

Towards a Biological Explanation of Sin

in Walter M. Miller, Jr.'s *A Canticle for Leibowitz*

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Abstract

Walter M. Miller, Jr.'s 1959 novel *A Canticle for Leibowitz* is on one level a theological reflection on the human propensity to sin. Not coincidentally, the story is located in an Albertinian abbey in the former American southwest six hundred years after a nuclear holocaust, recounting three separate historical periods over the following twelve hundred years: a dark age, a scientific renaissance, and finally a time of technological achievement where a second nuclear holocaust is imminent. Miller asks the question of whether humans as a species cannot avoid committing acts of sin that cumulatively and continually lead to acts of societal and technological self-destruction; his response oscillates between a fatalistic pessimism (the final extinction of the human species) and a vague optimism (the "new creature," the mutant Rachel, or perhaps a last group of humans leaving the Earth as the curtain falls). It is my thesis in this article that theological questions about sin (as explored by Augustine and later scholars) can be fruitfully approached by analogous genetic processes; more precisely by reference to the rising science of Epigenetics, which explores how genes can express themselves differently without mutating in response to life stressors. In light of the idea of a genetic and epigenetic expression of moral rules of existence, Augustine's thesis of original sin as something that is inherited makes new sense. In this light, it may also be possible to approach the question that the *Canticle* proposes: are we destined to self-destruction, or is there a way out of this destructive cycle?

Introduction

In his complex novel, *A Canticle for Leibowitz*, Walter M. Miller, Jr. (1923-1996) asks us to ponder the pervasiveness of human sin. This is not a new question but one which early Christian scholar Augustine of Hippo (354-430) considered, concluding that all of those descended from Adam are to be born with original sin. However, original sin is not a 'personal' affliction, but a human affliction. The child is born with original sin which she, herself, has not voluntarily committed. Augustine's cure to original sin is baptism, but this does not mitigate human propensity to sin. A newborn does not consciously sin, but as she grows up, she will eventually mature her capacity of will to sin which in the Latin results from the *fomes*, or the 'tinder' present that can ignite sin. While we all can sin, Miller asks the question of whether humans as a species cannot avoid committing acts of sin that cumulatively and continually lead to acts of societal and technological self-destruction.

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There are three currents of reflection that run through the *Canticle*. The first, and most obvious is the political: the propensity of world leaders, with the assistance of science, to develop and deploy technology that will drive humanity into ever more destructive holocaust events. In the *Canticle*, science is enabled by the Roman Catholic abbey that is the location for the story. The abbey serves as the repository for fragmentary documents and technology detritus left over from the 'Flame Deluge,' or the first nuclear holocaust. Eventually, these documents will form the basis of a second technological renaissance, leading to a second nuclear age.

The second current is Roman Catholicism and the issues associated with sin: the original sin, baptism, human propensity to sin (*fomes*), and one who is born without sin.¹ Both clerical and secular characters in the story wrestle with fundamental questions about sin. Some engage in practices that increase the likelihood of a second nuclear holocaust, others find this emerging threat abhorrent, but are powerless to stop it.

The third current is genetic. The *Canticle* was published in 1959, six years after the discovery of the shape of the chromosome by James Watson and Francis Crick. This was also the dawn of the nuclear age where the bomb had been used in anger (1945 Hiroshima and Nagasaki) and the cold war threatened the human species and earth herself. Science fiction of the time featured grotesque creatures, human-like or not, mutated by nuclear fallout.

The political current of human inability to refrain from using technology against ourselves is worthy of separate treatment. This study will focus on the other two currents, the Roman Catholic and the biological, both associated with the issue of sin. It is my thesis that theological questions about sin as explored by Augustine and later scholars can be explained, in part, by analogous genetic processes. The *Canticle* provides a setting where the analogous processes can be explored in detail. For example, through the political thread, Miller suggests the possibility that human self-destructive tendencies may be intractable. Augustine's work bolsters this argument because, while original sin can be overcome through baptism, the human propensity to sin cannot. However, what Miller also does is consider a genetic origin of sin, specifically through the mutant Mrs. Grales, from whom a third Adam (who is without original sin) emerges from her dormant second head she calls Rachel.² As we will see, Rachel presents paradoxical issues that neither religion nor genetics can fully explain.

Beyond Rachel, neither biology nor religion can fully explain all the other mysteries of humanity that the *Canticle* explores. However, we can learn from both the science of genetics and the teaching of Christianity to try to improve the lot of humanity (i.e. influence the political). If we continue along the same path as humanity in the *Canticle*, we may also ultimately face similar consequences (Miller, 65). After a brief review of the *Canticle's* plot, this study reviews the basic science of genetics and the emerging science of epigenetics (from *epi*, above: "above genetics") and how these can be considered through human behaviors such as sin. Following the discussion on genetics and epigenetics, this study consults Augustine and later scholars for their thoughts on human sin. In the final sections, this study returns to the *Canticle* to bring into conversation Roman Catholic discourses and

biological discourses in the context of their relationship to human sin, principally through the paradoxical Rachel, and an ark of the last humans who are on their way to establish a colony on a distant star.

The Journey of the *Canticle*

Miller locates his three-part story in a Roman Catholic abbey that endures one cycle of self-destruction in what was once the Arizona desert. According to abbey history, “Father Isaac Edward Leibowitz had won permission from the Holy See to found a new community of religious, to be named after Albertus Magnus, teacher of Saint Thomas, and patron of men of science” (65). The monks of the new order were bookleggers, hoarders of the remaining books and manuscripts of the world not burned during the Great Simplification, during which remaining technology was also destroyed—a dangerous activity. The warp and weft of the story is in the juxtaposition of ignorance, belief, and knowledge. Ignorance is the reaction of the masses to the horror of knowledge and technology used as a destructive force. Belief is the Catholic faith in the abbey that is woven from the industry of the Cistercians, and the scientific approach of Albertus Magnus (1205 est.-1280). The abbey will become the repository for scraps of knowledge and scientific relics that, when pieced together much later, will help usher in a new technological renaissance, followed by a second, more devastating, Flame Deluge.

Fiat Homo

In the first section, *Fiat Homo*, Miller explains how the abbey is a hoarder of relics of technology lost in the first nuclear holocaust. Many of these artifacts are saved because they serve as proof of existence and the actions of the long-dead Leibowitz who is a candidate for sainthood. *Fiat Homo* takes place six hundred years after the first Flame Deluge. Francis, a rather hapless novice (who possibly represents the innocence of discovery), meets an old wanderer and then stumbles into an old fall-out shelter from which relics believed to be associated with Leibowitz are retrieved by monks from the abbey.

While *Fiat Homo* portrays a relatively calm moment in the history of the abbey, what the moment hints at is that knowledge is both satisfying and dangerous. Satisfying, because the abbey sees the increase in treasure as improving the chances for New Rome declaring Leibowitz a saint. Dangerous, because what has been discovered is mysterious, incomprehensible even, and Francis’s explanation of his encounter with the old wanderer is the subject of considerable skepticism and concern in the abbey.

