

5-1-1953

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Recommended Citation

Rehwaldt, August C. (1953) "Some Phases of "After His Kind" in the Light of Modern Science," *Concordia Theological Monthly*. Vol. 24, Article 28.

Available at: <https://scholar.csl.edu/ctm/vol24/iss1/28>

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Some Phases of "After His Kind" in the Light of Modern Science

By AUGUST C. REHWALDT

SOME would estimate the number of species of animals to be about 1,073,000.¹ Others say that there are about 3,000,000 species of animals.² The wide range of difference between these two estimates is due to the diversity of opinion as to the concept "species." Since evolution is the background of modern biology, the term species is accordingly defined as an evolving group and not as an aggregation with set bounds and limits. Darwin's *Origin of Species* takes this view. Opposed to this view is that of the Bible, which speaks of natural groups of plants and animals and calls such a group *min* (Hebrew), "kind" (King James), *Art* (Luther), Gen. 1:11, 12, 21, 24, 25. The problem, then, may be stated thus: Either one may assign each living thing to a group called species, which gradually merges into other similar groups; or one may assign each organism to a group, a kind, which has strict boundaries and limits and which, because it has such sharp lines of demarcation, cannot be called a species as the term is now generally understood.

KIND, NOT SPECIES

Once species and kind meant the same. Today the term species has lost its first significance, and it has taken on a vagueness. No one seems to know just what a species is. How widely opinions differ is apparent from the following quotations taken from current texts used for first-semester botany, zoology, and biology courses.

The primary groups of individual plants are known as species. A species is a difficult thing to define except in a technical sense, and even then definitions do not agree. For practical purposes the idea can, however, be made sufficiently clear by examples.³

A species is a group of organisms which resemble each other so closely that they can be separated only by individual differences. In the case of many organisms there is little doubt about what constitutes a species. The gray squirrel, for example, constitutes

a species which is not easily confused with any other kind of mammal. Similarly the brook trout is an easily recognized species of fish, and the dandelion is an easily recognized species of flower. In other cases it is often extremely difficult to find definite distinguishing characteristics and therefore to decide whether all of the individual group should be placed in the same species or in one or more separate species.⁴

At the present time the unit of classification for both plants and animals is the species. It is difficult to give a definition of this term which will apply uniformly throughout the animal and plant kingdoms, but a species may be defined as a group of similar individuals, alike in their structural and functional characteristics, which breed only with each other, and have a common ancestry.⁵

Linnaeus considered each species "a thought of God," an immutable group created by the Almighty and remaining constant through all time. According to this interpretation, a lion was created as such, could never be modified in any way, and would therefore always remain a lion. This, of course, would be equally true of man, dog, horse, or sponge, and every other organism. A species once created might become extinct, but it would never change, and therefore it could give rise to no new species. This concept was known as "Special Creation." We now know that such rigid categories do not exist. Today a species is generally interpreted as a mere taxonomic concept (Linnaean concept) for a group of individuals of the same kind. The individuals comprising a species are thought to be very closely related by descent (ancestry), as indicated by their resemblances. This modern Linnaean concept of species, as we have seen, does not coincide precisely with his original definition of a species.⁶

In a general way it can be said that two opinions prevail concerning species. The one group insists on many species and has been known as "splitters," while the other group prefers fewer species, the "lumpers." But neither group will allow that limits are definitely set for a natural group or kind. Opposed to all these views is the Bible.

Gen. 1:11. And God said: Let the earth produce grass and herbs yielding seed and fruit trees bearing fruit after their kind whose seed is in them upon the earth; and it was so.

12. And the earth produced grass and herbs yielding seed after their kind and trees yielding fruit whose seed was in them after their kind; and God saw that it was good.

21. And God created the great sea monsters and each one of the creeping creatures with which the waters teem after their kind and every winged bird after its kind; and God saw that it was good.

24. And God said: Let the earth bring forth living creatures after their kind, domestic animals, reptiles, and wild beasts of the earth after their kind; and so it was.

25. And God made the wild beasts of the earth after their kind and the domestic animals after their kind and the reptiles of the ground after their kind; and God saw that it was good.

