How DNA Reveals God's Design

DNA's Code: The Signature of God

by **Dr. Alan L. Gillen [http://answersingenesis.org/bios/alan-gillen/]** on April 25, 2024
Featured in ***Answers in Depth [http://answersingenesis.org/answers/in-depth/]***

Abstract

Codes are big in today's world: QR codes, barcodes, computer codes, cell phone codes, and more. Specific information is needed to identify, diagnose, and inform. DNA is the code for life: microbes, plants, parasites, animals, and man. DNA Day is April 25 because it was this day in history (April 25, 1953) when James Watson and Francis Crick described DNA as the double helix and the code for life. Although we consider DNA the genetic blueprint for life, it has only been known for 80 years. On February 1, 1944, Oswald Avery, Colin MacLeod, and Maclyn McCarty wrote a revolutionary paper about DNA as the transforming principle in *Streptococcus pneumoniae*, changing from harmless to pathogenic. Their fundamental discovery that DNA is the genetic material would eventually lead Watson and Crick to publish their landmark paper on the structure of DNA. This transformational discovery would eventually lead to biotechnology, an awesome skill.

Credit should go to operational science discoveries by man, but greater glory to God who created DNA.

Watson and Crick acknowledged that without Avery's lab and the Rosalind Franklin lab, they would not (80 years ago) have studied DNA (Watson 1968, 2012). Today, we use DNA to diagnose disease, discern ancestry, understand the genesis of germs, and use in biotechnology products. DNA codes are very informative. They also provide evidence of God's wisdom and craft. *DNA is, in a way, the signature of God*. It is simple in code (just four letters), complex in expression (genome), beautiful in embroidery form (histones), and majestic in expression (epigenetics). The information is used in microbes and man alike, so we can also better understand the genesis of germs. Mutations since the curse (Genesis 3) cause a loss of the original code and information, and DNA helps us understand the origin of many pathogens and parasites, but we can also use DNA which uses PCR codes to identify pathogens and parasites for the diagnosis of infectious diseases.

Introduction

Although deoxyribonucleic acid (DNA) was first described in 1869, it was not until the middle of the twentieth century, following the classic experiments of Frederick Griffith (1928), Oswald Avery (1944), and Alfred Hershey and Martha Chase (1952), that the mechanism of inheritance was confirmed to be based in DNA.[1] Finally, in 1953, Watson and Crick determined that "like begets like" and that DNA, the Creator's code of life, is found in the sequenced bases of DNA's double helix and its replicating ribosomes (Figure 1).[2]

