Building Blocks in Life Science

From Genes & Genesis to Science & Scripture

Gary Parker

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Unless otherwise noted, Scripture quotations are from the New King James Version of the Bible.

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Dedication

To Dr. Jan (Mrs. Andy) Mercer

Students, colleagues, and textbook salesmen remember Dr. Jan as a stalwart advocate for critical thinking and fair treatment of creation in discussions of origin in the college science classroom. Tourists remember Jan as a gracious leader, opening up the wonders of God's creation on tours worldwide. Children and grandchildren remember her as a blessing. For Mary and me, Jan and Andy are dear friends and models of Christian hospitality and service.

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Table of Contents

Introduction to the Creation Foundation Series: War of the Worldviews

This Creation Foundation Series gives young people ANSWERS — answers from science and answers from Scripture — ANSWERS that show how SCIENCE and the BIBLE fit together to give answers we all need for all of life!

According to the evolutionist's worldview, each life form, including each human life, is the result of time, chance, and millions of years of struggle and death — what Darwin called the "war of nature." It must be depressing for students to hear over and over again that they are just products of time and chance caught up in a grim and ceaseless "struggle for survival" that ends for them (and the whole universe!) only when death finally wins.

The Bible has a much happier ending: life wins, new life in Christ! According to the biblical creationist's worldview, God created living things with plan and purpose, all working together in harmony. "Darwin's war" is real enough today, but it brought struggle, death, disease, decline, and disaster (Noah's Flood) into the world only after man's sin and selfishness ruined God's perfect creation. Christ's sacrificial love conquered sin and death, and His return brings new life — rich, abundant, and eternal.

When young people know what they believe and WHY THEY BELIEVE IT, they can stand firm on their own faith, even defend it to scoffers, and encourage all with reasons for hope in Christ and new life in Him (1 Pet. 3:15).