Fiat Lux

We discover in the next section, *Fiat Lux*—which takes place six hundred years after *Fiat Homo*—that knowledge has a cost. In *Fiat Lux*, Thon Taddeo, a renowned scholar and monk from another abbey, desires to learn more about what knowledge the *Canticle’s* abbey has in its hoard of documents and relics. It is in *Fiat Lux* where a second Renaissance begins. Modernity comes into full view here when technology once again becomes equal to literacy and book knowledge. When Thon Taddeo arrives at the abbey, brother Kornhoer, a

mechanical tinkerer, has just constructed the first carbon-arc lamp seen in twelve hundred years. After Thon Taddeo examines the hoard of abbey relics and documents, he presents his thoughts to a gathering of abbey brothers and the abbot. We begin to see in Thon Taddeo the same motivations that likely led to the first nuclear apocalypse, now twelve-hundred years in the past. Thon Taddeo announces that a new power will emerge:

Tomorrow, a new prince shall rule. Men of understanding, men of science shall stand behind his throne, and the universe will come to know his might. His name is Truth. His empire shall encompass the Earth. And the mastery of Man over the Earth shall be renewed. (Miller, 214)

Thon Taddeo is the first scientist in six-hundred years to once again willingly join science with the political, which is what the period immediately following the first Flame Deluge, the so-called Great Simplification, was successful in unlinking. Thon Taddeo then explains how the political will once again assert itself:

“And how will this come to pass?” He paused and lowered his voice. “In the same way all change comes to pass, I fear. And I am sorry it is so. It will come to pass by violence and upheaval, by flame and by fury, for no change comes calmly over the world.” (214)

Flame and fury are metaphors for self-destruction that humanity seems incapable of overcoming. It is Thon Taddeo, a monk, a scientist, and an intellectual who foresees the return to power of technology in the hands of persons who will use violence once again to assert humanity’s reign over the earth. Beginning with Thon Taddeo, this obsessive passion for knowledge that can recreate lost technologies starts to increase. The cycle has now begun its descent towards the second nuclear holocaust and the repeat of the cycle of self-destruction. Where is the Catholic Church? It is as it was before the Flame Deluge, a bystander that will continue to provide succor for the masses for which eternal salvation is promised. Though a skeptic about historical ‘facts’ of Church dogma, Thon Taddeo finds knowledge and technology of the past useful towards reconfiguring and transcending the past.

Fiat Voluntas Tua

In section three, *Fiat Voluntas Tua*, six hundred years after *Fiat Lux*, Abbot Zerchi begins to understand humanity’s repeated descent into self-destruction: humanity is once again trundling down the path to another nuclear annihilation. He knows that his faith and the Roman Catholic bureaucracy are powerless to stop the march towards Armageddon. Zerchi understands that this turn towards annihilation does not make any sense. However, he is still a priest.

Zerchi meets a woman and her daughter, both suffering from radiation poisoning, who are on their way to a mercy camp where a physician can assist them to end their lives. Zerchi tries to dissuade her from the mortal sin of suicide. She says to Zerchi, “Save your breath, Father. I’m not complaining. The baby is. But the baby doesn’t understand your

sermon. She can hurt, though. She can hurt, but she can't understand" (Miller, 316). Zerchi does not reply, but he muses:

What can I say to that? the priest wondered numbly. Tell her again that Man was given preternatural impassibility once, but threw it away in Eden? That the child was a cell of Adam, and therefore—It was true, but she had a sick baby, and she was sick herself, and she wouldn't listen. (316)

Zerchi knows that the sin of Adam is in the child (the cell of Adam), but the child does not know this and the sins that cause her condition are not of her making. The mother, however, is weary of the world and in pain with no hope of resuming a life with any meaning. She rejects Zerchi's admonition and enters the mercy tent. Like Eve, she disobeys God.

By the end of *Fiat Voluntas Tua*, even Zerchi's church knows the second nuclear holocaust is now inevitable and can do nothing to save earthly humanity from annihilation. The Church's only viable option is to send an ark of believers and clerics to establish a new Christian colony on a distant planet. The ship leaves with these migrants, all who are aware of the destruction that is occurring behind them and know that they may be the last human hope against Miller's prophecy of self-annihilation. Even so, we are left wondering whether humanity is doomed to continually exercise its propensity to sin by repeatedly causing untold suffering for the species.

Genetics and Epigenetics

Before turning to Augustine and Aquinas's explanations of sin, it is important to consider genetics and how genetic and epigenetic processes influence heredity and even changes in genomic expression that can affect individuals during their lifetime.

Genetics

The foundation for human and other life is in our genes. Genes are arranged in chromosomes that are passed down to new generations. Half of the genetic code is from the mother and half from the father (at least in humans). However, genes *can* mutate during this process and introduce changes to the individual and even human genome.³ During our lifetime, genes can also mutate from solar radiation and other environmental conditions, and the decreasing length of telomeres at the ends of chromosomes as we age are implicated in our eventual mortality. Environmental conditions (like nuclear fallout) can increase the incidents of genetic mutation leading to accelerations in evolution, including the production of monsters and mutants heretofore not seen in a population.⁴ We must give considerable literary license to Miller, because the panoply of mutants he sees emerging after the first 'Flame Deluge' we did not see after Hiroshima or Nagasaki, or today in animal populations that exist in the exclusion zones that followed the 1986 Chernobyl disaster.

Epigenetics

The Coelacanth fish is estimated to be a five hundred-million-year-old species that has thwarted genetic efforts to evolve significantly. Charles Darwin, on the other hand, discovered several distinct species of island finches that had evolved relatively more quickly than the Coelacanth into different species with unique beaks designed for separate diets (Darwin, 1845, 380). Why it is that the Coelacanth could forestall random mutation efforts to remain essentially the same creature for many millions of years while the finches seemed to accelerate change is not well understood.

However, science is beginning to suggest that there is another feature of genes that may contribute to fast or slow evolutionary change in species. All genes are not like cement blocks, that once set into the wall cannot change. Environmentally or randomly generated mutations aside, many genes can alter their expression, for example, on, off, or something in between. What science is discovering is that environmental exigencies can trigger the altering of expression of some genes. For example, some plants can provide genetic expressions of immunity against certain infestations that are transmitted to future generations (Miryeganeh and Saze, 2). A woman, pregnant during a famine, may prepare her unborn child for a lower calorie diet after birth.⁵ The process of changing genetic expression associated with environmental exigency is called epigenetics. Behavior, such as personal response to stress, and even how children are raised after they are born can alter genetic expressions of many genes.⁶ Some epigenetic changes can be positive, for example, associated with positive upbringing, and others negative, associated with abuse or other than positive upbringing that science is discovering may lead to future debilitations such as heart disease or cancer (Kaati, Bygren, and Edvinsson; Ramo-Fernández et al.).