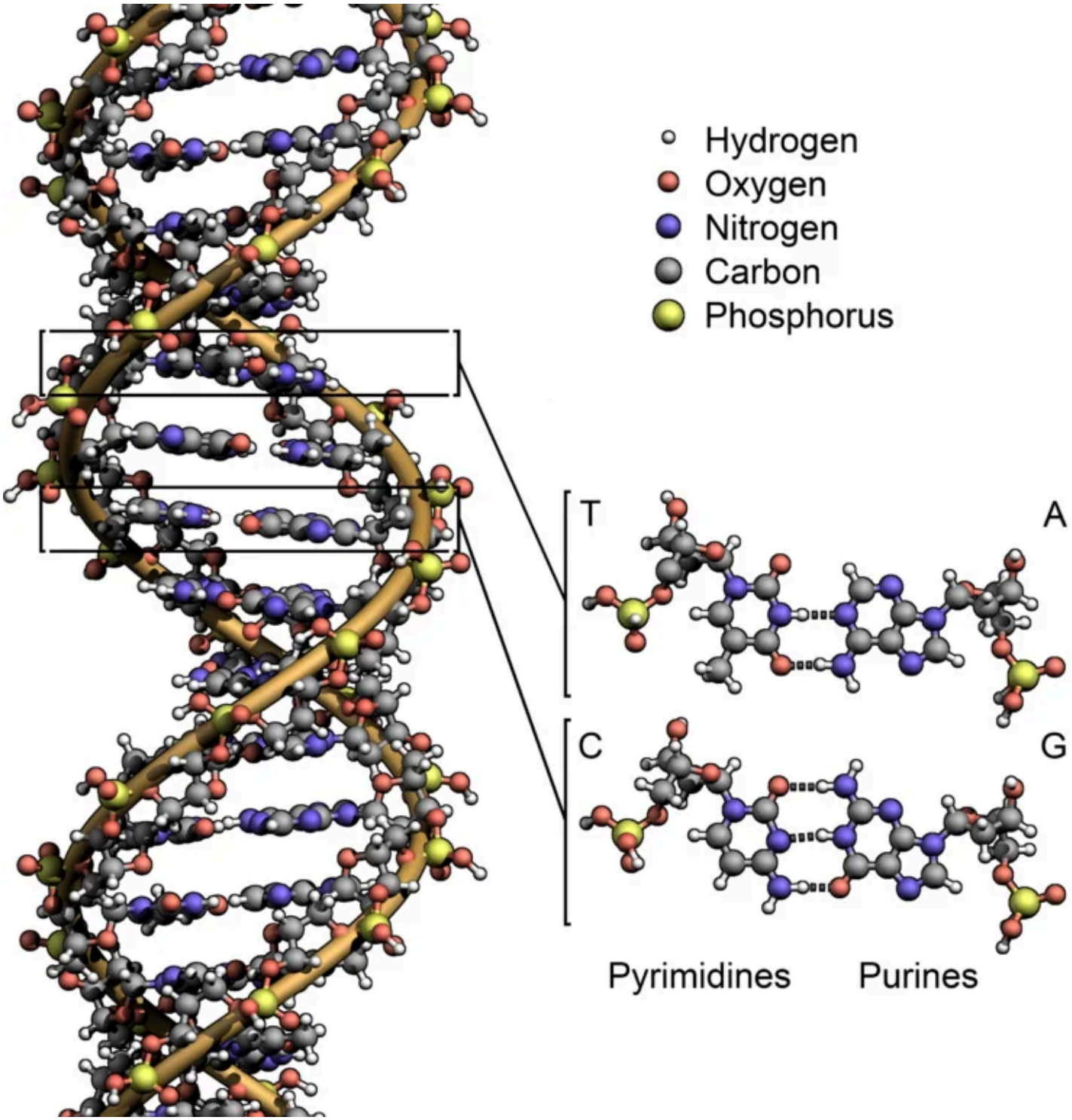


Figure 1. DNA double helix and its coding bases. **Zephyris**, **CC BY-SA 3.0**, via Wikimedia Commons.

DNA is a crafted chemical composed of a five-carbon sugar (deoxyribose), phosphate, and four nitrogen-containing, information bases. The purine bases are adenine (A) and guanine (G), and the pyrimidine bases are thymine (T) and cytosine (C) (Figure 1). If a ladder were twisted into a helix, keeping the steps perpendicular to the sides, the result would be a crude model of the DNA

molecule. The two sides of the ladder are made up of alternating sugar and phosphate molecules, and the steps of the ladder are the nitrogenous bases (often simply called "bases") (Figure 1). These elegant but simple codes are based on the Creator's blueprint of life and contain vast amounts of information.

Interwoven Complexity

We see parallels in Scripture, DNA, and in body design. Henry Morris (1995) says of Psalm 139:15, "Curiously wrought means embroidered, a striking description of the double-helical DNA molecule program which organizes part by part the beautiful structure of the whole infant." Gillen (2020a) explains that in Psalm 139:13 (KJV) "hast covered" implies "did weave." In this Psalm, David writes about structures (inward parts) that have been woven into the body by the Creator. In his song of praise to God, the psalmist beautifully pictures the weaving together of a human being. In Psalm 139:15–16, David would not have known how scientifically accurate his picture was. In ancient times, man had never heard of DNA, the helical and symmetrical molecules that are woven together to produce the blueprint of life. Yet with great accuracy, the psalmist depicts the skillful fabric of the human body.[3] This interwoven complexity, along with each life's intricacies, defies chance. The probability of **evolution [http://answersingenesis.org/evolution/]** occurring by mutations and natural selection is extremely close to zero, even given billions of years—an observation that points to a Creator. There must have been a Master Craftsman to weave such a beautiful fabric into each of the body systems. The complexity of living things is direct evidence against evolution. Because DNA has symmetry, purpose, exacting specifications, and high interdependence, then the most logical deduction is that the object has been made by an intelligent cause, a Master Bioengineer.

God Is in the Details of the DNA, the Double Helix, and Its Interwoven Design

The transforming agent, chemical data, and X-ray diffraction analysis described by Oswald Avery, Erin Chargaff, and Rosalind Franklin teams enabled Watson and Crick to propose a three-dimensional structure of the DNA molecule (Figure 1) that won the Nobel Prize. Two polynucleotide chains twisted around one another form a symmetric double-stranded helix in which each chain makes one complete turn every 3.4 nm. The bases are spaced 0.34 nm apart along each chain, so there are 10 bases per helical turn in each strand and, correspondingly, 10 base pairs per turn of the double helix. The helix is "right-handed," meaning each chain follows a clockwise path as it progresses. The bonds of the code, as all things, are held together by Christ (Colossians 1:17).