The translation is that of Leupold.⁷

When Prosksch⁸ writes: "Die beiden Genera . . . der Flora entfalten sich in den Species"; or Leupold:⁹ ". . . these fruit trees bear fruit 'after their kind,' a peculiar and definite limitation, which all those understand who have seen how the 'kind' sets limitations upon all who would mix and cross them"; they have in mind the species of the old and not the modern version. One uses the term "species," while the other employs the term "kind." Both are thinking of the same natural group. Linnaeus, too, had in mind the old species when he wrote his *Systema Naturae*, and, because he did, Newman said of him: "It is probable that Linnaeus' failure to see more deeply into the fundamental grouping of organisms was his slavish adherence to the idea of special creation. For him all species had been created essentially in their present form, except that certain types had arisen through crossing." When Luther, Lange, Keil, and others use the term species, they invariably have in mind a natural group with set limits and boundaries. Gesenius uses the term in this sense in his *Hebraeisches und chaldaeisches Handwoerterbuch ueber das Alte Testament*, which was in its fifth edition in 1857. When these men wrote, the term species had as yet lost none of its original significance. Darwin's *Origin of Species* was first published in 1859. Keil's *Biblischer Commentar ueber Die Buecher Mosis, Erster Band: Genesis und Exodus* appeared in 1861. Lange's *Theologisch-homiletisches Bibelwerk, Die Genesis* came off the press in 1864. They as well as the earlier commentators are justified in using species when they have in mind the *Art*

or kind of the Bible, for Darwin's influence was not felt immediately. His notions attracted much attention at first chiefly because they were so novel and because they fit so nicely into a materialistic way of thinking, but their prestige was not established until after Thomas Henry Huxley appeared on the scene as Darwin's champion. So it was during the last fifteen to twenty years of the past century that the term "species" generally lost the old meaning and acquired the new significance. Today if we wish to refer to a group of organisms which the Creator established in nature, we can no longer use the term species without causing misunderstanding and confusion, but we shall have to use the *Art* of Luther and the kind of the King James Version.

AFTER HIS KIND

To insist that the Genesis account establishes "three orders," grass, herbs, and trees, to "cover all vegetation in so far as it is of interest to man"; to go to great length concerning the implications of the expressions "yielding seed," "fruit-bearing trees," etc.; to attempt to show that the "seed came first and then the plant" or that the reverse order of this actually occurred: all these interpretations detract from the grandeur of Moses' account of God's creative act. Whether Moses was a retrospective Prophet¹⁰ and faithfully recorded the vision of Creation he had seen, or whether he received word pictures, does not add to, or detract from, the impression made on the reader of the Creation account, namely, that one grand scene upon the other unfolds before him and fills him with awe and wonder. In the sacred account, the Holy Ghost has scaled everything down to bring it within human range, so that man may learn more about the Creator than is written in his heart or in nature. What Moses pictures for us in bold broad strokes always directs our attention to Him who is back of it all. Details might divert our attention from the Creator God. Man in his attempt to get everything down to the finest details, as he goes about his exegesis, steps down from that prophetic mountaintop where the Holy Spirit has placed him as he reads. If we stay on the height as we read, a vast pageant unfolds itself before our eyes, and we see all forms of life appearing everywhere, on the earth's crust and below it, filling the air and the water. The particular form of plant

and animal life which Moses mentions is to direct our attention not to details, but to the vastness, the immensity of the Creation. But the thing that interests us now, above all else, is that Moses is not only retrospective but prospective. Not only does he see all life come from the Creator's hand, but he watches it to the very end of time, and it always appears "after his kind."

"After his kind." That dictum settles once and for all the problem whether or not kinds, *Arten*, once called species, are actually found in nature. It is a characteristic of every living thing to reproduce its like, whether that be sexually through gametes, which in the plants that we know best would include seed, or asexually through spores, or by means of that intricate type of nuclear and cell division called mitosis, or the simpler cell division called fission. Each living thing produces its own kind of living material, and it does not produce in one instance this kind and in another instance that kind of living matter. It is so obvious. Frog protoplasm always produces frog protoplasm, and that of the lily always produces lily protoplasm. Man was so created that human protoplasm would not only always produce human protoplasm, but it may be assumed that over and above the potentiality of producing a physical body (a potentiality common to all living things) man was endowed with the potentiality of handing on from generation to generation the divine image, which is the highest unifying principle of the human race. Had it not been that sin and evil came into the world, man would no doubt be handing on that image from generation to generation even today. The image was lost through the fall into sin. The soul of man suffered the loss, in the first place, for the image was, as man came out of God's creating hand, inherent in the soul; in and through the soul's loss the body, too, has suffered loss. Man, as he is now, still a rational being, still occupying a position above all living things, but in a limited way, is corrupted and defiled in his nature. The dictum "after his kind" still applies to man, but he can hand on to the next generation only as much as is now his. What is lost is not his to hand on. With a feeling of deep shame and guilt we read Gen. 5:2: "And Adam . . . begat a son in his own likeness,

after his image. . . ." So it has gone down to the present day. The very principle which was designed to perpetuate in its operation the glory and excellence of man throughout all generations now perpetuates his shame.