While epigenetic processes are associated with variability of gene expression, epigenetics does not alter the chromosome order. The gene order in chromosomes we were born with will not change from active epigenetic processes, but how some genes express themselves can change during our lifetimes, and perhaps we can pass these expressions down to future generations. While the genome is fixed for the individual, barring random mutations during life, epigenetic science provides evidence that both environment and behavior contribute to genetic expression and overall individual wellbeing (or not) and perhaps future generation(s) wellbeing (or not).

Epigenetic processes 'learn' from past experiences during stress and remember these for use in the present, either to produce defenses against pestilence, for example, or to pass this knowledge down to successive generations (without education). Consider the cyclical nature of weather where a decade of drought is followed by normal rainfall for a similar period. Mutation is a "permanent" solution to long-term changes in climate and ecology. Permanent change during a short-term decade-long drought may not be beneficial. However, if climate change is towards a definitive descent towards desertification, permanent genetic alteration might be necessary. Also, random mutations often require many more years to make substantive beneficial changes in a species. Outside immediate

behavior changes of existents, and long-term mutation, epigenetics is an intermediate natural process that can, for example, help parents of offspring in some species to advantage their progeny during difficult times such as famine or drought.

Genes can express themselves epigenetically in different ways.⁷ They can sometimes switch on or switch off during periods of stress. For example, during a drought, epigenetic processes in the womb or in plant seed production may activate one or more genes that serve the species during drought conditions. Ichiro Yahara explains:

Epigenetic responses to environmental alterations lead to altered or new phenotypes that are often adaptive, probably because the responses consist of biomolecular elements that have been naturally selected and fixed during evolution. For instance, when plants are exposed to water deficit, specific inactivation of histone deacetylase HDA6 is induced, leading to activation of genes involved in drought tolerance. (Yahara 2019, 524)

When the drought ends, the plants can once again use epigenetic processes to silence the drought-enduring genes. If, however, the drought is not an anomaly but the beginning of desertification, the drought-coping genes may not adequately defend against enduring drought. Mutation or even migration of the species to less dry areas may be required. However, until that occurs, epigenetics may help future generations survive the change. There is even some thought that epigenetics may help organisms more quickly benefit from mutations that are helpful towards the objective of, for example, surviving drought (Miryeganeh & Saze; Yahara). The thinking (in theory) is that epigenetics *may* assist natural selection advantage mutations that can provide benefits that genetic expression alone cannot.

Epigenetics is not mutation but uses the capabilities of genes to express themselves in different ways. Adrian Bird defines epigenetics as, “[t]he structural adaptation of chromosomal regions so as to register, signal or perpetuate altered activity states” (Bird, 398). Such adaptation capabilities themselves may have been formed during mutation over long periods of time, for example, a perennial drought/rain cycle. Epigenetic processes permit parents to pass along their experience and learning to offspring without active education. In some species like humans, epigenetics may help fetuses and infants cope with virulent new viruses, but the actions of nurturing parents may also help or hinder the survival of children exposed to this new virus. Most plants do not nurture their young (seeds often sprout far away), so epigenetic processes are valuable in passing along adult learning and experience through changes in gene expression in the seed.⁸ What epigenetics also is discovering is that life stress itself can activate epigenetic processes.

There is now a large body of epigenetic research. Here are a few findings. Flowering plants can produce different forms of flowers to attract local pollinators (Bird, 397). Also, while there is evidence of inherited epigenetically modified genes in plants, there is not enough evidence yet to assert the same in humans (Olmeda-Gómez et al.). Science believes that there may be therapeutic value for epigenetics for things like cancer, but there are only early studies on the process (Nagy and Turecki, 7). Mood and stress on the mother can

produce epigenetic changes in the womb and in young children (Janusek et al., 1). However, there remains a lively debate as to whether these changes are some combination of both nature and nurture (Janusek et al., 5). As more research is conducted, we will find more answers as to both the power of and the limitations of epigenetics. One question is the extent to which nature and nurture are interrelated and, in what combination, produce things like changes in behavior or even higher mortality.

Nature Versus Nurture

The question of nature versus nurture is explored in a study of American Civil War veterans that may provide some evidence of the kind of epigenetic inheritance across generations that is also important to the *Canticle*. Dora L. Costa et. al. studied the mortality of children born to Union U.S. Civil War veterans who were interred in the notoriously inhumane Confederate POW camps.⁹ They discovered higher early mortality in male children born after the former POWs returned home. This mortality increase was higher for those who endured the worst camps than those in the less cruel camps. There was no such mortality increase for any female children or to male children born before the Civil War. While Costa et al. suggest an epigenetic cause for such mortality increases, they also note that “[s]ocioeconomic effects, family structure, father-specific survival traits, and maternal effects, including quality of paternal marriages, cannot explain our findings. While we cannot rule out fully psychological or cultural effects, our findings are most consistent with an epigenetic explanation” (Costa et al., 11215). The promise of epigenetics is that there may indeed be a process whereby the trauma that parents experience can somehow have an effect on offspring, which in the case of Civil War POWs, affected the male offspring of the male POWs but not the female offspring. However, not everyone is convinced that human epigenetic transfer to future generations has been confirmed. The effects of nurturing, both in the womb and during human childhood, still have not been ruled out in any study conducted so far (Ruse and Wilson, 180).

For purposes of this paper, I will grant a charitable understanding of epigenetics. Despite the nagging nature versus nurture question, science has conducted multiple studies that conclude that epigenetics alone (in some species) is a powerful tool of nature, for both good and bad. There is both a permanence and impermanence to genetic code.

Epigenetic Rules

In the *Canticle*, humans endure centuries of technological progress, followed by a return to near-savage conditions—a cyclicity they cannot seem to overcome. However, humans seem always to return to technology and inevitable self-destruction. This may be something genetic, something hard-wired in our genes. However, there may be another process at work that helps individuals learn how to behave in society that is epigenetic in nature, so-called epigenetic rules.

As humans (for this study, descended from Adam and Eve) began to roam the lands, they developed certain modes of existence that we classify as moral and ethical. We have codified such teaching into works like the Bible and codes of law and regulation in our

bureaucracies. Michael Ruse and E.O. Wilson speculate controversially that much of our understanding of morals may be of epigenetic origin. Ruse and Wilson offer that such rudimentary rules of moral existence can be called, “epigenetic rules”:

[g]enetically based processes of development that predispose the individual to adopt one or a few forms of behaviours as opposed to others. The rules are rooted in the physiological processes leading from the genes to thought and action. The empirical heart of our discussion is that we think morally because we are subject to appropriate epigenetic rules. These predispose us to think that certain courses of action are right and certain courses of action are wrong. The rules certainly do not lock people blindly into certain behaviours. But because they give the illusion of objectivity to morality, they lift us above immediate wants to actions which (unknown to us) ultimately serve our genetic best interests. (Ruse and Wilson, 180)

