

How Can Sin Be Passed Down? A Study in Epigenetics

Have you ever wondered how Adam's sin could be passed down to all of humankind since that tragic event about 6,000 years ago? We read in Genesis 2:15-17 that God placed Adam in the Garden of Eden and told him he could eat of every tree of the Garden except the Tree of the Knowledge of Good and Evil. If he ate of that tree he would die ... or the aging process would begin. Death even in the flesh was not intended by God, but by eating of the Tree of Life he would live forever (Genesis 3:26, KJV).

Then, in Genesis 3 we read of the incident of the Serpent (Satan) deceiving Eve into eating of the forbidden fruit, and then she gave some of it to Adam and he ate as well. As a result, Yahweh Elohim cursed the Serpent. He would "go on his belly and eat dust all of his existence", or be deposed to the lowest of esteem, and there would be enmity between him and the woman, and their offspring, and though the Serpent would "bruise the women's heel" (the crucifixion of Christ), ultimately the Son of the woman, Jesus Christ, would cause the annihilation of the Serpent (Revelation 20:1-3, 10).

Elohim told Eve that there would now be pain in childbirth, and that her husband would rule over her. Her conception would be multiplied greatly, because now death entered in and those individuals who died would have to be replaced.

He told Adam the soil would be cursed, and would bring up weeds (thorns and thistles), and he would have to produce his food through pain and sweat, and would now eat of the plants of the field rather than the fruit of the Garden. Then he would die.

Death Now Built Into Mankind

King David confirmed this fate of death passed on to mankind when he wrote Psalm 51:5.

"Behold, I was brought forth in iniquity, and in sin did my mother conceive me".
Conceive = *yacham* (3179) "to be hot, fig. to conceive."

Job stated in 14:4, "Who can bring a clean thing out of an unclean? Not one."

What can this mean? Are we hopelessly filled with sin from the time of conception, or should we say that we contain that element of human nature that Jesus Christ and the disciples so vehemently preached against, that trait of our nature that must so desperately be put aside and replaced with God's holy spirit?

Yes, we have evidence that we contain this selfish, sinful nature even before birth. We are not born "neutral," as some might say, neither good nor evil.

"And Isaac prayed to the Lord for his wife, because she was barren. And the Lord granted his prayer, and Rebekah his wife conceived. The children struggled together within her, and she said, 'If it is thus, why is this happening to me?'" (Genesis 25:21-22).

Then we learn that Esau was born first, followed by Jacob, and Esau was to be a stronger people than Jacob and would serve him.

The competition these unborn children in the womb is not an indication of the spirit of Godly cooperation, but of the spirit of man ... his sinful nature. This *struggle* is the Hebrew word *ratsats*, meaning "to crack in pieces, literally or figuratively." Certainly that was the attitude of Esau towards Jacob after they grew older and Esau sold his birthright for a bowl of soup. In fact, that conflict between Esau and Jacob continues to this very day, despite the fact that Edom was prophesied to never rise again as a nation. This is another epigenetic effect.

The New Testament writers confirm this passing down of sin to all of mankind.

"Therefore as the trespass of one [Adam] led to condemnation for all men, so one act of righteousness leads to justification and life for all men. For as by the one man's disobedience the many were made sinners,

so also by the one man's obedience the many will be made righteous" (Romans 5:18-19).

Romans 5:12 says the same thing: "Therefore, just as sin came into the world through one man, and death through sin, and so death spread to all men because all sinned" Incidentally, Romans 5:12 tells us that *it is the man, through his Y chromosome, that spreads death to all of mankind!*

See also Ephesians 2:1-3. "And you were made alive, who were dead in trespasses and sins, in which you once walked according to the course of this world, according to the prince of the power of the air, the spirit who now works in the sons of disobedience, among whom also we all once conducted ourselves in the lusts of your flesh, fulfilling the desires of the flesh and of the mind, and were by nature children of wrath, just as the others."

We Are Children of Wrath By Nature

I Corinthians 15:22 says the same thing: "For as in Adam all die, so also in Christ shall all be made alive."

The plot thickens even more when we examine scriptures like Exodus 20:4-6: "You shall not make for yourself a carved image — any likeness of anything that is in heaven above, or that is in the earth beneath, or that is in the water under the earth; you shall not bow down to them nor serve them. For I, the LORD your God, am a jealous God, visiting the iniquity of the fathers upon the children to the third and fourth generations of those who hate Me, but showing mercy to thousands, to those who love Me and keep My commandments."

How is it possible for God to "visit the iniquity of the fathers on the children to the third and fourth generations of those who hate Me?" Well, He could just do it because He is God, but is there something else going on there that we may have overlooked? This generational curse is reiterated in Exodus 34:7, Numbers 14:18; and Jeremiah 32:18.