VARIANTS

Where are the *Arten* and the kinds now? The races of men give us a hint as to what to expect when we look for kinds, the natural groups. That God "hath made of one blood all nations of men" is hard to believe when we look at the races of men and the different human strains which inhabit the world today. There is the range of color and size, and there is the long catalog of major and minor characteristics which separate group from group. There are mental, psychological, and physical differences. Despite all these differences it is generally accepted that there is only one species of man. With respect to man, the terms "species" and "kind" still coincide. If now we look for kinds elsewhere, among other living things beside man, we should expect to find, just as we did with man, wide divergence and many and striking differences between members of the same original group.

Today the limits and boundaries of kinds are obscured by the many divergences within a kind. The following examples will indicate what has happened within each kind. From the rock pigeon some sixty-five strains or breeds of domesticated pigeons have been developed. We are astounded as we walk past the exhibition cages of a poultry show. All the types of chickens shown are offspring of the wild fowl of India. In 1935 the American Kennel Club listed descriptions and standards of 102 breeds of dogs in their book, *Pure-Bred Dogs*, ranging from the mastiff or Great Dane to such miserable travesties upon the name dog as the hairless Chihuahua. In Indian corn and the fruitfly, the plant and animal most widely used in breeding experiments, some 400 and 600 mutations respectively have occurred within the past forty years. Cabbage, cauliflower, broccoli, brussels sprouts, kale, collards, kohlrabi, all are supposed to have arisen from the wild cabbage still growing along the coastal regions of Europe and northern Africa. Each kind is endowed with the potentiality of producing many and divergent variants.

Several questions naturally arise at this point. How can we explain these differences? What may have caused them to appear? Do kinds still have set limits and boundaries? "After his kind." Is this principle still in operation? What may Adam have looked like?

THE CURSE OF SIN

Paul says in Rom. 8:20: "For it was not the fault of creation that it was frustrated."¹¹ "Cursed is the ground for thy sake," the Lord says to fallen Adam. This is not so much the Lord pronouncing a just sentence upon fallen Adam as it is the Lord's stating the natural consequence of Adam's fall. Adam from now on had to live in the world which he had spoiled. Lenski¹² explains the effect of sin and evil on the creation outside of man about as follows. Originally the good creation was made subject to good man. In serving man the creation would accomplish the purpose for which God had called it into being. No small part of creation's glory lay in its serving man. Man was set to be its lord and exalted sovereign and to rule as such amid the beauties and harmonies of Paradise. The excellence of man, the divine image, man's rule over creation, creation's servitude to man, all were to redound to the greater glory of God. But there was the fall and the consequent frustration. Man failed. The whole creation outside man failed in its purpose, not because of anything it had done, but because of what man had done. The creature world still had as its immediate purpose to serve man. Since the Fall man is no longer morally a free agent, but he is now coerced by sin and evil and lives in bondage to them. Now man serves evil, and so does the creation in that it serves man. Thus Lenski explains how the whole creation shares in the consequence of sin. Evidences of this fact abound everywhere. If, then, we get back to our question, why such wide divergence among the members of a kind? we cannot avoid the answer that the coming of sin and evil partly explains that divergence.

If we halt but a moment or two to consider what has happened to the physical being of man, we may have some indication of what happened to the creation outside man. His nature has been terribly

marred and defaced. A foul disease against which there is no earthly antidote and remedy has gnawed its way through all his nature. Death and decay cling to him, and he cannot cut himself loose from them. If we think of the sores and ulcers and tumors, abscesses and cancers, and the endless catalog of diseases and maladies which ravage the body of man, then we wonder what sin may have done to the soul if it did so much evil to the body. If the full depravity of our soul and inner nature were revealed to us, were it possible, we would die from the shock of horror at seeing ourselves as we really are. We see that, in a small measure, in a conscience which has been aroused. Within a kind are found many individuals, weak, sickly, defective. Some are monstrosities. All these are marks of sin and evil. "After his kind" is still in operation. The creatures, scarred and marred by the effects of sin and evil, hand on from generation to generation weaknesses and defects.