The genetic code is read in blocks of three. It is now known that genes are short sections of DNA. There are about 20–25,000 genes in the human genome, with about three billion base pairs in all. The genetic code, using only A, T, C, and G, encodes the sequence of nucleotides into all the information necessary for every trait. The alphabet is simple, but the expression is complex. In contrast, the number of genes in *Streptococcus pneumoniae* is 2,236 genes and 2.16 million base pairs of circular chromosomes (even this is fairly complex).

The Sugar-Coated Microbe's DNA Demonstrates That Code Changes Cause Disease

Streptococcus pneumoniae demonstrates that a change in codes causes disease (McCarty 1985). It is evidence of the molecule that causes a "genesis of germs." The history of transformation is important because ultimately, it demonstrates that DNA is the hereditary material. Without this evidence, there would have been little incentive for biologists later to elucidate its structure, which made way for major advances of the last half century. Frederick Griffith (an Anglican) discovered this transformation process in 1928 while attempting to develop a vaccine for pneumonia caused by the bacterium *Streptococcus pneumoniae*. Griffith was a bacteriologist in England, working in a laboratory where he isolated and typed the pneumococci from specimens from patients with pneumonia, and he had many strains of strep (McCarty 1985). Two important conclusions were

made: (1) bacterial pneumonia in mammals can be caused by a variety of strains of *S. pneumoniae*, and (2) some strains can synthesize a sugar-coated capsule around itself. This capsule enables the bacterium to cause disease by protecting the bacterium from the defense mechanisms of the infected animal. First, when he injected mice with a living R-strain of *Streptococcus pneumoniae* (nonencapsulated and nonvirulent), the mice remained "healthy," as was expected. Second, mice injected with a living S-strain (capsulated and virulent) died, also as expected (Fig. 2, 3). Third, if he first took the S-strain *Streptococcus pneumoniae* and heat-fixed the bacteria then injected these dead bacteria into mice, the mice remained alive—the application of heat kills these encapsulated cells, rendering them harmless when injected into mice. In a fourth experiment, he mixed the dead S-strain with the living R-strain, both of which would be harmless individually. When this combination was injected, though, the mice died. He concluded there must be a transforming factor that caused the sugar-coated microbe to change from harmless (R) to pathogenic (S) form since the *Streptococcus pneumoniae* was initially dead and could not come back to life. Therefore, dead S cells must give something to the living R-strain to restore the ability to withstand the immunological system of the mouse and thereby multiply and cause pneumonia. Furthermore, this acquired ability is inherited by the offspring of the transformed and changed bacteria (Dubos 1976; Gillen 2020b).

