laboratory, evolutionism rests *entirely* upon faith in an undemonstratable assumption, not upon scientific fact. In contrast the theory of special creation is in complete harmony with all demonstratable (scientific) proof.

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### QUOTE

This fact, of God's articulate disclosure of His moral will in the Decalogue and other ethical imperatives that Scripture publishes in a literary canon, and that Jesus Christ publishes in His life and ministry, has far-reaching consequences. It disputes mystics who would deny intelligibility to divine revelation because of its supernatural character. And it disputes modern rationalists as well, who in the name of evolutionary intelligence consider final divine revelation offensive to the modern mind.

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