



## Section 8A .. A Question Of Salvation/Original Sin



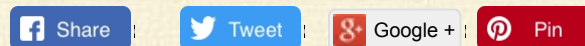
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### Original Sin and Epigenetics

What exactly was it that Adam passed down to his descendants ?

Carol Brooks

Can we at least grant the Holy Spirit the honor of being more learned than we are.

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## Introduction

Part IV of **Original Sin.. Fact or Fable** ended with the words..

There no question that although guilt can not be imputed to one who has not committed the crime, there is no question that Adam's sin caused his descendants to be separated from the Tree of Life, which doomed them to physically die. However, one very interesting question remains.

Is there ANY possibility that Adam's sin did something that affected his descendants so much so that that they were no longer "in His image"? ...A something that has to be put right before a person can be considered once more a "son of God", eligible for the Kingdom of Heaven.

### **A Recap of The Previous 4 Sections**

It has long been assumed, by those that believe in Original Sin, that Adam's transgression was transferred to all future generations, tainting even the unborn. That his legacy to all his descendants is a moral corruption that causes every member of the human race to be born guilty of sin long before they commit one for themselves. Depending on whom you talk to, either Adam's descendants have a *sin nature*, an inclination to sin, or they inherit the very sin of Adam and Eve and are condemned to hell because of it. One way or the other, Adam's sin was imputed or charged to our account, with the result that we too are legally guilty. In other words.. we all sinned when Adam sinned or, as they like to put it, we all sinned "in Adam".

Several passages in Romans, particularly from the fifth chapter, are often taken as proof texts for Original Sin and the total depravity of man. [The large number of serious problems associated with using these verses as proof texts can be read in the first part of the article **HERE**]

However, the fact that there are innumerable passages of Scripture that, clearly and unambiguously, tell us that no person can bear the guilt (or innocence) of another, but will only answer for their own sins and misdeeds... That our eternal destiny is determined by our conduct, not by inheritance, and that every single person will be judged by his own actions whether they be good or bad, ...makes it impossible to simply accept that we are sinners **because** Adam sinned.

But, on the other hand, what we can not ignore is that Paul does make a direct connection between Adam's sin and the fallen condition of the entire race. In Romans 5, Paul seems to be saying that **something happened** to all humanity because of what took place in the garden of Eden. That the entire race was affected by the sin of Adam. These statements are very intriguing, especially since they seem to fly in the face of innumerable other verses that say exactly the opposite. What then did Paul mean when he said [Emphasis Added]

Therefore, just as through one man sin entered into the world... (Romans 5:12 a NASB)

So then as through one transgression there resulted condemnation to all men, even so through one act of righteousness there resulted justification of life to all men. (Romans 5:18 NASB)



For as through the one man's disobedience the many were made sinners, even so through the obedience of the One the many will be made righteous. (Romans 5:19 NASB)

The answer to the above question may very well be found in relatively new scientific discoveries... the emerging field of Epigenetics. As the name suggests, this is a field associated with the study of genes, which makes it necessary to first briefly identify what a gene is, and what it does.

## Genes..

### **What they Are and What They Do**

Genes (also found in all animals and plants) are sections, or segments, of DNA which, copied and inherited across generations, determine specific human characteristics, such as height or hair/eye color... which is how and why people inherit features from their ancestors. Children usually look like their parents because they have inherited their parents' genes.

Each gene carries blueprints for making proteins, which are the building blocks for everything in our bodies. They...

...are a diverse group of large, complex molecules that are crucial to every aspect of the body's structure and function. Collagen, which forms the structural scaffolding of skin and many other tissues, is a protein. Insulin, a hormone that regulates blood sugar, is a protein. Trypsin, an enzyme involved in digestion, is a protein. So is the pigment melanin, which gives hair and skin its color. Still other proteins regulate the body's production of proteins. [1]

We commonly accept that our genes determine a great many of our characteristics... our body shape, our personality, our intelligence and even our health. Note that while no one gene determines whether a person has a disease or not, there is a degree of a genetic disposition towards certain illnesses. Some diseases like diabetes, asthma, cancer and mental illness "have a complex pattern of inheritance" and "a number of genes may each make a subtle contribution to a person's susceptibility to a disease" [2]

Some even believe that genes are the root cause of countless social ills, including crime, and violence. In other words a person was violent or asthmatic because they had inherited "bad genes", and there was little one could do about it since all, or at least most, patterns were firmly established during early fetal development.