SEPARATING FORCES

Changes in the physical environment, it seems to me, have also favored the appearance of variations among the members of a kind. Genesis gives us little more than a hint that such changes have occurred. For the rest we have to rely on conclusions which can be drawn from what we observe today. "The Lord had not caused it to rain upon the earth. . . . But there went up a mist from the earth and watered the whole face of the earth." Gen. 2:5, 6. There is certainly nothing in Genesis to prevent anyone from believing that this arrangement continued until the Flood. The Flood is, in fact, the first rain mentioned. The firmament (expansion, extension) mentioned in Gen. 1:7, 8, and particularly "the waters which were above it," account for much of the flood water, when "the windows of heaven were opened," Gen. 7:11. If the firmament and the waters above were a heavy blanket of clouds, it would have the tendency of producing a universally warm semitropical climate on the earth. That such a climate once existed is indicated by the plant fossils found under the arctic ice cap and by the coal beds of the arctic regions. That plants which required a warm climate at some time or other grew in the arctic regions is a fact and not

a hypothesis. The Genesis account will never contradict facts, and facts can never contradict Genesis. When "the windows of heaven were opened," the waters were poured down upon the earth. The heavy blanket disappeared and was never restored again. This had a far-reaching effect on the climate of the earth. The seasons were much more pronounced than before. Man had to apply himself more diligently to his work of gaining a livelihood, especially if he depended on agriculture, as did Noah. And so when Noah stepped out of the ark into that new and strange world with the marks of the wrath and anger of a just and righteous God everywhere about him, he no doubt wondered whether he had a chance in this place of destruction and desolation; whether it would be worth while to plan beyond the immediate future. But with the promise ringing in his heart: "While the earth remaineth, seedtime and harvest, and cold and heat, and summer and winter, and day and night, shall not cease" (Gen. 8:22), and with the bow, the sign of the covenant before his eyes, the Lord sends Noah and his family out to till the soil. They could go with confidence. Whether this marks the end of the antediluvian order in nature or not, changes have occurred (Spain, Palestine, North Africa, etc.). The after-effects of the Flood would be tremendous, would affect the climate first and then both plants and animals.

The changed conditions favored the preservation of variants and mutants among living things. Temperature barriers and changes in the physical world now had a tendency to isolate certain groups so that inbreeding not only tended to maintain but increased in some instances the rate of production of variations and mutations among living things. The human race, too, underwent great changes, e. g., the origin of races is generally associated with the sons of Noah. We cannot avoid thinking of the difference between Jacob and Esau here. There is, too, the confusion of tongues to be considered. Everything points to powerful forces which were at work tearing apart mankind, originally "one nation," and to the separation of the original kinds into smaller groups and individual variants. Besides natural forces which were exerting themselves in this direction, sin and evil were on the increase, as is so apparent when one reads the history of these people and of the sin and the abominations from which Abraham was rescued.

LIKE FROM LIKE

Every form of reproduction is in the final analysis the result of cell division. Some cells are said to reproduce, or divide themselves by fission, i. e., by simply cleaving themselves, so that two cells result from one. This is common to the most simple plants and animals, where variations are not easily detected because everything is reduced to a minimum in organisms which are composed of one cell only. Some cells are more simple than others. Some cells are more elaborately put together than others. These more elaborate cells go through a more intricate process when they divide than do the simpler cells. In the former the nucleus, which is a denser body lying in the less dense living material of the cell, is its dynamic center and divides first, after which the rest of the cell is cleaved into two cells. Within this nucleus lie substances (factors or genes), which transmit similarities and dissimilarities from one generation to the next. When the nucleus divides, each hereditary particle first generates another particle just like it. For a short period of time the cell contains not one nucleus, but two "daughter" nuclei. Next, the material outside the nucleus divides, forming two cells, but the exact counterpart, one of the other, if the whole process has taken a normal course. Thus in our body every nucleus, exclusive of the germ cells (egg, or sperm), has these hereditary particles alike, particle for particle. Moreover, each nucleus of the body cells is provided with two sets of these hereditary particles, with the exception of some special cases which need not concern us now. One set came from the maternal parent and the other from the paternal parent to make a complete individual. The gametes, or germ cells, can carry only one set of these particles, for the gametes are formed in a unique way so that they are provided with only one set. Thus the gametes complement each other at the time of fertilization to form a new individual.

Experiment has shown that the hereditary characters of an individual are determined by these particles already present in the two germ cells from which the individual develops. Furthermore, experiment has also shown that the genes involved in the simplest hereditary process can be generally divided into two kinds. The one kind has a greater power of expressing itself and is called

dominant. The other kind of gene has less power of expressing itself and is called recessive. If both genes for a certain character are recessive, that which they carry becomes apparent sometime during the life of the individual that possesses these genes. If the two genes which control the appearing of a certain character are unlike, i. e., one recessive and the other dominant, the recessive one cannot express its potentiality, but the appearing of this specific character will be controlled by the dominant gene.