Unit 1: Biological Change: Darwin vs. Design

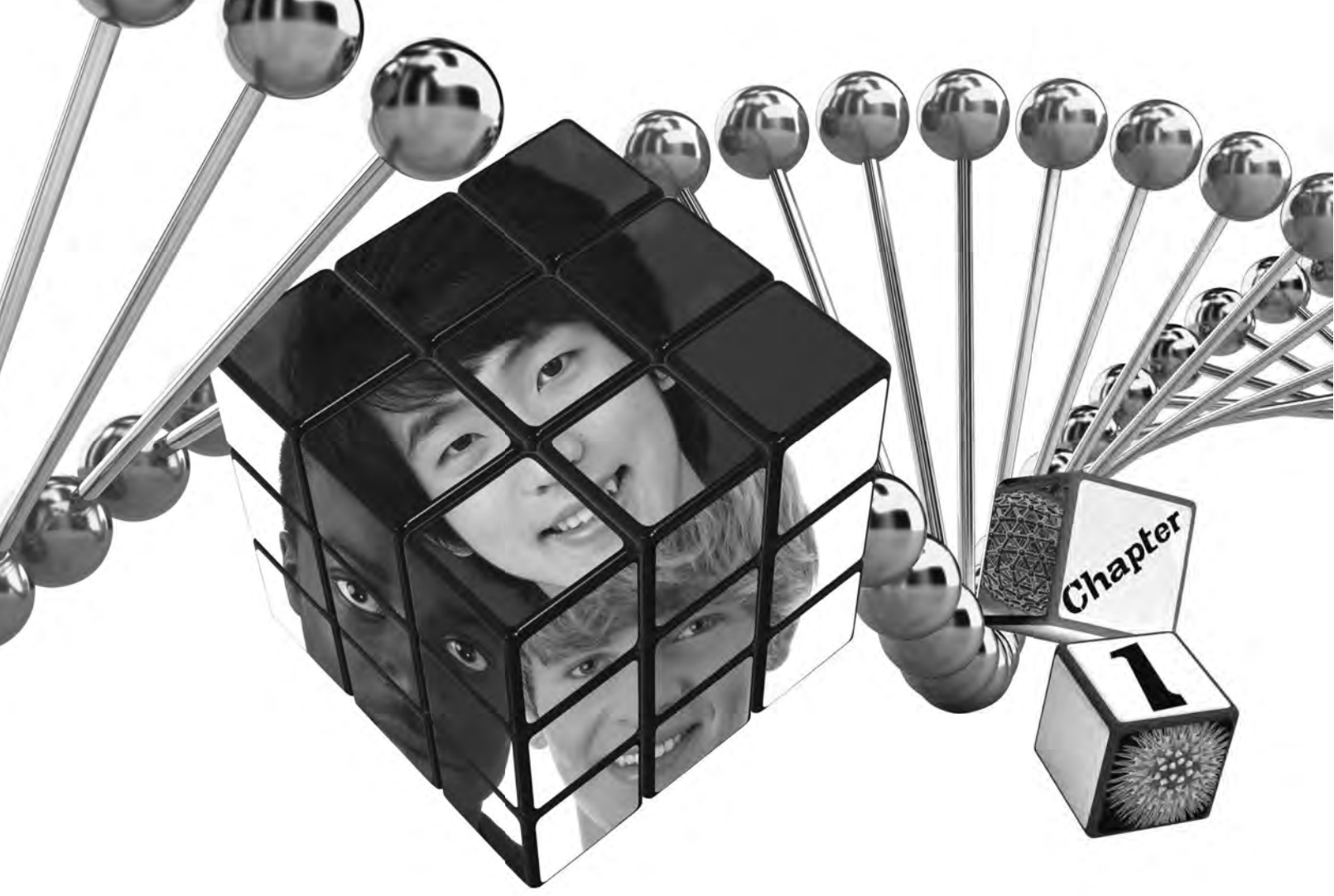
The scientific "war of the worldviews" began as a *battle over biology.* The foundations for biology as a science had been laid in the 1600s and 1700s, primarily by Christians freely using the Bible as the basis for understanding the world of living things. The definition of *species* as an interbreeding group of organisms was based on the biblical record that God had created living things to "multiply after kind" (Gen. 1), each with a special role to play for the good of the whole. Patterns of trait distribution among different kinds, the basis for biological classification, were seen to reflect "theme and variation." Theme and variation in music, for example, are used today to identify a master composer (theme) and the extent of his/her creative genius (variation). Similarly, variations within and among different species proclaim the creative genius of the Composer of Life, and the unified theme points back to one God with a *common plan* uniting all living things.

Those early creationists were well aware that the peace and harmony of God's perfect creation had been tarnished by mankind's sin. "Pure science" was seen as "thinking God's thoughts after Him," but "applied science" (e.g., making eyeglasses, treating disease, waste removal, etc.) was devoted in part to bringing healing and restoration to things gone wrong — until the final restoration would be accomplished by the coming again of the Great Healer, Jesus Christ.

All that changed in 1859. Evolutionists used Darwin's popular new book, *Origin of Species*, as the basis for both attacking the Bible and reinterpreting the scientific evidence supporting the creationist model. Variability within kind was replaced with change from one species to others; boundaries between kinds with missing links between species; ecological cooperation with competition; common plan with common ancestor; struggle and death as problems to overcome with *struggle and death as pathways to progress*. Finally, *evolutionists made Darwin's "war of nature" a substitute god*, an alternate religion, and the authority of God's Word was replaced with the supremacy of human opinion.

As we shall see, the study of genetics and the laws of heredity make it very hard to believe in evolution and very easy to accept the "4 Cs" of biblical history: *Creation, Corruption, Catastrophe,* and *Christ*: (1) God's perfect creation, (2) ruined by man's sin, (3) destroyed by Noah's Flood, (4) restored to new life in Christ.

4C theme	
1	Creation
2	Corruption
3	Catastrophe
4	Christ



Genes and Genesis

Modern evolution began as a theory of biological change, belief that limitless genetic change could produce all life ultimately from one common ancestor by "descent with modification." Ironically, this genetic theory was based on astonishing *ignorance* and *misunderstanding* of the laws of heredity. It wasn't just the evolutionists who didn't know how genetics worked; no one else did either. The basic laws of heredity we take for granted and teach in middle school today were first discovered by Gregor Mendel, an Austrian monk, and published in 1860, the year after Darwin's book — but Mendel's work was not discovered and made a part of science until over 50 years later.