However fairly recent discoveries are shaking many of these concepts. While genes (or the genome) contain the manual for the human body, they themselves operate according to sets of instructions.

## Epigenetics

### **Defining the Terms**

In modern molecular biology and genetics... the genome can be likened to the hardware, while the epigenome is the software.

**The Genome** is the complete set of genes, or genetic material, present in a cell or organism, which contains all of an organism's hereditary information.

**The Epigenome:** *Epi* is a prefix taken from the Greek that means *on* or *above*. Therefore the epigenome, which is cellular material, sits on top, or just outside of, the genome, and governs how the gene behaves.

**Epigenetics** is the study of how environmental factors like diet, stress and maternal nutrition can change gene function without altering the underlying DNA sequence in any way which, until recently, was scientific heresy.

## Altering the Expression of Genes

Epigenetics shows that there is a control system of 'switches' that turn genes on or off □ and suggests that "things people experience, like nutrition and stress, can control these switches." [3]. Discover Magazine's November 2006 edition carried an article entitled *DNA Is Not Destiny*, in which they said [All Emphasis Added]

Our DNA □ specifically the 25,000 genes identified by the Human Genome Project □ is now widely regarded as the instruction book for the human body. But genes themselves **need instructions** for what to do, and where and when to do it. A human liver cell contains

the **same** DNA as a brain cell, yet somehow it knows to code only those proteins needed for the functioning of the liver. Those instructions are found not in the letters of the DNA itself but on it, in an array of chemical markers and switches, known collectively as the epigenome, that lie along the length of the double helix. These epigenetic switches and markers in turn help **switch on or off** the expression of particular genes. [4]

When Emma Whitelaw (of the University of Sydney) and her colleagues studied the inheritance of coat color in mice, they found that.... [All Emphasis Added]

...independent of the sequence of the coat colour gene, the mother's coat colour influences the likelihood of the pups having the same colour coat. For instance, a yellow mother has more pups that are yellow than mottled, whereas a mottled mother is likely to have a higher percentage of mottled pups. But the gene that determines the coat colour has an **identical sequence** in both the yellow and mottled mothers, so something else must be coming from the mother to influence coat colour. Whitelaw and colleagues show that an **epigenetic mark** located at the start of the gene is responsible; it influences the expression of the gene, which in turn determines the colour of the coat. Instead of being completely erased in the mother's germ line, **this epigenetic mark is passed on to subsequent generations**, where it exerts an influence on coat colour. [5]

In other words, you are born with a set of genes, but it is the expression (behavior) of those genes that matters. In other words, your genes can be imprinted in a semi-permanent fashion that is transmitted to future generations.

The idea that inheritance is not just about which genes you inherit, but whether these are switched on or off, is a whole new frontier in biology, and has brought us to the sudden realization that we appear to have a measure of control over our genetic legacy. But the fascinating part, that flies in the face of all previously held beliefs, is that what your genes do, or don't do, **is not set in stone**, but can be either activated or silenced by various factors including our diet, what we smoke, the environment and our surroundings.

Although it is well known that conditions in the mother's womb can alter the development of a fetus and is still considered a critical period, scientists have lately discovered that the epigenome can change in response to the environment **throughout an individual's lifetime**. In other words our free will, not fate, can determine a great deal about us, including our health. In fact,

Scientists have found striking examples of epigenetic behaviour in the animal kingdom—in the way, for example, honeybee larvae "decide" whether to become queens or workers depending upon their interaction with other larvae and the environment. [10]

Not only this.

## Inheriting Epigenetic Changes

The conventional view was that every characteristic that we inherit is carried by our DNA, and nothing we do in our lifetime can be biologically passed to our children. Whatever choices we make during our lives might make us fat, give us a heart attack and/or hasten death, but they won't change our genes. However there is a growing body of evidence which suggests that the epigenetic changes wrought by one's diet, behavior, or surroundings, can work their way into the gene line and reverberate far into the future. In other words.. what you eat or smoke today could affect the health and behavior of your great-grandchildren.