Why epigenetic and not genetic rules of behavior? Perhaps because genetic rules might be too inflexible for the thinking beings we have become. While our autonomic nervous system operates by strict rules (heartbeat, respiration), we otherwise have what Augustine calls will, and therefore can make decisions from time to time that are perhaps contrary to what Ruse and Wilson call epigenetic rules. Epigenetics requires genetic flexibility to change expression of the gene. There may be circumstances such as trauma that, for example, change the person’s attitude towards stealing. Still, epigenetic rules do help exemplify some of Augustine’s thinking about sin (which will be reviewed in more detail later in this study). First, that the original Sin of Adam is inherited. Second, that the act of baptism can absolve a person from original sin. The process of epigenetics offers some limited flexibility to the gene to express itself in alternative ways. Epigenetic rule making must also be flexible because different societies have evolved different moral codes. Both Slavery and cannibalism have been considered acceptable in different societies. Ruse and Wilson speculate on the origin of epigenetic rules:

[e]nsembles of genes have evolved through mutation and selection within an intensely social existence over tens of thousands of years; they prescribe epigenetic rules of mental development peculiar to the human species; under the influence of the rules certain choices are made from among those conceivable and available to the culture; and finally the choices are narrowed and hardened through contractual agreements and sanctification. (Ruse and Wilson, 180-181)

Think of epigenetic rules this way. We are presented with an overwhelming amount of sensory information each day. We must filter what information is valuable to us and what is not. We often must make quick decisions such as what to do when a child runs into the street in front of our car. We do not have the time to deliberate the moral implications of whether to avoid the child or not. We simply swerve.

As we explore Augustine and Aquinas’s thoughts on sin, we will return to epigenetics in the context of Augustine’s notion of sin, and of original sin specifically.

Augustine and Aquinas on Human Sin

A question raised by Miller in the *Canticle* is whether humans are innately self-destructive. Perhaps they are, but why? Is there a genetic or other explanation for this seemingly intractable malady? The analysis of the doctrine of original sin produces a theological argument for the consequence of the fall of Adam and Eve, but it also has analogous genetic implications. Jesse Couenhoven notes that most scholars agree that, “[t]he doctrine of original sin cannot be traced back beyond Augustine” (Couenhoven, 359). I summarize Augustine’s basic argument for original sin.

Something and Nothing

First, Adam and Eve were created by God in Eden where they were immortal and did not want for anything. This should have been the end of their story. However, says Augustine, “God foresaw all things, and therefore was not ignorant that man would fall” (*City of God* XIV, 11). Entering deeply into the millennia-old theodicy debate on how there could be evil in the world if God is perfect, is beyond the scope of this study. However, that God would go to the trouble of giving to human beings immortality and freedom from want along with a fatal flaw that would negate both for them and their descendants, on the surface, makes little sense. Augustine argues that though humans were created with good will by God, evil will pre-existed this good will. Why would have God created evil will? Augustine suggests that evil will is overcome by good will and is permitted to exist, “[f]or the sake of demonstrating how the most righteous foresight of God can make a good use even of them” (XIV, 11). This argument that evil exists because God can make good use of it is a claim that theologians have used to justify an all-powerful God *and* the existence of pain and suffering in the world. Augustine, however, goes a step further. He maintains that humans, their souls, and the earth were created from *nothing* which absolves God from complicity in the creation of a human being that would fall. If God had created humans from *something*, and God knew that humans would fall, then God would have created a flawed being and that simply is not possible. Augustine explains that God could not create a creature equal to God but had to produce someone different and the only way to do that is to create humans from nothing, “for that which was made of nothing could not be equal to Him, and indeed could not be at all had He not made it” (*City of God* XII, 5). Augustine conflates “something” with God in order to subordinate “nothing” so that humans could acquire sin because they cannot be equal to God. The words “something” and “nothing” in this context do not signify the understanding that physics gives to them, but they become metaphors for the idea that there is a superior being (a necessary something) to which humans (contingent from nothing) can never aspire to become.

Jesse Couenhoven echoes Augustine’s rationale for accepting that Adam could sin: “God, a necessary being, cannot diminish himself by sin, but beings made from nothing can” (Couenhoven, 365). The stage is set; Adam and Eve, created from “nothing,” are immortal and without want in Eden. They have good will, but there exists evil will which God knows will lead to humanity’s fall.

Augustine's Adam Paradox

Augustine finds it difficult to believe that human beings, given so much and so much to look forward to, would have disobeyed the one order that God gave: not to eat the fruit of one tree. Augustine muses:

And as this commandment enjoining abstinence from one kind of food in the midst of great abundance of others was so easy to keep—so light a burden to the memory—and, above all, found no resistance to its observance in lust, which only afterwards sprung up as a penal consequence of sin, the iniquity of violating it was all the greater in proportion to the ease with which it might have been kept. (*City of God* XIV, 12)

Augustine suggests what precipitated the original sin was pride, “And what is pride but the craving for undue exaltation?” (XIV, 13). The pride of exaltation turns love inward rather than towards the loving God, and this is the primordial moment that triggers the fall. The act of eating the fruit is therefore likely pre-ordained when pride emerges in the hearts of Adam and Eve. The seeds that precipitate the fall (the *fomes*) existed in humans even before they considered eating the forbidden fruit.¹⁰ However, as Couenhoven notes, “Augustine came to find the primal sin inexplicable” (365). Given eternal life without any want, why would Adam and Eve have sinned? Adam and Eve, born from Augustine’s “nothing,” were given free will which means that they could choose to sin. However, the primal sin of Adam baffled Augustine because, “sin has a ‘deficient’ cause...and...if the primal sin made sense, it would not be so bad!” (366) They knew they were rejecting God’s “no” ... but this rejection makes no sense if the consequence of that sin is known—which Eve, at least, knows is death.¹¹ How could Adam and Eve have understood suffering if they had never suffered? I suggest humans, having been given free will by God, are curious creatures who find the word “no” an irresistible challenge. Augustine gifts us with a theological explanation for how humans cannot resist disobeying the word “no.” Curiosity combined with free will likely generate this sin of pride that produces disobedience whether to a loving God or a loving parent. This orientation towards the word “no” we might want to suggest is our nature, and therefore (without any current scientific evidence) has a genetic origin. Whether or not it is in our genes, rejecting “no” sometimes help us advance our thinking, even while it has and continues to sow our own seeds of self-destruction.

Continuing Augustine’s line of reasoning, Adam is born into a world where there is both good and bad will and ultimately chooses to sin against God. This generates the original sin that is part of human nature and is passed down to all born from the original seed of Adam.

The original sin is not a personal sin, but one that is inherent in humanity. The original sin adds credibility to Miller’s notion that humans cannot help themselves from trundling down the path of self-destruction as did Adam and his acts of disobedience that precipitated his fall from Eden. Correspondingly, it can be thought of as a genetic condition that has been passed down from the first human who disobeyed God. However, the original sin can be absolved by the process of baptism which analogously can be compared to epigenetic processes that change the expression of certain genes.