We understand today that hereditary features (skin color, tongue-rolling ability, length of nose, blood type, etc.) are encoded in sections of DNA molecules called genes. Figure 1.1 is the "schematic diagram" of a DNA double helix with the open sections representing active genes. G, C, A, and T are *bases* in DNA that act like "letters" in a code that "tells" the cell how to make the proteins related to each hereditary trait. Most activities in living cells are controlled by proteins called enzymes.

The second gene shown, for example, "tells" the cell how to make the enzyme (tyrosinase) that produces *melanin*, the coloring agent for skin, hair, and eyes. If another genetic factor blocks this gene's function, lack of skin, hair, and eye color results, a condition called *albinism*. The third gene shown codes for production of a liver enzyme (parahydroxylase) that helps to process nutrients in milk. Babies born with a certain defect in this gene can develop brain damage from drinking milk (but this result, called PKU, can be avoided by putting the baby on milk without phenylalanine — which is a key ingredient also in the artificial sweetener aspartame).

The first gene diagrammed in Figure 1.1 "tells" the cell how to make *hemoglobin*, the protein that carries O_2 in red blood cells. Real genes average about 1,200 base "letters" in their genetic codes. A change from T to A in the sixth position of the coding sequence for the beta chain of hemoglobin causes blood-producing cells to make abnormal "sickle cell" hemoglobin. On a lighter note, there's even a gene that determines whether or not you can taste PTC (phenylthiocarbamide)! To "tasters," PTC is intensely bitter; to "non-tasters," it's tasteless. (Imagine the fun you could have at parties — but only imagine it!)

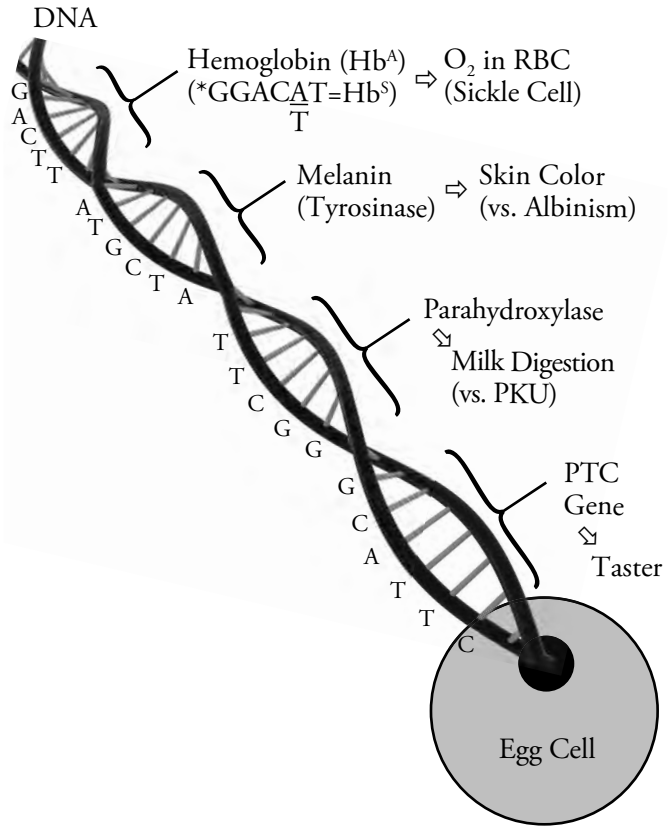


Figure 1.1. Sections of DNA called *genes* often direct production of proteins related to particular traits.

Cells of most adult plants, animals, and human beings usually have two genes for each trait, one inherited from the father and the other from the mother. Using letters to represent genes, we could use R to symbolize the gene found in people who can roll their tongues, for example, and r for the gene related to "non-rolling." A person with two R genes (RR) would be a tongue "roller," and a person with two r genes (rr) a "non-roller."