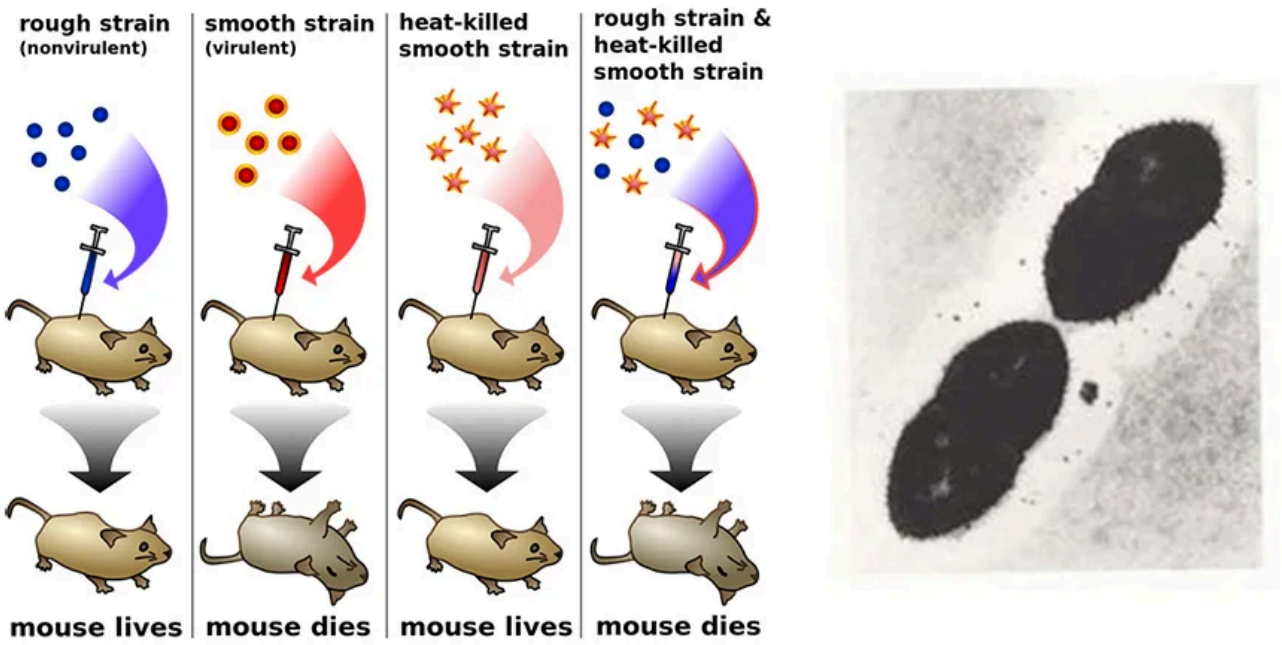


Figure 2. The transformation experiment and the sugar-coated microbe, *S. pneumoniae*. **Griffith experiment** by Madeleine Price Ball, CC0, via Wikimedia Commons. **Pneumococcus [http://resource.nlm.nih.gov/101584575X341]** by The Oswald T. Avery Collection via NLM Digital Collections.

Griffith's work revealed the importance of transformation (1928), stimulating Avery to start his work in the early 1930s (McCarty 1985). It would take about 13 years until the transforming factor would be confirmed as DNA and as a heat-stable substance. They had evidence in 1943, but it was published February 1, 1944. Studying transforming extracts, Oswald Avery (MD, American bacteriologist, and Baptist), Colin MacLeod (a Canadian geneticist), and Maclyn McCarty (an American medical doctor and chemist) purified DNA from S-strain cells. They found that adding small amounts of S cell DNA to growing cultures of R cells consistently resulted in the production of some transformed cells with the capsular polysaccharide characteristic of S-strain *Streptococcus pneumoniae*. DNA preparations from these transformed cells contained traces of protein and RNA, but the transforming activity was not altered by treatment with enzymes that degraded proteins or by treatment with ribonuclease (RNase, an enzyme that degrades RNA). Interestingly, the transforming activity was destroyed by treatment with enzymes that degrade DNA. Such experiments indicated that the genetic material was DNA. However, some of their experiments were considered crude (i.e., there may have been contaminants with the DNA).

Therefore, some doubt in the scientific community remained as to whether nucleic acids were genetic material (Dubos 1976). It would take more experimentation to confirm that DNA was the universal genetic material. McCarty would have some confirming evidence later in 1944–1950s as would Hattie Alexander, MD, at nearby Columbia University.

God Is in the Details of DNA Transformation

In the early 1940s, Avery and McCarty, a chemist and fellow doctor, studied pneumococcal transformation, in which "R-form" (nonvirulent) pneumococcus *Streptococcus pneumoniae* changed into the virulent "S-form" after killed S-form *Streptococcus pneumoniae* were added to the culture. The changed *Streptococcus pneumoniae* were identical in virulence and type to the killed sugar-coated microbe, *Streptococcus pneumoniae*, and the changes were permanent and heritable. Avery and McCarty then isolated active "transforming substance" from samples of pneumococci and found that the substance was deoxyribonucleic acid, or DNA.[4] They found it in 1943 and on February 1, 1944, published their discovery in the *Journal of Experimental Medicine*. They wrote that the phenomenon of transformation was "interpreted from a genetic point of view."[5] DNA was apparently able to transform bacteria by a code to change the strain from a harmless one to a deadly one. Most scientists were blind to Avery's discovery because the publication was not widely read by geneticists and bacteriologists of that period, and many were preoccupied with WWII. There was limited dissemination of their finding, few had scientific knowledge to appreciate their work, and limited funds were available to continue their scientific research. It was not until Watson and Crick noticed the publication, along with the supporting evidence of other repeats of the experiment and Hattie Alexander's work with *H. influenzae*, that scientists began to fully comprehend the importance of this work. McCarty continued efforts to prove that DNA was more than an inert chemical in the nucleus. He isolated a quantity of DNase from the pancreas cells of a cow. DNase is a biological catalyst, an enzyme that destroys DNA but has no effect on other molecules. The investigators mixed their transforming substance with DNase and noted that the mixture lost its ability to transform bacteria, concluding, "If the results of the present study on the chemical nature of the transforming principle are confirmed, then

nucleic acids must be regarded as possessing biological specificity."[6] Some initially questioned this conclusion, but others confirmed it, and soon Hattie Alexander would also demonstrate transformation in *Haemophilus influenzae*.