Absolving Original Sin

Augustine now begins the exploration of how original sin can be mitigated. He says, “And evil is removed, not by removing any nature, or part of a nature, which had been introduced by the evil, but by healing and correcting that which had been vitiated and depraved” (*City of God* XIV, 11). The healing and correcting does not alter the biological foundation of humanity but serves as a kind of wound-healing function. Even so, and with much speculation, such a function could also be an epigenetic process, a change in expression of an “original sin” gene to “off.” However, the healing and correcting does not mitigate an individual’s propensity to sin. Augustine explains, “And thus, when the grace of Christ has been once received, the child does not lose it otherwise than by his own impiety, if, when he becomes older, he turn[s] out so ill. For by that time he will begin to have sins of his own, which cannot be removed by regeneration, but must be healed by other remedial measures” (*Letters*, XCVIII, 2). In the Catholic doctrine, remedial measures include confession, repentance, and penance.

However, Augustine suggests there is a way to absolve original sin. Augustine accords the faithful two resurrections, baptism, and the final judgment. He says, “[t]he one according to faith, and which takes place in the present life by means of baptism, and the other according to the flesh, and which will be accomplished in its incorruption and immortality by means of the great and final judgment” (*City of God* XX, 6). Augustine then explains how infants are absolved from the original sin: “That infant children, even before they have committed any sin of their own, are partakers of sinful flesh, is, in my opinion, proved by their requiring to have it healed in them also, by the application in their baptism of the remedy provided in Him who came in the likeness of sinful flesh” (*Letters*, CXLIII, 6). The *Him* (the Christ, the son of God) of Augustine’s explanation becomes manifest in *sinful* flesh.

Sin can gain a foothold because both the world and humanity are created from Augustine’s “nothing.” While Adam and Eve were created from “nothing” as immortals in Eden, always present, even in Eden, were both good and evil. Adam and Eve somehow discovered evil which led to the defiance of God (perhaps resulting from the human propensity to defy the word “no”).

After the fall, Adam and Eve lost their immortality and became contingent humans who by their very nature (biological at least) are born sinners—born with original sin. Augustine invokes the continuity of the Christ through his own divine practice of baptism to absolve believers from the original sin. Since human flesh is not altered, the propensity to sin is not removed from humanity, but the wound of the original sin is healed. While the notion of an “original sin” gene is speculative, the idea that turning off such a gene through an external process (stressor) like baptism (that would have no effect on the otherwise sinful nature of human beings) is consistent with how epigenetics works in nature.

While the *Canticle* story is located in a Roman Catholic abbey, there seems nothing over the centuries that the Church can do that will turn humanity away from its self-destructive path. While the Church’s baptism ritual could absolve original sin, it could do

nothing to absolve humanity's propensity to sin. Centuries of Catholic teaching in the *Canticle* seem not to have had much effect on assuaging humanity's return to its self-destructive ways. New generations, it seems, have not learned from the past. But perhaps there is something in the way that these generations raise their children that can be associated with this continuity towards self-destruction.

Parental Influence on Their Children's Original Sin

Augustine thought that the actions of parents would increase or decrease the intensity of the original sin in offspring, a very epigenetic idea indeed. He said, "And it is said, with much appearance of probability, that infants are involved in the guilt not only of the first pair, but of their own immediate parents" (*Enchiridion*, 46). This he clarifies in the next chapter by declaring that any guilt inherited from parents would follow no more than four generations because the infant should not have to bear the cumulative sins of all predecessors (47). Couenhoven says, "Augustine further claims that parental sins can increase the original sin of their children, and parental righteousness can lessen it" (385).

Speculate with me for a moment that there is an "original sin gene." In line with Augustine's reasoning (who had no knowledge of genetics), this "gene" has epigenetic capacities to increase or decrease the intensity of original sin of offspring, and this intensity can be carried down to some number of future generations. His "epigenetic-like" reasoning is also cogent, that bad parenting followed by good parenting in future generations should preference good parenting and, in time, switch off the epigenetic intensifier of the original sin gene.

Miller, however, does not see a break in the self-destructive nature of humanity during the centuries of his *Canticle* chronicle. There is a certain pessimism about humanity that runs through the *Canticle*. The book of Genesis through the fall of Adam also lends a note of pessimism about whether humans can earn their way back into the grace of God. However, the birth of Jesus presents theological and biological questions which Thomas Aquinas thought it important to address and that are also important for the later analysis of the Rachel paradox.

Aquinas on Sin and the Blessed Mother Mary

Thomas Aquinas (1225-1274) wrestled with how Mary, the mother of Jesus, could conceive, bear, and deliver the Christ if she were born human and from the lineage of Adam. In his *Summa Theologica*, Aquinas engages a discourse where he asks an important question, develops answers, then argues against these answers and responses to these objections until he can develop a final response. Fundamental to this study is Aquinas's question of how Mary became sanctified so that she could bear the infant Jesus (ST III, q.27 a.2). Aquinas accepts the original sin as afflicting all who are born from Adam's lineage. How then could Mary be born without original sin? Aquinas submits many arguments and answers such as considering that her parents were without original sin, or she was sanctified before Jesus was conceived, but none is satisfactory in and of itself. Complicating this is the fact that even if Mary were somehow absolved of the original sin, she, as human, would

still have the *fomes* of sin. Aquinas did not discover a hereditary or other mortal human means for Mary to have either been born without or have been absolved from original sin, nor a means to remove from her humanity the *fomes* of sin. After consulting Augustine and the Scriptures, he answers his question with, “God so prepares and endows those, whom he chooses for some particular office, that they are rendered capable of fulfilling it” (ST III, q.27 a.4). Mary must be without original sin and without the *fomes* of sin when she conceives Jesus, but this is God’s doing. Perhaps Mary regains her human sinfulness after conception; perhaps not. While we do not have a good biological explanation for how Mary avoids the human propensity to sin, we can consider other exigencies associated with her life.

She produces one child who is like herself at the moment of conception, free from sin. The Bible does name “brothers” of Jesus and unnamed “sisters” who presumably are born with original sin and the *fomes* of sin. There is considerable debate whether Mary was and remained a virgin and these other children were from Joseph, or that the words “brother” or “sister” during biblical times do not necessarily mean direct siblings. Assuming for a moment that Mary could have born more children, the vagaries of genetics make it possible, for example, to have all but one child born with brown eyes. As Jesus presumably never married or produced offspring, his genetic sinlessness was not passed on. The answer to whether Jesus’s siblings (half or otherwise) carried genes that eventually could produce sinless offspring is likely no. Even if Jesus’s siblings did carry his sin-less genes, somehow, they have not been suitably arranged or cannot yet alter their expressions to eliminate original sin and the *fomes* of sin for the many generations that have followed. No generally accepted “messiah” has followed Jesus, which gives credence to the notion that he could not have fathered children who might have had similar capabilities. Yet again, even if he did father children, and given Aquinas’s explanation that somehow God prepares individuals for their mission in life, that which made Christ different from other humans may not be replicable.