What about an Rr person with the mixed (*hybrid* or *heterozygous*) gene pair? If one gene produces enough product or influence to cause the whole trait to develop, it's called dominant. R is a dominant gene, so Rr individuals are tongue rollers, just like RR persons are. Since even one R gene makes a person a tongue roller, non-rollers must be rr. Genes that usually produce no direct effect are called recessive, and their trait (or lack of trait) is expressed only when there's no dominant gene present.

Genes that produce different effects on the same trait are called *alleles*; the R and r genes that affect tongue rolling are alleles. If one allele is dominant and the other recessive, two variations of a trait can be expressed, e.g., tongue rolling (RR or Rr) and non-rolling (rr). Variations increase if there is *lack of dominance* ("*blending*") between alleles. For example, crosses of pink-flowered four o'clocks with genes Pp produce three variations of flower color: red (PP), pink (Pp), and white (pp).

Genetic results among the children or offspring of given parents can be shown in a Punnett square. The pair of alleles found in parent cells separate into single genes during the formation of sex cells (egg and sperm in people and most animals; spores in most plants). The sex cell genes of one parent are listed along the left side of a square; the sex cell genes of the other parent are along the top. Punnett squares for the tongue rolling and flower color examples described earlier are shown below.

	R	**r**
R	**RR** tongue roller	**Rr** tongue roller
r	**Rr** tongue roller	**rr** non-roller

	P	**p**
P	**PP** red	**Pp** pink
p	**Pp** pink	**pp** white

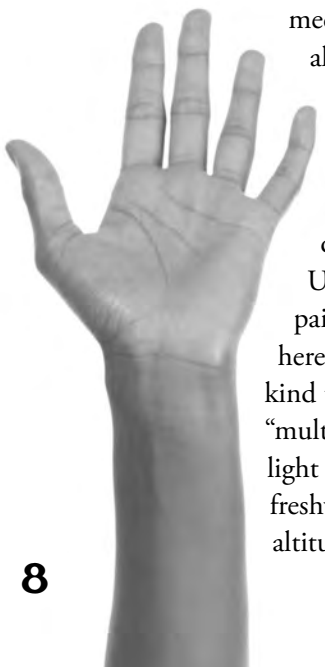
When sex cells come together at fertilization, alleles are reunited as pairs in all possible combinations, as shown in the boxes inside the big square. The results in the squares show that, on average, three children out of four of Rr tongue-rolling parents will also be tongue rollers (RR or Rr), but one in four on average will be non-rollers (rr), unlike either parent. Only one-half of the offspring of the pink-flowered plants (Pp) will be pink like their parents: one-fourth will be red (PP) and one-fourth white (pp).

Variety increases further when more than two allelic variations of a gene exist ("*multiple alleles*"). There are three alleles for ABO blood types, for example, which we can symbolize L^A, L^B, and l^O. Any one person can have only two of these three alleles, *but our first parents, Adam and Eve, could have been created with a total of four alleles for a given kind of gene,* two alleles in Adam and two different alleles in Eve. Even the three ABO blood group alleles produce four different blood groups from six different gene pairs:

AB	L^AL^B, which are "co-dominant" genes, each producing a product
A	L^AL^A or L^Al^O, since l^O is recessive
B	L^BL^B or L^Bl^O
O	l^Ol^O, the recessive pair that makes no product

God is the Author of variety, and created in His image, we see "*variety is the spice of life*." Genetic variation within each created kind seems to serve two purposes in God's plan. For people especially, genetic variation guarantees each person will be a *unique individual* with a special place in God's plan no one else can take. For plants and animals, genetic variation enables members of a created kind to "*multiply and fill*" *many different environments*, or meet changes in existing environments.

Certain flies, for example, have a gene for producing a key energy enzyme that exists, with lack of dominance, in two allelic forms, one that works best at high temperatures (T^H) and one at low (T^L). The fly population, then, includes individuals designed for high temperatures (T^H T^H), low temperatures (T^LT^L), and medium temperatures (T^HT^L). As the flies move through a forest, the flies designed for high temperatures stay in the sun, those for low temperatures stay deep in the shade, and the medium temperature flies move along the edge of the branches — *all three splendidly designed for their different environments*, and the population able to adjust should the temperature change drastically in either direction.