In man, eye color is hereditary. Risking the criticism of oversimplification, we shall consider a certain brown color which has as its contrast a certain blue or gray.¹³ The blue or gray color which is apparent, as the case may be, we shall designate as blue. The gene which produces blue, for which the symbol *b* is used, is recessive to the gene which produces brown, indicated with *B*. If an individual has received the *b* gene from one parent, and the gene for brown, *B*, from the other parent, he would possess the genes *Bb* for eye color and have brown eyes. The brown gene is dominant and has greater power of expressing itself than the blue gene, *b*, which is recessive. If an individual has received the brown gene from each of his parents, he would, of course, have brown eyes. Both genes for eye color are alike, *BB*. His eye color would be pure brown. If an individual received *B* from one parent and *b* from the other, he would have an impure brown. He would be a hybrid for eye color. That does not mean that his eyes would be less brown than if he had received *BB*, but it does mean that he can hand on to the next generation a factor for blue eyes even though his eye color is brown. This is an important point for our later discussion (Gen. 30:31-43; 31:7-13). A person can have blue eyes only when he receives the blue gene from each of his parents. The gene combination for blue is therefore *bb* and is always pure.

The following implications result. Within a pedigree may be found several generations of individuals with brown eyes of the kind *Bb*, but in a later generation a child may appear with blue eyes, for the trait blue may "skip a generation." Both of its parents may have had brown eyes, *Bb*. If both parents were of the type *Bb* for eye color, then according to this principle (Mendel's law) we would expect 75 per cent of the children to be brown-eyed (one

third of these brown-eyed children would be pure brown, BB; two thirds of them would be hybrid brown, Bb), and 25 per cent would be blue-eyed, bb. This means, then, that each gene is an independent factor; that it is not influenced constitutionally by the presence of its contrasting gene together with it in the same cell. The brown gene has no effect on the blue gene, does not change it in any way. The brown gene does prevent the blue gene from expressing itself. Each is an independent unit factor that is sorted out with purity in later generations. The end result of this fundamental principle of genetics is that each organism reproduces "after his kind."

MUTATIONS

Thus this process of which we have considered only the simplest phase will hand on from generation to generation hereditary traits, the appearance of which may skip here and there. There is another process inherent in living things which produces new traits within a kind, the process of "mutation." But before entering into a brief discussion of mutation, it will be necessary to explain what is meant by "inherent in living things" so that there be no misunderstanding, for what we mean by "inherent in living things" will mark us as rationalists or as Bible Christians.

Adam's creation, or the creation of any living thing, can be said, in a certain sense, to have been different from ours and from those living things which come to life today. What follows applies to all living things, but we shall consider only man. With Adam a human "nature" was established. Henceforth humans were born from other human beings and grew and developed. That nature originated directly from God. But if it is a "nature," *eine Natur, physis*, we can distinctly conceive of it only if we regard it as in some manner left to itself and operating by its own laws and processes. If we keep our eye and mind on only the laws and processes, we shall be rationalists, but if we observe these laws and processes, call them natural, if you will, while at the same time we keep the words of Paul in mind "In Him we live and move and are," both our theology and our science will be right. All nature is an appeal to faith first, and then to the intellect. But we must distinguish between the supernatural energy — God — which

established this nature in the first place, when there was none, and the subsequent ongoing or outgoing or process of this nature, or else God is resolved into nature and nature into God. The original divine force is ever present, is the supporting ground, but not immanent or permanent, is not in operation when the natural process is not operating, does not start the natural means (which is always subordinate) to operate when it is at rest, but operates concurrently, connaturally, antecedently; it co-operates, not pre-operates. "However, the operation of the means is not co-ordinate with that of God, but rather subordinate to it, so that the secondary causes work only as far and as long as God works through them, Ps. 127:1."¹⁴ Those who maintain the immanent divine presence in every act and process in nature degrade divine power and dignity.

The inherent process by which diversions within a kind are produced is known as mutation. These traits which appear suddenly were designated as "saltations" by some early workers. The causes of natural or spontaneous mutations are unknown, but they "can be produced artificially by a variety of agents: X rays; the alpha, beta, and gamma rays emitted by radioactive elements; neutrons; heat and cold; ultraviolet rays; chemicals, such as the war gas known as nitrogen mustard; and in plants, the aging of seed. Cosmic and other rays present in the environment may cause some natural mutations. But since genes are believed to be complex, unstable molecules, it is possible that metabolic processes in the cell bring about some spontaneous mutations without the intervention of external agents."¹⁵ These external agents listed by Villee of Yale, and others, effect random changes in the genes and chromosomes which result in the production of an individual possessing a trait not found in the parents. The variation from the parents may be great or minute; it may be beneficial or harmful; but it will be handed on by hereditary processes; it will breed true. Many of our fruits, flowers, domesticated animals, and chickens were obtained by taking advantage of a mutation and by maintaining it by careful breeding. This process would have a tendency of producing variants within a kind. If the trait proves itself useful to the organism rather than harmful, or if it is neutral, it may establish itself in considerable numbers. A trait useful in one environment may be less useful in another. The probability of

mutation-producing agents in nature has not been ruled out; H. H. Plough in 1942 expressed the opinion that temperature may have something to do with the greater number of species in tropical areas. The "metabolic processes" mentioned by Ville would not rule out sickness and disease. Risking further criticism, it seems to me that sin, evil, sickness, disease, and environmental forces are involved in the production of variations, nor should this imply that there would have been no variations at all had not sin and evil entered the world.