The traditional Christian explanation for the birth of Jesus and the sinlessness of Mary may be ultimately more satisfactory to the faithful and others than a biological explanation. However, Aquinas and Augustine challenged themselves to produce a more natural argument that might answer the question of the birth of Jesus without too much inexplicable mystery that could only be resolved through faith alone. The intersection of the theological and the biological in their arguments points to the vagaries of nature, particularly that of genetics. A gene might mutate and never be passed on because the creature born with the gene might never reproduce. Even so, we must now confront the Christian theological problem that we have a human, Mary, giving birth to the son of God.

Mary is human, but she carries the Christ to term. Augustine declared that humans are made from his notion of “nothing,” because humans can never be equal to God. Humans are flawed, but a human Mary carries the God made of flesh in her womb. However, God has given God’s son human form which means that while Christ is the son of God, he carries the sin of flesh as any human. In fact, he question’s God love while he is on the cross and in Matthew (27, 46) he cries out, “My God, my God, why hast thou forsaken me?” What

Augustine has done is to provide a rationale for how humans continue to sin despite the teachings of God and Christ. Miller expands the notion of original sin arising from the ego of Adam and Eve in such a way that this sin seems capable of overtaking the collective human mind/spirit, to where it continually returns to self-destructive practices that could eventually lead to extinction.

Augustine, Baptism, and Epigenetics

Previously I speculated on the existence of an original “sin gene” and how Augustine’s argument for parental increase or decrease in intensity of original sin has epigenetic implications. While the notion of an original sin gene is pure speculation, and staying with this speculation, the notion of *baptism* as the way to absolve someone from original sin can also be considered through an epigenetic lens. This is because the act and experience of baptism appears to be capable of changing the expression of original sin from active (on) to that which has been absolved (off). While a rather far-fetched idea, who can say whether the dripping of water on the head of the infant is enough to cause epigenetic change? Even so, the idea that humans can effect fundamental changes in their offspring through specific actions is not inconsistent with the epigenetic process.

Prior to any understanding of genetics, Augustine maintains the continuity of the human species from generation to generation even as he tries to explain how Christianity can both explain human sin and, in the least, provide a methodology for mitigating original sin through a process of healing called baptism. The newborn who is baptized will have no conception, either cognitively or through faith, of what the baptism ritual means. Rather, it is the parents of the child who prepare the child for baptism and healing. While a child is in the womb, the environment in which the mother exists, her behavior, her stress, moods, and attitudes towards her unborn child may trigger positive or adverse epigenetic processes. After birth, actions of care and nurturing, or lack thereof can also trigger epigenetic processes. Epigenetics does not change the human chromosome order, only the expression of genes within the human chromosome. Augustine’s notion of healing through baptism does not alter the biological (chromosomal content) that is human. Rather, baptism alters the expression of original sin as epigenetics does alter the expression of genes. However, since the human condition itself is unaltered by the practice, there is no guarantee that the wound of sin will not become exacerbated by either the growing child’s environment or, like Adam and Eve, the pride that is associated with the fall and human propensity to sin even after receiving the baptismal rite. Even armed with epigenetic rules on peaceful coexistence, we see evidence every day of human sin.

Miller takes this problem to the extreme in the *Canticle*. Can humans overcome the *fomes*, or must we wait for a successor to humanity? The *Canticle* ends with two divergent threads. First an ark with the last of humanity leaves earth for a distant planet. They carry with them the seed of Adam, with its sin as we have explored through Augustine and Aquinas. Can these future Noahs evolve themselves, create new epigenetic rules that will cease humanity’s repetitive path towards self-destruction? Miller ends the ark thread without answering this dangling question. The second thread is the paradoxical Rachel,

perhaps the successor to humanity, but also perhaps not. However, Rachel will bring into focus both the genetic and theological issues this study has explored. Her birth as the third Adam, however, poses more questions than answers.

The Rachel Paradox

Miller gives us too little time with Rachel and that is only through the eyes of Abbot Zerchi. While Miller gives us some answers, others we much search for with the limited information he gives us. The paradoxical questions concerning Rachel involve baptism, her genetic origin, whether she can sin, her relationship to God, whether she carries the original sin, her birth, and what will happen to her after the second Flame Deluge makes humanity extinct on earth.

Baptism

Miller presents us with a baptismal dilemma with Rachel. Miller introduces Rachel, whom Abbot Zerchi recognizes as a third Adam, at the very end of *Fiat Voluntas Tua* when the world is about to experience a second Flame Deluge (a descriptive term for the nuclear holocaust, given during the technology-banning “Great Simplification” that followed). Rachel is the dormant second head of the mutant Mrs. Grales who suddenly becomes animated. Miller asks us to take as an article of faith that Rachel emerges, perhaps in the same condition as the Christ (who takes on humanity’s sins), but more likely quite different. Rather than hold Mrs. Grales up as a second Mary (to birth Rachel), Miller makes her head dormant as was the head of Rachel before her animation. Rachel rejects the baptismal offer from Abbot Zerchi. She is without sin. This is different from the Christ who, in taking on the flesh of humanity, also takes on all of humanity’s sins. Yet Christ accepts baptism from John the Baptist.

Couenhoven says, “In baptism Christians are brought into a proper relationship to God by being incorporated into Christ” (379). At first John the Baptist balks at baptizing Jesus, in Matthew 3,14: “I have need to be baptized of thee, and comest thou to me?” To which Jesus replies, “Suffer it to be so now: for thus it becometh us to fulfill all righteousness.” Jesus remains the loyal servant of God even as he is the son of God in the flesh of a human.

What relationship is Rachel in with God after she refuses to be baptized? Miller gives us no answer, but Rachel is so different from what we may classify as human, that perhaps her genetic structure has so changed that she no longer carries what has been described as the “original sin gene.” She may be an Adam who is otherwise-than-human but is not a Christ who was the son of God. However, Rachel’s emergence produces more genetic paradoxes.

Rachel’s Genetics

Mrs. Grales and Rachel are presumably the product of mutation from lingering background radiation from the first Flame Deluge. With this idea, Miller introduces genetics into the

equation for the creation of a new Adam. The emergence of the Christ did not alter the *fomes* of sin in humanity. While Augustine did supply the means to mitigate original sin through baptism, both Augustine and Aquinas agree that the *fomes* of sin in humanity was not altered by Jesus's coming or his passing.

Far into the future, Miller envisions the *fomes* operating in ways that produce the extinction of humanity on earth. His Rachel is perhaps a feeble attempt at evolving a successor to humanity who will not carry within her the *fomes* of sin. However, she is born at a time when humanity is about to destroy itself on earth. If she is a new Adam, and there are no others on the earth who can take her life as was the fate of Jesus, then perhaps she is born not only without sin but is also immortal. However, if Eden was paradise, the second flame-deluge-damaged world must be a kind of hell, or perhaps purgatory, from which nature herself might evolve into another Eden only after an untold number of years. At the end of the book, Miller describes a shark who continues to thrive in the ocean after the conclusion of the second Flame Deluge that presumably has ended humanity on earth. Miller cleanses humanity from the world, but not life itself. Life once again survives another near-extinction event. What is the fate of Rachel? Miller gives us no answer.