Using nothing more than one mixed pair of alleles and ordinary laws of heredity, God enabled the first of each kind to produce descendants that could "multiply and fill" dark, shady, and light environments; salt, brackish, and freshwater; and high, middle, and low altitudes, etc.

Variation within kind increases even further when two or more sets of alleles affect the same trait ("*multiple genes*" or "*polygenic inheritance*"). Human skin color provides an excellent, very important, and often misunderstood example.

Question	How many skin colors are there among people living today?

The answer may surprise you: one! You never met anyone with a skin color different from yours! Everyone has the same skin coloring substance, a protein called melanin. Certain skin cells (melanocytes) in some people make lots of melanin, so they have a very dark melanin color. Others make only a little melanin and appear very light. Most people make a "medium" amount of melanin that produces various brown skin tones. So everyone *has the same skin color, just different amounts of it* — NOT a big difference at all!

There are at least two different genetic sites (segments of DNA) that influence how much melanin a person produces. We can call the alleles at one gene site A and a, and alleles at the other site B and b. Persons inheriting all "capital letter" genes, AABB, would produce the most melanin and be *very dark*. Persons with aabb genes would produce the least melanin and be *very light*. Persons with two "capital letter" genes (AaBb, AAbb, or aaBB) would produce a medium amount of melanin and be some shade of brown. Persons with three "caps" (AABb or AaBB) would be a shade darker, and those with one "cap" (Aabb or aaBb) a shade lighter.

What skin tone, or what gene combination for producing melanin, was present in the first two human beings, Adam and Eve? The Bible doesn't tell us, so we can't be sure. But the Bible does say that Adam and Eve were designed to be the parents of all people, so it seems God would have enabled them to produce the rich variety of unique individuals we have today. To get the most variety in the least time genetically, the best place to start is in the middle. So if we assume our first parents were "medium brown" with genes AaBb, how long would it take to get all the variations in skin tone or amounts of melanin we see among people today?

The answer may surprise you. It's not a million years, a thousand years, or even a hundred years. Starting with AaBb genes, we could get ALL the different amounts of melanin and ALL the variations in melanin skin tone

we see today in just ONE *generation*! Figure 1.2 shows the routine genetics involved. Each AaBb parent would produce egg or sperm with one gene of the Aa pair and one of the Bb pair equally in all possible combinations: AB, Ab, aB, and ab. The boxes show the 16 possible combinations resulting from union of egg and sperm cells. As Figure 1.2 shows, the likelihood is 1 in 16 (1⁄16) that a child of Adam and Eve would be *very dark*, with genes AABB producing the greatest amount of melanin. The probability is also 1⁄16 that Cain, Abel, Seth, or one of their brothers or sisters would be aabb and be very light. An average 6⁄16 would be some medium shade of brown similar to their parents, 4 a shade lighter, and 4 a shade darker.

From two people with one melanin skin color to people with five different shades of melanin color in just one generation — wow!

When God commanded our first parents to "multiply and fill the earth" with a variety of uniquely special descendants, He did not have to wait for "*miracle mutations*" or "*millions of years.*" The ordinary laws of heredity He established show us how we can go from two medium-brown people to people with all the different amounts of melanin and all the different skin tones from very lightest to very darkest in just one generation! And so far we're only talking about two gene sites out of over *30,000* in people, and sites that have only two alleles each when four are possible! Wow!

Without mutations (to be discussed later) the principles of skin color inheritance could produce most of the variation among people today in just one generation: straight to wavy to curly to "super curly" hair; round or oval "eyes": thick to thin lips; numerous variations in height and body build; etc.! Tremendous variability built into the first of each created kind would also allow plants and animals to "multiply and fill" the earth's ecologic and geographic diversity. It seems God did indeed make "variety the spice of life."

A couple with **melanin** control genes
AaBb (Adam and Eve?)
would have "**medium**" skin tone, and each
would make four kinds of reproductive cells,
as shown along top and side of this
"genetic square":

genes in mother's egg cells

genes in father's sperm cells	AB	Ab	aB	ab
AB	**AA** **BB**	AA Bb	Aa BB	Aa Bb
Ab	AA Bb	AA bb	Aa Bb	Aa bb
aB	Aa BB	Aa Bb	aa BB	aa Bb
ab	Aa Bb	Aa bb	aa Bb	aa bb

Each box in the larger "Punnett square" shows the gene combination possible in a child.