It is clear that something is going on here for the sins of the fathers to be passed on to the children for several generations. Moreover, an illegitimate person was not allowed into the congregation of the Lord to the tenth generation, and likewise for any

Ammonite or Moabite. There has to be a good reason for that, something that is carried along from generation to generation. What might that be?

Enter the Science of Epigenetics

Let us first clear up the issue of guilt from a parent's sin. Ezekiel 18:20 says that the soul that sins shall die, and the son shall not suffer for the iniquity of the father. So, we are saying that children can suffer from the consequences of their parents' sins but not for the fruit of their sins. Each person bears the guilt of his or her own sin (Romans 14:12).

Let us also state that we now have a way to understand *generational curses*, evil behaviors that are passed down through families like alcoholism, homosexuality, the tendency toward anger or debauchery, lewdness or self-absorption. Research has proven that there are no genes for alcoholism or for homosexuality. Yet, there can be epigenes for these traits.

The genome. The complete set of genes, or genetic material, present in a cell or organism, which captures all of the organism's hereditary information.

The epigenome. *Epi* is a Greek prefix that means "on" or "above". Thus, the epigenome is proteins and other compounds that sit on top of the genes and govern how the genes behave.

Epigenetics. The study of low environmental factors like diet, stress, and natural nutrition can change gene function without changing the underlying gene sequence. This idea was scientific heresy until fairly recently.

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. *Discover Magazine's* November 2006 edition carried an article entitled "DNA Is Not Destiny," in which they said,

"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.”

When Emma Whitelaw of the University of Sydney and her colleagues studied the inheritance of coat color in mice, they found that...

“... 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.”

In other words, you are born with a set of genes, but it is the expression (behavior) of those genes that matters. ***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 child 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.”

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.***

1. 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”.

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." 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...

"... 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 chil-

dren 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.”

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.

2. The Effects of Behavior

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" 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".

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.

3. The Effect of Culture and Human Interaction

Prospect Magazine also brought 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?

A paper on "Early Childhood Health Development" by University College Dublin says,

"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)."

How Long Can Epigenetic Effects Last?

Epigenetic effects can last for many generations, at least 40 in some cases. This would equate to about 1,600 years of generational history. Is it not plausible, then, that the terrible disobedience in the Garden of Eden would have placed a lasting epigenetic effect on the human race that has lasted until today? What about the effect of the Israelites crossing the Red Sea with a wall of water on each side, chased by the Egyptian army? What about the horrible atrocities of wars that have afflicted families and nations throughout human history, and their nutritional and psychological effects on their children? How about the effects of the Black Plague in Europe, Africa, and Scandinavia during the Middle

Ages?

All Is Not Lost: Reversing the Negative Effects of Epigenetics

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 he has been born again (John 3:3-8). This second birth is one that, according to II Corinthians 5:17, causes the person involved to become a "new creature," and all old things will pass away. "Therefore if anyone is in Christ, he is a new creature; the old things passed away; behold, new things have come.

I John 3:9 gives some very interesting information as well. The verse 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. The Greek word translated "seed" is the Greek *sperma*, which is where we get our English male "sperm". The imagery expressed here clearly refers to the male parent who fathers children, so when the Father in heaven procreates a human life to divine life He is indeed generating a new and unpolluted life, one free of previous epigenetic flaws caused by life within an imperfect world.

Restoring The "Image of God"

God made man in His image (Genesis 1:26), perfect and flawless, but when Adam transgressed this flawless image was lost for all subsequent generations. The whole plan of God is to restore Eden upon the earth and populate the earth with people who are free of the stain of this corrupt society. As James 1:17 states,

Pure and undefiled religion before God and the Father is this: to visit orphans and widows in their trouble, and to keep oneself unspotted from the world."

This righteous character is in those whom God

has called even in this age, at the very present time. The harmful effects of ancestral curses, traumatic effects of war and crime, of famine and disease, and of all other trials and sufferings on earth has been, is being, or will be removed from those in which the Father has placed His spirit, if not totally in this life then surely in the next. These epigenetic curses of living within a Satanic age will be removed totally, and can be removed even today for those who place themselves totally under the love and care of our Father in heaven. Exactly how these are removed is something we do not understand, any more than we can understand how they got there. Won't it be wonderful to live free of the effects of the epigenetic curses that have been carried on by the human race for all of its sinful history. Won't it be nice to have the original sin of Adam removed entirely from the Y chromosome of the male human line, and have a human race that is truly righteous, and refuses to learn war any more?