Rachel Without Sin

While genetics teaches that random mutations help species evolve, the new science of epigenetics explores an intermediate process that does not require the mutation of genes or changes in the chromosome order. Many genes can alter their expression during our lifetimes, both towards existential benefit and detriment. This is analogous to baptism. Without baptism, the child carries the original sin for life; with baptism, the child is absolved from original sin. However, baptism's epigenetic-like process does not affect the human genes (if any) associated with sinning.

Assume, again, for a moment that we have "sin genes", or more simply, have a propensity to sin as Augustine and Aquinas suggest. Assume also there is a God. God permits both good and evil will to exist. Couenhoven explains through Augustine how Adam's will first generated sin, "Adam's sin differs from and is prior to original sin. The primal sin is different in that 'Adam ... sinned because he willed to sin'" (Couenhoven 364). Human temptation precipitates what St. Augustine calls the original sin. However, God also promised humans the possibility of regaining Eden in the form of Heaven after living a life of moral rectitude. The problem is we have Adam's will which means we are born with the propensity to sin. If we were born without this will, the admonition against disobedience to Adam and Eve would not have been necessary. Miller leaves us wondering what kind of will Rachel has if she cannot sin nor carries with her the original sin? An exploration of Rachel's relationship to God provides some ideas.

Rachel and God

Beginning with the spaceship thread, Miller turns the narrative over to God. God, through the Catholic Church (New Rome), orchestrates the second banishment of humanity, this time from Earth. Humans will no longer exist on the earth after the second Flame Deluge.

However, God directs Rachel, the dormant head of Mrs. Grales to emerge, not as a pitiful creature created from Augustine's "nothing," but from somewhere else, which means that she is most probably not a descendent of Adam and cannot sin, because if she could sin, she would be flawed just as Adam became.

As has been explained, Adam and all who follow him are born from Augustine's notion of "nothing." However, the Christ is the son of God and so is from God, but he takes on both human flesh and the sins of humanity. What can we say about Rachel? Through Abbot Zerchi's eyes we see the emergence of Rachel:

The image of those cool green eyes lingered with him as long as life. He did not ask why God would choose to raise up a creature of primal innocence from the shoulder of Mrs. Grales, or why God gave to it the preternatural gifts of Eden— those gifts which Man had been trying to seize by brute force again from Heaven since first he lost them. He had seen primal innocence in those eyes, and a promise of resurrection. One glimpse had been a bounty, and he wept in gratitude. (Miller, 336)

In Zerchi's view, Rachel is a third Adam (the second being Christ) who is given the gifts that God bestowed upon Adam and Eve in Eden. However, she is born into a living hell. The gifts given to Adam and Eve included immortality and freedom from want. While Miller gives us no help in this regard, the condition of her existence as a mutant gives us some license to consider that she no longer carries the "original sin" genes of Adam. Therefore, she could not be born with original sin. Recall that Rachel reject's Zerchi's offer to baptize her, which is not what Jesus did with John the Baptist. She is a different form of Adam than Christ. First, she is female and thereby upends the patriarchy of the Bible. Instead of accepting baptism, she offers the dying Zerchi his last rites. She has become a something different from the previous incarnations of Adam. She is born cognizant of the resurrection and its meaning to human believers like Zerchi, implying that in some respects, she is not unlike the Christ who understood the same. Rachel shows she has will, but also appears to be a servant of God, as was her predecessor Adam—Jesus. What mission God may have given her (beyond giving Zerchi last rites) and how she, like the two Adams before her, will use her will on this mission, we are not given any information. She is an anachronistic 'Adam' for whom Miller provides no further clues as to her nature or her future.

Rachel and Original Sin

Without original sin, we are left to wonder just what kind of creature Rachel can become. Rather than into the plenitude of Eden, she is born into a world that will not be free from want. The second Flame Deluge will likely kill most land life and much of sea life. Also, it is only Zerchi who sees the emergence of Rachel and when he dies, so does her narrative.

The science of epigenetics is beginning to understand that stress on parents can produce epigenetic changes in human children and the offspring of other life forms that may even be passed down from generation to generation. Augustine maintained that pride caused the fall, and therefore humans would carry this original sin forward because it was the nature of humanity to bear this burden. However, what I am suggesting is that when

Adam and Eve were dispatched from Eden, the contingent world produced stressors of existence that started epigenetic processes in motion. These epigenetic processes are not only towards helping children fight pathogens and survive drought, but they have also helped humanity develop the means for co-existence and perhaps even helped the emergence of moral institutions such as the Catholic Church.

Christ, the second Adam, is not the successor to humanity because he is of the divine and takes on human form and humanity's sins. However, the third "Adam", Rachel, is born perhaps not from the emptying of God into human flesh, but from God bringing about, through natural genetic mutation, a sentient creature who is born without sin—the successor to humans who have all but made themselves extinct.¹²

Rachel's Birth

Miller brings both biology (genetics) and theology into conversation at the end of the *Canticle* through Rachel. Mrs. Grales is not Mary, whom Aquinas had a difficult time classifying in a biological sense, leaving her to God to prepare for the conception and carrying to term the Christ child. Rather, Mrs. Grales's once dormant second head Rachel may become the successor to humanity, genetically different from those born from Adam and therefore not bearing the original sin. Evidence of this comes from her rejection of baptism because she does not need the rite to absolve her original sin, because she has come into being without original sin. In addition, perhaps the spark that is the *fomes* is no longer expressed in Rachel and we can argue that any "sin genetics" that are part of the human condition she no longer possesses. While God may have had a hand in her animation, I suggest that God did not mess with the human genome directly to do so. God presumably created the genetic process, but in the case of Rachel, God lets the process work on its own (even as humanity accelerates mutation through nuclear fallout) and this enables her birth out of the dereliction of Mrs. Grales, the creature from which she emerges. Even so, like Eve, God likely prepared her for her office (whatever that may be) in ways that we cannot ascertain.

The emergence of Rachel is jarring for many reasons. First, she is a grotesque creature, not unlike others who have continued to emerge after the first Flame Deluge. Second, she is born in the hour where, presumably, all human life will become extinct on earth in the midst of the second Flame Deluge. I suggest that Miller wanted a new Adam who would represent the emergence of a being who is other-than-human, but who is not the God-in-the-flesh, Son of God, who will attempt to lead humans out of sin—humans *will* become extinct on the earth. Alternatively, she, like Jesus, could die from the hand of humanity, perhaps within thirty or so minutes of her birth, compared to thirty or so years for Jesus. Or perhaps (because Miller does not tell us) her immortality permits her to endure like the shark that survives the second nuclear holocaust and continues to thrive after. Even if immortal, she is not equal to God and therefore must have been created from nothing. However, without original sin, she has not the pride to sin and end her immortality.