As shown in the pictures below,
children of "medium" parents could have
most to least melanin and
color darkest to lightest with 4, 3, 2, 1, 0 "capital letter"
genes indicated with each picture.

Figure 1.2. Inheritance of melanin skin color

AABB
(4 "capital letter" genes)

AABb or AaBb
(any 3 "caps")

AAbb, AaBb, aaBB
(any 2 "caps")

Aabb or aaBb
(any 1 "cap")

aabb
(0 "caps")

Like the condition we postulated for Adam and Eve in Figure 1.2, people in India today have all four versions of the melanin control genes: A, a, B, b. Some people from India are as dark as the darkest central African; some are as light as the lightest northern European; most are somewhere between. Our family once knew a family from India where the children of just one couple ranged from the very darkest to the very lightest found anywhere on earth today. Many biology textbooks today contain a news picture of twin boys. Why? One was as light as his English father; the other twin (fraternal) as dark as his Nigerian mother. What is really surprising in that story is that anyone would find it surprising in a so-called scientific age. The ordinary genetics involved requires a Punnett square with only four boxes (Figure 1.3). So, when people from different backgrounds get together, we're right back to *no more and no less* variation in amounts of our one skin color than God built into our first parents.

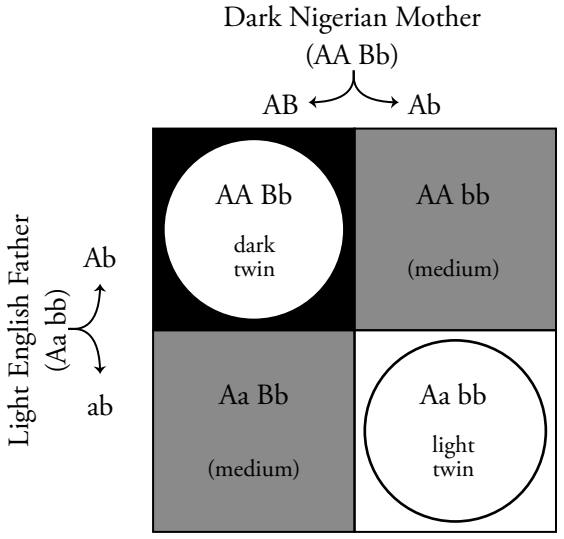


Figure 1.3. Dark and light twins today are as easily explained as Adam and Eve having children from darkest to lightest in one generation.

What would happen to variations in amounts of melanin skin color after God broke people up into different language groups at the Tower of Babel (Gen. 10:1–9)? If one migrating language group included only individuals with "cap" A and B genes (AABB), then all they could pass on to their children would be A's and B's, and individuals in that group would remain only very dark (AABB), generation after generation (like some populations in central Africa). An isolated language group moving away with only "little" a and b genes would be very light (aabb) through its generations (like some northern European populations). A group could even get "stuck in the middle" (like some Native American and Oriental populations). If a group contained only cap A and little b genes, all its members would be "medium brown," with genes AAbb. Each AAbb parent would give their child 1A and 1b, so the children would all be medium-skinned, AAbb, through their generations. Similarly, aaBB parents would only produce medium aaBB children for endless generations. It's only medium-brown parents with one each of A, a, B, and b genes (AaBb) that can produce a generation with the full range of melanin amounts and skin tones.

Without all four melanin control genes, some language groups leaving Babel would produce generations with only one skin tone.

Only Dark	Only Medium	Only Light
AABB	aaBB or AAbb	aabb

Sad to say, we all know that different amounts of our one skin color (melanin) were once used to assign people to different so-called races. As late as the 1930s, evolutionists were even teaching that some races were "less evolved" or inferior to others. Scientists now agree with what the Bible said all along. As Paul preached in his "creation evangelism" message in Athens, "He has made from *one blood* every nation of men to dwell on all the face of the earth" (Acts 17:26; NKJV; emphasis added). There's only ONE "RACE," the HUMAN RACE, and we're all parts of it! Think how much trouble and heartache we could have been spared if only we had listened to God's Word, and not man's opinion, right from the beginning!