### The Effects of Nutrition

Methyl groups are basic units in organic chemistry, and are entirely derived from the foods people eat. The term methylated means that a substance has at least one methyl group. Choline is a water-soluble essential nutrient, usually grouped within the B-complex vitamins. It has three Methyl groups attached to it, which make it trimethylated. Methyls enable the smooth functioning of cells. The circulation of these components within the body has a great impact on mental health and cell development [6]

When a methyl group attaches to a specific spot on a gene—a process called DNA methylation—it can change the gene's expression, turning it off or on, dampening or making it louder."

As an example of the role that diet can play, consider the study done in the year 2000 by Randy Jirtle, a professor of radiation oncology at Duke University, and his postdoctoral student, Robert Waterland. Discover Magazine calls the experiment "simplicity itself".

Agouti mice are so called because they carry the agouti gene, which alters their appearance making them fat, yellow, constantly ravenous, and prone to cancer and diabetes. The offspring of these mice usually





share the same unfortunate genetic legacy and are identical to their parents in every way. They are equally yellow, equally fat and equally susceptible to life-shortening diseases. However, the parent mice in the experiment produced a majority of offspring that not only were slender and brown, but "did not display their parents' susceptibility to cancer and diabetes and lived to a spry old age" [7]. The effects of the agouti gene had been virtually erased without altering a single letter of the mouse's DNA.

How was this accomplished? Conventional wisdom would suggest that they were fed a witches brew of lab concocted chemicals. Not so. The approach of the researchers was... [Emphasis Added]

"... radically straightforward **they changed the moms' diet**. Starting just before conception, Jirtle and Waterland fed a test group of mother mice a diet rich in methyl donors, small chemical clusters that can attach to a gene and turn it off. These molecules are common in the environment and are found in many foods, including onions, garlic, beets, and in the food supplements often given to pregnant women. After being consumed by the mothers, the methyl donors worked their way into the developing embryos' chromosomes and onto the critical agouti gene. The mothers passed along the agouti gene to their children intact, but thanks to their **methyl-rich pregnancy diet**, they had added to the gene a chemical switch that **dimmed the gene's deleterious effects**. [7] All Emphasis Added

One further example bears mentioning..

In November 2005, Marcus Pembrey, a clinical geneticist at the Institute of Child Health in London, attended a conference at Duke University to present intriguing data drawn from two centuries of records on crop yields and food prices in an isolated town in northern Sweden. Pembrey and Swedish researcher Lars Olov Bygren noted that fluctuations in the town's food supply may have health effects spanning at least two generations. Grandfathers who lived their preteen years during times of plenty were more likely to have grandsons with diabetes—an ailment that doubled the grandsons' risk of early death. [8]

### **Behavior**

However nutrition is only one of many players. While we already know that there are significant behavioral changes in children who grow up without maternal care, Michael Meaney of McGill University in Montreal "compared two types of mother rats: those that patiently licked their offspring after birth and those that neglected their newborns". The licked newborns showed "decreased methylation patterns in an area of the brain that helps them handle stress" [9] and therefore grew up to be relatively brave and calm (for rats). "The neglected newborns grew into the sort of rodents that nervously skitter into the darkest corner when placed in a new environment". [7]

After analyzing the brain tissue of both licked and nonlicked rats, the researchers found distinct differences in the DNA methylation patterns in the hippocampus cells of each group. Remarkably, the mother's licking activity had the effect of **removing dimmer switches on a gene** that shapes stress receptors in the pup's growing brain ...Through a simple maternal behavior, these mother rats were **literally shaping the brains** of their offspring. [7] [All Emphasis Added]

### **Inheriting Cultural, Personality or even Psychiatric Traits**

Prospect Magazine also bring up the alarming possibility that certain "cultural, personality, or even psychiatric traits" can be passed down through epigenetic inheritance.