GEN. 30:31-43; 31:7-13

Gen. 30:31-43 records Jacob's attempt to interfere with the principle of genetics to his own advantage. If this account is considered in the light of the principle discussed, the difficulties are removed, as Van Haitsma has shown.¹⁶

The concluding account of this episode from the life of Jacob is recorded in the next chapter, Gen. 31:7-13.

Opinions disagree considerably concerning these two passages. Some interpretations of these passages have called forth ridicule of the Bible from among those who delight in pouring out such derision and who do not bother to inquire whether the volley of derision was evoked by the word of Scriptures itself or by some well-meant statement of interpretation. It can be shown that the increase of Jacob's herds was not the result of his successful use of a pseudo-scientific device, based on superstition and folklore, but that it was the providence of God, which employed ordinary processes in nature, that gave him the increase. Of course, if anyone will not believe that not even a sparrow falls without the Lord's notice, neither will he believe that the providence of God gave Jacob this increase, and we should have nothing more to say. We shall leave it to the Lord to answer such scoffers in His own way.

Gen. 30:37-43 does not say that there was a physiological relation between the pillared rods and the spots in Jacob's cattle. In Gen. 30:43, where the English and German translations (and as Van Haitsma points out, also the French and Netherlands translations) imply that the pillared rods were effective, the Hebrew uses the "waw," meaning "and," which tells us nothing more than that

Jacob prospered *after* the use of pilled rods. Van Haitsma, who is himself not a Hebrew scholar, bases this statement on the opinion of Hendriksen, Aalders, and Albright. Nowhere in the Bible do we read that the patriarch was blessed because of his device. Leupold says: "It must be conceded that v. 43 states that his device proved effective; but again we add: Only in the providence of God."¹⁷ Leupold, of course, belongs to that group which is of the opinion that the pilled rods were effective, and that the principle of prenatal influence, or maternal influence, is valid. All the available commentaries, Lange, Keil, Daechsel, Leupold, Procksch, Kurtz, and Delitzsch, base their statements and opinions on Bochart, 1599—1667, *Hierozoon* (*Hierozoicon*, London, 1663). Dr. G. Ch. Aalders of the Free University of Amsterdam, an eminent student of Genesis, when asked by Van Haitsma on what he based his maternal influence explanation, declared that he had assumed a connection between Jacob's device and his subsequent prosperity, and had based his assumption on Bochart's *Hierozoon*, when he wrote his *Korte Verklaring van Genesis*. It seems that practically all who subscribe to the prenatal influence principle base their opinion on Bochart. As far as it is possible to judge Bochart, from quotations pieced together from various commentaries, it might be said that he based his opinion on hearsay and on popular notions people had in his days about animal breeding. In direct contradiction of Bochart is the experimental evidence of present-day geneticists. Just one example will suffice. William Ernest Castle, Professor of Zoology, the Bussey Institution, Harvard University, reports in the lecture on "Heredity," one of the Mayo Foundation Lectures, how he, together with Dr. Phillips, grafted the ovaries of a pure black guinea pig, on a pure white female, whose ovaries had been removed; then bred this female with the grafted ovaries, with a pure white male and obtained offspring which were all black. White in this case is recessive to black. A pure white crossed with a pure white will produce only white. But in this experiment the albino mother was only host to the black-producing ovaries. Her offspring had only that which the ovaries to which she was host could contribute, and what they contributed was unaffected by the environment of a white body. The dictum "after his kind" is opposed to the idea of prenatal influence.

But another feature of Gen. 30:37-43; 31:7-13 is opposed to the explanation that the maternal impression or prenatal influence of the pilled rods was the cause of spotted lambs and kids. Laban's flock included both sheep and goats (Gen. 31:38). It is consistent with this prenatal influence explanation that the pilled rods affected sheep and goats alike. But the Genesis account does not mention either spotted or dappled sheep, except by inference of commentators. When sheep are mentioned they are designated as black or brown, and these were to be sorted out (Gen. 30:32, 33, 35, 40). Spotted sheep are *not* mentioned, nor were they to be a part of Jacob's wages (Gen. 30:32). Evidently there were none in Laban's flock (Gen. 30:35), or Jacob, who had an eye for noticing anything which was to his advantage, would have asked for them, too. The vision, Gen. 31:10-12, mentions only spotted he-goats. The commentators assume that also spotted sheep were produced by Jacob's device.