God endowed our first parents, and the first parents of each created kind, with the potential to produce tremendous variability among individuals, and God delights in our diversity. As if the above were not enough, additional factors introduce even more variability into human skin tone. Melanin itself actually comes in two different forms: eumelanin that grades *black to brown* in different amounts, and phaeomelanin that grades *red to yellow*. Thickness of skin, kind of fat under the skin, and amount of blood circulation through the skin all have effects that can, for example, make people with the same medium amount of melanin appear more yellow-brown, red-brown, or dusky-brown.

Many people "tan," up to their genetic maxima of course, only when and where they are exposed to sunlight, and they "fade" with less sun exposure. Oftentimes traits are expressed or repressed in accord with environmental cues, but only within genetic limits. Tanning illustrates the nature/nurture principle that both the genes we

Height and weight are two factors influenced by nature and nurture.

inherit (*"nature"*) and our surroundings ("*nurture*") influence the traits we manifest. *Height, weight, intelligence,* and *temperament*, for example, are complex traits influenced both by nature (many genes) and by nurture (family, cultural, and even nutritional conditions surrounding our upbringing).

Expression of genetic potential in plants is especially sensitive to environmental conditions. A scrubby willow bush on the Arctic tundra, for example, may grow as a luxuriant tree if transplanted to a temperate zone streamside. American men today average much taller than the medieval "knights in shining armor" who averaged only 5 feet, 4 inches (1.6 m) because of better health and nutrition, not because of any genetic changes or "evolution."

Think back over all the variability related to just two major gene pairs that influence melanin skin color. Now think about the fact that the full gene set (genome) in a human cell contains over 30,000 *different genes*! If only a fraction of these genes existed in simple allelic pairs like R and r, the number of unique, individual human beings a single couple could produce (mathematically, not physically!) would greatly exceed the number of *atoms* in the universe, estimated at 10^{80} — a 1 followed by 80 zeroes. A leading geneticist (an evolutionist) calculated the number of genetically different children a single couple could have at 10^{2017} — a number "zillions of times" larger than the number of atoms! And he said that staggeringly HUGE number is a *low* estimate!

Wow! YOU ARE SPECIAL! Nobody in the past ever had your combination of genes; nobody in the future will ever be just like you. You have an absolutely unique combination of genes that gives you a special place in God's plan that no one else can ever take! The next time you look in a mirror, think about how incredibly special you are — and remember that each of your friends and every other person has a unique place in God's plan, too!

What does this awesome variability mean? For one thing, it reflects God's creativity. God created the first man from the "dust of the ground" and the first woman from a portion of his side, and God rested from those kinds of creative acts at the end of the creation week. But we still see God's creativity unfolding before our eyes in a different way in the birth of each child. As they relate to the genetic potential God created in our first parents, we may not yet have seen the fastest runner or the greatest

mathematical or musical genius. These genes were not produced one at a time by evolution — time, chance struggle, and death operating over millions of years. This *unfolding of genetic variability built in ahead of time* can be called entelechy, but NOT evolution.

As the descendants of each created kind multiplied to fill the earth, we see their genetic potentials unfolding (*entelechy*). God created "bear kind," for example. But as bears moved into different environments around the world, their in-built genetic variability came to visible expression in black bears, brown bears, grizzly bears, polar bears, etc. Entelechy diversified created "dog kind" into specialized sub-types: foxes, wolves, coyotes, etc. Just by shuffling pre-existing genes, animal breeders have brought out in domestic dogs an astonishing range of variation — in size, from Chihuahua to St. Bernard; in nose length, from bulldog to collie; in fur, from hairless to Pekingese; in speed, from basset hound to greyhound; in affection, from pit bull to Labrador; in intelligence, from sheep dog to _____ (you fill in the blank) — and all these in a dazzling variety of colors and markings! Think also about the tremendous genetic variability brought to visible expression (entelechy) in "cat kind," "rose kind," "tomato kind," etc.

Though distinct, these two dog breeds represent variation within the created kinds.