For instance, historical "insults," such as Oliver Cromwell's brutal reconquest of Ireland in 1649, have led to an "embedding" of attitudes within the affected communities that persist for generations. However, it has generally been thought that this phenomenon could be explained by Richard Dawkins's theory of memes, according to which cultural or intellectual traits are passed down via non-genetic mechanisms such as storytelling. The possibility raised by epigenetics is that such cultural transmission may, after all, have a genetic component. Could it be that historical traumas, such as transatlantic slavery, leave some kind of genetic mark on the descendants of their victims? [10]

A paper on Early Childhood Health Development by University College Dublin says [All Emphasis Added]

The mechanisms that lead to deficits in using socially accepted behaviours are strongly intergenerational, based on complex genetic and environmental contributions, **including epigenetic mechanisms**. Prevention of these deficits requires early, intensive and long-term support to parents and child. Newly discovered epigenetic mechanisms suggest that intensive perinatal interventions will have impacts on numerous aspects of physical and mental health, including DB (disruptive behaviour). [11]

Epigenetic Changes... Everlasting or Reversible?

How long these Epigenetic changes can last is a question that can not yet be answered, since the results seem to vary quite widely.

"fruit flies exposed to a drug called geldanamycin show unusual outgrowths on their eyes that can last through at least **13 generations** of offspring even though no change in DNA has occurred (and generations 2 through 13 were not directly exposed to the drug).

In another study, roundworms fed with a particular type of bacteria exhibit loss of a green fluorescent protein and a small dumpy appearance that lasts **40 generations**. In human terms, factoring for 40 years equaling one generation, would represent 1600 years of generational history". [12] All Emphasis Added

When, in 2004, Michael Skinner, a geneticist at Washington State University was studying the effect of a commonly used agricultural fungicide on rats, he discovered that only did male rats exposed to high doses of the chemical while their mothers were pregnant, have lower sperm counts later in life, but the effect continued for **several generations** down to the great-great-grandsons. [7] Emphasis Added

In February 2009, the Journal of Neuroscience published a paper which described an experiment with mice, which was led by Larry Feig, a Tufts University biochemist. In this case where the changes came about through environmental factors, the effect only went on to the next generation with no real impact in the long term.

Feig's team exposed mice with genetic memory problems to an environment rich with toys, exercise and extra attention. These mice showed significant improvement in long-term potentiation (LTP), a form of neural transmission that is key to memory formation. Surprisingly, their offspring also showed LTP improvement, even when the offspring got no extra attention. [13]

However the good news is that Epigenetic changes are reversible

Unlike defective genes, which are damaged for life, methylated genes can be demethylated. And, methyl tags that are knocked off can be regained via nutrients, drugs, and enriching experiences. [14]

Epigenetic changes represent a biological response to an environmental stressor. That response can be inherited through many generations via epigenetic marks, but if you remove the environmental pressure, the epigenetic marks will eventually fade, and the DNA code will □ over time □ begin to revert to its original programming.

## Epigenetics and Darwinism

Darwinian evolution has never been demonstrated, but epigenetic changes have been repeatedly demonstrated in the laboratory. Darwin taught that

"...it takes many generations for a genome to evolve, but researchers have found that it takes only the addition of a methyl group to change an epigenome". [13]

So what did Charles Darwin actually observe when he visited the Galapagos Islands near Ecuador over a century ago □ gene mutations or gene switching (epigenetics)?

The finches on those islands are of similar size, coloration, and habits, but have different sized and shaped beaks. While Darwin never came up with a detailed theory as to how this happened, he did speculate that the different finches had descended from a common ancestor. However since then the Finches are celebrated as a classic instance of the workings of evolution through natural selection. The theory being that their beaks evolved over time to be best suited to their function.. an adaptation to the available food..

In each locality one or more individual finch happened to acquire, **by random mutation**, a beak shape more suitable for the food sources in that locality. These individuals then had a competitive advantage over their fellow finches, enabling them to grow and reproduce more successfully, and pass on their more specialised beaks to successive generations - until eventually the characteristic had spread throughout the finch population in that locality.

However, if the Finches were to survive at all, the changes would have had to happen rapidly, not over many generations, which is more evident of gene switching (epigenetics) rather than gene mutations or natural selection.