Whatever her fate, Rachel presents genetic dilemmas. To make this emergence of a new being, there should be a different genetic structure for both Mrs. Grales and Rachel. I have no other explanation for the two-headed creature other than they are conjoined twins. However, this is problematic because all conjoined twins are of the same sex and have identical chromosomes. Could the background radiation have so mutated Rachel's genes that she lost the ability to sin while not doing the same for her identical sister? Certainly, the direction and intensity of radiation can have different effects on one side of the body versus another. Perhaps both twins were born with genes that required little manipulation to alter their expression to no longer engender the *fomes* of sin. This may be possible, but in a fictional story, possibility can become certainty. Somehow, Rachel must have genetically evolved so as not to have the *fomes* of sin. More importantly, what I believe we can also take away from Miller's story is the notion that without the influence of humans and their genetically inherited *fomes* towards sin, Rachel (as a successor to humanity) can freely make use of epigenetic processes like those described by Ruse and Wilson. In other words, while she is no longer human (without sin), the remainder of her DNA did not change and therefore it is possible that she retains the capacity to use epigenetic rules inherited from her human predecessors. The question of whether she will also be immortal as was Eve in Eden, Miller lets us decide because he ends the story before we can see any more of her existence beyond her birth as Rachel.

Ark of Expatriates

Miller ends his story offering only bleak optimism for the future of Rachel and the world. However, he also sends technologically enabled humans who remain genetically armed with the *fomes* of sin, and who, at some future date, could return to earth and engender a third Flame Deluge. It is possible that the ark of expatriates could change their ways, embrace the teaching of Jesus, and begin a combined epigenetic and genetic journey towards the evolution of a humanoid creature who does not possess the genes that create the *fomes* of sin. Then again, if they remain humans, they may not.

Miller's Technology Dilemma

Humans in the *Canticle* learn the consequences of unrestrained technology. They have the historical Flame Deluge and generations of mutant creatures to demonstrate the consequence of not obeying the word "no." Yet they persist, and at the beginning of *Fiat Voluntas Tua* are like Adam and Eve, poised once again to fall. This time, it is not from Eden but from the earth itself, where likely all but a few who have escaped earth in the spaceship will perish. While incredulity about Adam's fall filled the heart of Augustine, the sheer absurdity of the coming Armageddon in *Fiat Voluntas Tua* vexes Abbot Zerchi. He says:

Listen, are we helpless? Are we doomed to do it again and again and again? Have we no choice but to play the Phoenix, in an unending sequence of rise and fall? Assyria, Babylon, Egypt, Greece, Carthage, Rome, the Empires of Charlemagne and the Turk. Ground to dust and plowed with salt. Spain, France, Britain, America—burned into the oblivion of the centuries. And again and again and again. Are we doomed to it,

Lord, chained to the pendulum of our own mad clockwork, helpless to halt its swing? (266-267)

Abbot Zerchi, after hearing the news broadcast of the likelihood of a second nuclear holocaust, ruminates about the perversity and pervasiveness of heritable sin:

That's where all of us are standing now, he thought. On the fat kindling of past sins. And some of them are mine. Mine, Adam's, Herod's, Judas's, Hannegan's, mine. Everybody's. Always culminates in the colossus of the State, somehow, drawing about itself the mantle of godhood, being struck down by the wrath of Heaven. (282)

With humanity on the verge of extinction, Miller could have let humanity go the way of the dinosaur. Yet, the dinosaur never went extinct because birds are their direct descendants, and small mammals survived the extinction event sixty-five million years ago to eventually evolve into humans. The small band of refugees from earth who are headed to a distant star will carry the original sin of Adam that follows all who are human, were created from Augustine's "nothing." Miller gives us no clue as to their fate, but he does not leave us with any good feeling that they can return to a time before the fall and let go of pride altogether.

Miller's pessimism counters Ruse and Wilson's optimism that we can epigenetically code morality and pass it down to future generations either in genetic form or through epigenetic rules. Augustine's original sin suggests a biological origin of sin, and both Miller and Aquinas see the *fomes* of sin as part of what it is to be human.

Concluding Thoughts

Miller brings religion and biology together in the long-running discourse on the human propensity to sin. He provides a vision of humanity that cannot help but travel down technological highways towards self-destruction. That whatever epigenetic rules that humans may have encoded are not very strong, in that they can be easily ignored. If we do possess epigenetically derived moral rules, we also possess the capability of sinning against those rules which is just what Augustine proclaimed was possible. While there is good in the world, there is also evil in the world that led to the original fall of Adam and Eve; that also led to the contingent human beings who not only can die but who also pass along the original sin to all future generations. The speculative implications are that the *fomes* of sin are a part of the human condition that cannot be eliminated, because they are part of our genetic code. While Augustine saw baptism and theological evidence for the existence of the Christ as necessary for ending original sin, he also understood that the *fomes* of sin might only be mitigated by faith. Such teaching fits with Ruse and Wilson's epigenetic rules that we have developed over many generations of human existence. What Miller offers in the *Canticle* is that neither epigenetic rules nor the Church and its beliefs are enough to overcome our propensity to sin, perhaps even to sin in such a way as to engender our own extinction. Rather, what may be necessary is a successor to humanity, which nature herself conceives, that is free from the *fomes* of sin—a Rachel. God has created nature who creates Rachel. God assists only with Rachel's emergence, in a similar fashion as Aquinas suggests God did when preparing Mary for her pregnancy with Jesus.

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Notes

¹ Jesus, son of God, took on the sins of humanity in order to save humanity. E.g. Peter 2:24, “Who his own self bear our sins in his own body on the tree, that we, being dead to sins, should live unto righteousness: by those stripes ye were healed.”

² The first two Adams being Adam and Christ, who is called the new Adam, or sometimes the second Adam, someone who, like Adam before the fall, is in the grace of God.

³ Genetic mutations can be random or not (Martincorena, Seshasayee, & Luscombe). In other instances, like blue or brown eyes, the right combination of genes from the mother and father are required to produce the recessive blue eye. Some early studies in genetic inheritance include (Darwin; Davenport and Davenport; Mendel, Corcos and Monaghan). Epigenetics, on the other hand does not involve changes in chromosomes, only the expression of individual genes.

⁴ For example, see Williams, 2002.

⁵ For details on gestation and epigenetics see Wang et al.

⁶ For example, “A major change in epigenetic thinking came from the realization that the environment has a profound effect on developmental plasticity, particularly with aging and susceptibility to common disease” (Longo and Feinberg, 1323). See also discussions in Stanner et al.; Veenendaal et al.

⁷ Evgenya Popova and Colin J. Barnstable explain, “Genes can be in one of several functional states: transcribed, poised for transcription, inactivated, and silenced” (93).

⁸ For more information on plant epigenetics see Boyko et al.; Slaughter et al.

⁹ Other studies associated with the Holocaust Warsaw Ghetto, the Dutch Famine of WWII, and the Siege of Leningrad have found generational and even intergenerational changes in offspring. See Stanner et al.; Veenendaal et al.

¹⁰ *Fomes* is a Latin word that means “that which can generate fire from a simple spark,” e.g., dry tinder.

¹¹ See *Genesis* 3, 1-3.

¹² While we can call her a third Adam, like Christ, she is not born from the seed of Adam. She is a new being; a new line.