Since the brown or black sheep in Laban's flock were sorted out, the rest of the sheep must have been white. As far as we can tell, speckled and spotted sheep are unknown today, and were also unknown at Jacob's time. Apparently, Jacob expected no sheep which had white for the background color and black for the spots or the grizzling. The account seems to stress Jacob's anxiety, in some manner or other, to produce white. If the pilled rods of Jacob also produced speckled and spotted sheep, as most, if not all, of the commentators would have it, then this device of Jacob's produced one effect in the goats and another in the sheep. In the goats it produced white spots or white streaks on a background of black or brown; in the sheep it produced black specks and streaks on a background of white. Thus most of the commentators would have it; and because they add the devout "In the providence of God," we hesitate to question anything they may have said, lest we seem sacrilegious and irreverent. But since it appears from the account that Jacob hoped to produce white spots or streaks, he expected his device to affect the goats only, for the sheep given under his care were all white. Here we have an indirect argument against the whole scheme which Jacob employed.

The dream vision mentioned Gen. 31:7-13 appears to contradict a detail mentioned in the previous chapter, Genesis 30. There we

are given to understand that the sheep which Jacob tended for Laban were all white, black and brown ones had been sorted out; and that the goats were all brown or black, speckled, spotted, and "ringstraked" ones had been culled. But the dream vision has it: "the rams which leaped upon the cattle were ringstraked, and speckled, and grised," and what is more, the angel of God repeats that statement. This apparent contradiction gives us the right solution, although it presents new difficulties for those who follow the maternal-influence explanation. Keil and Strack and others simply cut the knot by assuming, without offering further proof, that the dream vision was a figment of Jacob's excited mind and imagination. The attempts of some to harmonize the dream or the vision with the rest of the account vary. Some simply ignore it. Leupold says: "This dream is rather a revelation given to Jacob at a particular breeding time to make him aware of the fact that even this matter was being regulated entirely by God's providence, and that Jacob could put full confidence in God to guard his best interests. Surely what Jacob saw in the dream (v. 10) was not necessarily what was happening in reality."¹⁸ Leupold is not here casting doubt on what he considers revelation, but he is presenting the dream vision as a reassuring message from God. When he reaches verse 12, he stresses its last part and says nothing about the reference of the angel of God to the dream. What Jacob saw in the dream was happening in reality. That was actually happening. Potentially spotted, speckled, and striped rams were leaping the goats. They were, as we would say today, carriers of these color characters. With his physical eyes Jacob saw what was apparently happening. In the dream he saw what was actually happening. God, employing a natural process, "had the issue fully under control" and needed Jacob's scheming devices no more to make him rich than He needed them to lay upon Jacob the blessing of the first-born. Jacob had much more to learn about his God.

The vision implies that Laban's uniformly colored goats were hybrids, at least with respect to the color character. Whether Jacob was shrewd enough to conclude this from his experiences we do not know. These early people practiced hybridization, and probably with animals more widely separated than those of Laban's herd. Lev. 19:19 bears this out: "Thou shalt not let thy cattle gender

with diverse kinds; thou shalt not sow thy field with mingled seed." It may be that the hybrid offspring of the male ass and mare is referred to in Gen. 36:24, although that translation of *yemin* is extremely doubtful. Thus Van Haitisma deals with this problem.

OTHER REFERENCES TO HEREDITY

Other features mentioned in these two passages of Genesis might be considered, but shall be omitted from this consideration after having been merely noted. The "strong" and the "feeble" cattle of Gen. 30:41, 42 may have something to do with hybrid vigor. The change of wages mentioned Gen. 31:7, 8, 9 presents a problem which cannot be explained as an ordinary natural phenomenon. An interesting fact mentioned is that after six years, seven to be exact, the flock of Laban had apparently "run out,"¹⁹ as they still do today. It would have been disadvantageous to continue to use them for breeding purposes. "Now," the God of Bethel commands Jacob, "now arise, get thee out from this land." That is no mere coincidence, but clearly indicates who it was that gave the increase.

Before concluding it might be of interest to point, in a general way, to other references to genetics found in the early books of the Bible. The early people and the later Israelites were very conscious of their heredity. The many and long genealogies bear this out. The often-repeated words of Leviticus: "Whether it be male or female, he shall offer it without blemish before the Lord," certainly obligated the Israelites to watch for perfection in their flocks and herds.

Lev. 21:21: "No man that hath a blemish of the seed of Aaron, the priest, shall come nigh to offer the offerings of the Lord made by fire . . . because he hath a blemish; that he profane not my sanctuaries: for I the Lord do sanctify them" (23), again holds perfection before the people. This is probably all a picture and a parable of the perfection in which all men ought to stand before the Lord.