Besides which, scientists may have "too easily dismissed" early naturalists like Jan-Baptiste Lamarck (1744-1829) who argued that evolution could occur within a generation or two.



He posited that animals acquired certain traits during their lifetimes because of their environment and choices. The most famous Lamarckian example: giraffes acquired their long necks because their recent ancestors had stretched to reach high, nutrient-rich leaves. In contrast, Darwin argued that evolution works not through the fire of effort but through cold, impartial selection. By Darwinist thinking, giraffes got their long necks over millennia because genes for long necks had, very slowly, gained advantage. [13]

## Epigenetics and Romans 5

### Paul Was Right on Target

However what has all this to do with Original Sin and the apostle's Paul's words in the book of Romans?

The fact remains that while we have certainly made some astounding discoveries, we have probably just scratched the surface, inasmuch as the patterns of epigenetic marks in the human epigenome numbers in the millions. The Human Epigenome Project is already under way in Europe, but a full epigenome map will require "major advances in computing power" [13]

In other words, there is a whole lot that we do not know.

We have only recently discovered that the epigenome can change in response to diet, stress, nutrition and the environment... and that these changes occur throughout an individual's lifetime. Also, the epigenetic changes that come about by the choices we make, or the situations we find ourselves in, during our lifetime, can be biologically passed to not only our children, but can reverberate far into the future affecting future generations.

So, why would it be so hard to believe that Paul was right on target when he implied, in Romans 5, that **something happened** to all humanity because of Adam's sin.

Note that all the factors (that we know of) that can be responsible for changes in the epigenome became issues when Adam and Eve sinned and were banished from the garden. In view of their hiding from Him [Genesis 3:8-10], we know they must have felt intense guilt and shame at having disobeyed the Lord which, along with their expulsion from Eden, must have led to a great deal of stress. The couple went from a safe and plentiful garden to the outside world, which meant that their environment changed significantly. They now had to grow their own food, which must have meant an appreciable change in their diet, and physical labor.

So why would it be too much to believe that significant changes took place in their epigenome, which was then transferred to future generations.

### Adam's Role

The Bible teaches, even though Eve was the first to sin, it was through Adam that sin entered the world.

"Wherefore, as **by one man sin entered into the world**, and death by sin; and so death passed upon all men, for that all have sinned. [Romans: 5:12]

Certainly, mentioning Adam specifically could be no more than laying blame at his door since he was the head of the human race to whom the original warning was given. On the other hand, questions have also risen as to how much epigenetic change is transmitted through the sperm of the male.. One paper concludes that "sex-specific, male-line transgenerational responses exist in humans". [15] While other studies suggest that RNA found in human sperm might also affect human inheritance. [16]

## "Born Again"

### Reversing the Condition

However this is not where it ends. The Bible also teaches that this condition is reversible... many will be made righteous by the obedience of Jesus.

"For as by one man's disobedience many were made sinners, so by the obedience of one (Jesus) shall many be made righteous." Romans 5:19]

Remember that Jesus said that no one will enter the Kingdom of Heaven unless they have been born again (John 3:3-8), but the Greek words translated "born again" can equally well be translated "born from above". In fact Jesus goes on to call it being "born of the

Spirit" (John 3:5,8).

Essentially, this second birth is very different from the physical birth when your mother delivered you, since this one comes about by an action of the Holy Spirit. It is a spiritual birth that, according to 2 Corinthians 5:17, causes the person involved to become a "new creature" and all old things to pass away

"Therefore if anyone is in Christ, he is a new creature; the old things passed away; behold, new things have come. (2 Corinthians 5:17 NASB)

There is a very intriguing verse in 1 John which says...

No one who is born of God practices sin, because His seed abides in him; and he cannot sin, because he is born of God. (1 John 3:9 NASB)

In the above verse the word translated seed is the Greek *sperma* (seed), which, obviously, is where we get our English male "sperm". The imagery expressed here clearly refers to the male parent who fathers children [John refers to Christians in this way several times ...1 John 2:29, 3:9, 4:7, 5:1, 4, 18]. So when the Bible says someone is "born of God" it means that person is "fathered" by God through the work of the Holy Spirit [John 3:5].