Geneticists call the shuffling of pre-existing genes recombination. Perhaps you've played a game with the common deck of 52 cards that includes four groups (hearts, diamonds, clubs, and spades), each with 13 different numbers (2–10) or "faces" (J, Q, K, A). In one game called bridge, each of four players gets a "hand" of 13 cards. You can play bridge for 50 years (and some people do!) without ever getting the same group of 13 cards! The "hands" you are dealt are constantly changing, and each is unique — but the deck of cards remains always the same.

Although the comparison is not perfect, a deck of cards illustrates the concept of variation within created kind. The hands dealt are *unique, different,* and *constantly changing*, like the *individual* members of a population, but the deck of 52 cards remains *constant, never changing, always the same*, like the *created kind*. Ever-changing individuals in a never-changing group, or individual variation plus group constancy: that's variation within created kinds.

Form your foundation.

Science and Scripture agree:
There's just one race, the human race.
All of us have the same skin coloring protein, melanin, and shuffling AaBb genes can produce all variations in melanin color in just one generation!

Building Inspection

1. Complete the paragraph with these key words:

   DNA dominant hybrid alleles gene recessive blending

   Sections of a _____ molecule that affect particular traits are called _____. Genes in adults usually come in pairs called _____, like T and t for "tasters" and "non-tasters" of PTC. A "mixed pair." Tt, is called _____ (or heterozygous). If Tt is a taster, then T is a _____ gene, and only tt could express the _____ trait. If T and t represent tall and short and Tt were medium, the inheritance pattern would be called _____.
2. If both parents were hybrid tasters (Tt), what is the likelihood they could have a non-tasting child? (**0-none, ¼, ½ , ¾, 1-all**) _____. If Tt represented parents of medium height, what fraction of their offspring would be taller than parents? (**0, ¼, ½, ¾, 1**) _____. Shorter? _____. Medium like their parents?_____ .
3. Darwin's followers once taught that there were different "races" of human beings with different skin colors that were in different stages of evolution. But science and Scripture agree: all people belong to only (how many?) _____ races(s), and human skin color depends primarily on only (how many?) _____ molecule(s), a protein called _____.
4. If two pairs of genes controlled the amount of melanin skin color and Adam and Eve were AaBb, they would be (**very dark, dark, medium, light, very light**)_____. How many of these five shades of melanin skin color would be found among their children? (**1, 2, 3, 4, 5**)_____. So, how many generations would it take to go from two people with one skin color to people with all the various amounts of melanin color we see today? (**one, one thousand, one million**)_____. Evolutionists believe it takes lots of time to produce little variation; science and Scripture (see the chart on p. 9) show that it takes (**lots, little**) _____ time to produce _____ of variation.
5. God delights in diversity! The number of combinations among genes created in Adam and Eve is far (**greater/less**)_____ than the number of atoms in the cosmos – meaning YOU are SPECIAL with a UNIQUE place no one else can take in the whole (**country, planet, universe**) _____.
6. Why is it important for Christians to relate God's world and God's Word – science and Scripture?

   _____

   _____
7. Use the following words and phrases to fill blanks in the paragraph below:

   plan, purpose, and special creation God better life (wins)
   time, chance, struggle, and death Darwin worse death (wins)

   According to the biblical worldview that gave birth to science in the 1600s and 1700s, the first of each created kind of life resulted from _____. But the Bible also records that man's disregard for God (sin) brought the processes of _____ into God's world, making things _____. In the 1800s, _____ argued that the processes of _____ (which he called the "war of nature") would make living things slowly _____, even though finally _____ wins. Those believing the Word of _____ rather than the words of Darwin have hope in Christ that _____ wins.
8. Relate each statement about God's world below to one of "4Cs" in God's Word:

   Creation Corruption Catastrophe Christ

   _____ a. Flood conditions are ideal for forming fossils.
   _____ b. Many defects and diseases result from chance changes in heredity called mutations.
   _____ c. Adaptations are design features that suit each organism for its special role in the web of life.
   _____ d. Land animals saved on the Ark and the immune system healing deadly infections both illustrate God's deliverance from death and disaster.