Interesting, too, are the giants mentioned first in Gen. 6:4 during the pre-Flood days. Giants appear in the account again, relatively soon after the Flood (Gen. 14:5). The giant strain mentioned Gen. 15:18-21, when the Lord gives the Land of Promise to Abraham, can probably be traced for many generations. The

Hittites and the Perizzites and the Rephaims were at home here and continued to live here for many generations, for they are mentioned again in Num. 13:32,33 after the Israelites had sent spies to reconnoiter the land. The Goliath slain by David was very likely of this strain, which apparently is mentioned once more (2 Sam. 21:16-22), with the interesting addition of a case of polydactylism, for here "was a man of great stature that had on every hand six fingers, and on every foot six toes, four and twenty in number." Here we can, it seems, trace a mutation through many generations, and unless we understand something of the process by which the principle "after his kind" operates, we might be inclined to wonder whether it is valid when we are face to face with such mutations.

IN HIM WE LIVE AND ARE

From Jacob's experience, particularly the instruction he received through the dream, we may infer the general principle that all organisms are constituted as factorial complexes, for our observations supplement Jacob's instructions. We are not all born with the same constitutional potentialities. In our country we believe that all men are born with equal rights, but that does not mean that we are all born with the same constitutions. The principle established at creation, "after his kind," and the laws of genetics which are subservient to this greater principle, employed by the hand of God, determine the hereditary factors and how the various lineages of man shall differ in their inherited characteristics. This conforms with Matt. 25:14-31, the Parable of the Talents.

This should not be interpreted in a fatalistic sense. Factors are only secondary causes. Food, in fact, the general environment, all the physical forces which exert themselves upon us, are secondary causes. All are means by which the Lord maintains all things with respect to their ordinary existence and their heredity. No secondary factor is an independent something that operates of itself and by itself, but "in Him we live and move and have our being." Even an inanimate creation is, and exists, by that principle. This view is far from fatalism. There is security here. We are impelled to cry with joyful wonder in the words of the Psalmist: "Thine eyes did see my substance, yet being imperfect, and in Thy book all my

members are written, which in continuance were fashioned, when as yet there was none of them. How precious also are Thy thoughts unto me, O God! How great is the sum of them!" Ps. 139:16, 17.

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FOOTNOTES

1. City of Milwaukee Museum. Wall chart. Lower Invertebrates.
2. Robert Hegner. *Parade of the Animal Kingdom*, Macmillan, 1951, p. 2.
3. Paul Weatherwax. *Plant Biology*, W. B. Saunders Co., 1947, pp. 257—258.
4. James Watt Mavor. *A Brief Biology*, Macmillan, 1949, pp. 62—63.
5. Claude A. Villee. *Biology, The Human Approach*, W. B. Saunders Co., 1951, p. 59.
6. Bernal R. Weimer. *Man and the Animal World*, John Wiley & Sons, 1951, p. 283.
7. H. C. Leupold, D. D. *Exposition of Genesis*, the Wartburg Press, Columbus, Ohio, 1942, pp. 66, 69, 79, 85.
8. D. Otto Procksch. *Kommentar zum Alten Testament Band I, Die Genesis*, Leipzig, Erlangen, 1924, p. 445.
9. Leupold. *Op. cit.*, pp. 67—68.
10. Joh. Heinr. Kurtz. *Geschichte des Alten Bundes*, Erster Band, Berlin, 1853, p. 57, Note 2.
11. Edgar J. Goodspeed. *The New Testament, an American Translation*, the University of Chicago Press, Chicago, 1923, p. 300.
12. R. C. H. Lenski. *Interpretation of St. Paul's Epistle to the Romans*, the Lutheran Book Concern, Columbus, Ohio, 1936, pp. 498—582.
13. Villee. *Op. cit.*, p. 534, Fig. 213, p. 544.
14. John Theodore Mueller, Ph.D. *Christian Dogmatics*, St. Louis, Mo., 1934, p. 90.
15. Villee. *Op. cit.*, p. 477.
16. J. P. Van Haitsma. *The Supplanter Undeceived*, Privately Printed, Grand Rapids, Mich., 1941.
17. Leupold. *Op. cit.*, p. 827.
18. Leupold. *Op. cit.*, p. 834.
19. "Run out" is still used by some animal breeders. It does not mean that the hereditary trait runs out, but rather that inbreeding has weakened the vigor of the flock. The *Yearbook of Agriculture* (1937), p. 1306, states that "close inbreeding is not a good practice for the average breeder of goats. . . ." This is indeed interesting in this connection.