### Restoring The "Son of God" Status

To be particularly noted is that the Biblical term "Sons of Elohim" (son of the Creator Himself), is only used of someone who is born of a specific divine act of creation. The Angels, who were directly created by the Father are referred to as *Bənai HaElohim* or sons of God [Job 1:6]. Jesus is referred to as the Son of God throughout the New Testament simply because, although He was with the Father from the beginning, He was also God's Son in that He was conceived, in Mary, by the Holy Spirit. However, **except for Adam** who was created directly by God, **no human in the Old Testament** was ever called a Son of God. It was only after believers in the New Testament were born again of the Spirit of God, and considered to be a new creation that they are again referred to as sons of God. [[See The Term "Sons of God"](#)]

### Restoring The "Image of God"

The term *Image of God* has been the subject of much debate among theologians who have wrestled long and hard with this question simply because it is a difficult expression to precisely understand. Opinions have included man's capacity to rule (based on Genesis 1:26), man's capacity for relationship, a personal knowledge of God, morality, and righteousness. [17]

While the expression *Image of God* may combine any or all of these elements, the fact remains that God made man in His image [Genesis 1:26] and this man was called a "son of God" [Luke 3:38], but "when the first man transgressed, this image was lost for all subsequent generations and **no man** was ever called a "son of God" again until Jesus and His born again followers.

Paul's belief was that Jesus had replaced Adam as the true and perfect image of God. On two occasions Paul explicitly "refers to Christ as the *imago Dei* (Colossians 1:15 and 2 Corinthians 4:4). In both cases he employs the language of the creation narrative in Genesis to describe the magnificence of Jesus as the ideal man—the image—who represents God and manifests his glory." [18]. Note: *Imago Dei* is the Latin term for "Image of God."

Since no human being could return to being the image, or son, of God apart from a complete renewal of their total being, Jesus Christ was the means by which this total renewal could take place, and the image of God could be restored to humanity. However this is a two stage process, one a reality now and the other to become a reality in the future. Paul made the case that

"... the two aspects of the human being, the "inner person" (the spirit, mind, or heart) and the "outer person" (the physical body), would be renewed separately, one part now and one part in the future. The inner person would be progressively renewed in this life by morally and ethically displaying likeness to Christ, while the physical body would continue to degenerate until death. Then, at the event of the final resurrection, the body would be renewed to its intended glorious form, restoring the complete image of God back to humanity. [18]

The end result will be people who will be some like Christ in both body and spirit and will visibly manifest God's glory... morally pure and free from sickness, sorrow, and death

Just as we have borne the image of the earthy, we will also bear the image of the heavenly. (1 Corinthians 15:49 NASB)



## Conclusion

However while the Bible tells us we have to be *Born Again* of the Spirit, it tells us nothing of the mechanics involved. What exactly is it that, in so many cases, causes people to have such astounding conversions and becomes so totally different? While it is true that many others have 'quieter' conversions, if no change at all occurs in a person's life, the Scriptures say that there is a very good chance true conversion never took place to begin with.

Being Born Again of God is commonly believed to be in a figurative rather than a literal sense. But what if it is not? What if this being *Born Again* of God, or being fathered by God, involves very literal physical changes, which leads to a total transformation of the person.

If, for all the reasons previously mentioned, Adam and Eve's epigenome underwent some drastic changes, why wouldn't true Biblical repentance and a conscious decision to follow Christ result in God 're-setting' the altered Epigenome which, in essence, would be a new birth from above. While we certainly inherit faulty gene function from our parents, it is only God who can reset the expression (behavior) of those genes **after** we make a conscious decision to turn back to Him.

As I said before, this is a theory, but one that goes a long way towards explaining Paul's statements in Romans 5 as to how one man's actions could affect the entire race even before they sinned themselves. It not only makes one heck of a lot more sense than the totally absurd □Original Sin□ doctrine, but also throws a more literal spin on Paul's words that tell us that anyone who is in Christ is a new creature, with the old things passed away. [2 Corinthians 5:17].

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"You are the Christ, the Son of the living