Clearly, Avery was the leader of the lab and had the idea of DNA being the transforming principle. In the early years, Avery and Macleod would make minor progress on the evidence, but Maclyn McCarty (known as "Mac") would do the hands-on work and was the chemist who made the proof possible. After Maclyn McCarty joined the lab, he carried out much of the biochemical work that followed, but the driving force behind the project was Avery. By 1942, they had shown that the transforming principle was active at 1 part per 100,000,000 and that it was affected by enzymes that attacked DNA.

The DNA history developed as more experiments took place (Watson 1968, 2012):

1. Crucial data from Erwin Chargaff (1948) indicated that the amount of guanine is the same as cytosine, as is the comparative amount of adenine and thymine (G = C and A = T).
2. The final confirmation that DNA was the material basis of heredity was reported by Alfred Hershey (microbiologist) and Martha Chase (microbiologist) in 1952. In these experiments, both the DNA of the virus (bacteriophage) and the protein coat were labeled, and it was confirmed that the DNA contained the code and the virulence factor for the reproduction of bacterial virus T2 in the bacterium *Escherichia coli* (*E. coli*).
3. X-ray diffraction photographs of DNA by Rosalind Franklin from the laboratory of Maurice Wilkins (1951–52) showed very symmetrical patterns, which almost certainly reflected the turns of a giant helix.

Stephen Meyer (2010) also discussed this period in ***Signature in the Cell***, where he reports that Chargaff saw the importance of Avery's work, DNA, language, "grammar," and the importance of sequence coding:

> *When Erwin Chargaff, of Columbia University, read Avery's paper, he immediately sensed its importance. He saw "**in dark contours the beginning of a grammar of biology**," he recounted. "Avery gave us the **first text of a new language or rather he showed us where to look for it.** I resolved to search for this text."*
>
> More important, Chargaff recognized that even for nucleic acids with the same proportion of the four bases (A, T, C, and G), "enormous" numbers of variations in sequence were possible. As he put it, different DNA molecules or parts of DNA molecules might "differ from each other . . . in **the sequence**, [though] not the proportion, of their constituents." (Meyer 2010, 68, emphasis added).

Then, in 1953, Watson and Crick determined the double helix structure of DNA. Thus, Avery played a critical role in early molecular biology.

Summary

This model made it easy to comprehend the role of DNA molecules as stable carriers of genetic information, the manner of their precise replication, and the probable nature of some kinds of mutations.

Five experiments—Griffith's transformation experiment, Avery's transforming factor experiment, Chargaff's data that all living things had the same four DNA bases, Hershey and Chase's "blender experiment" of T2 bacteriophage, and Rosalind Franklin's X-ray diffraction. Soon after these experiments, increased knowledge of DNA chemistry was used in proposing a physical structure for the DNA molecule until 1953, when Watson and Crick proposed the double helix. This model made it easy to comprehend the role of DNA molecules as stable carriers of genetic information, the manner of their precise replication, and the probable nature of some kinds of mutations. Despite a few exceptions, such as viruses, the knowledge that DNA is the genetic material has proven to be a powerful driving force for further research in molecular genetics.

We study DNA with the same methods and techniques because this code works in a parallel manner across species. This would strengthen the understanding of God as being the Creator of DNA as his signature. DNA has a specified and sequential complexity.

The mechanism by which genetic information is used to direct cellular function and to pass from one generation to another is embedded in the genome of each organism. The development of an understanding of which chemical is responsible can be followed by a survey of the history of research on proteins and DNA, culminating with the 1953 *Nature* report by Watson and Crick on the double helix of DNA. Subsequent clarification of the mechanism for replication and the genetic code led to the understanding of microbes, man, pathogens, and parasites. While the basic genetic code was determined to be consistently used across the range of organisms within all of **creation [http://answersingenesis.org/creation/]** , much of the work involved came through the study of viruses, bacteria, and parasites. It was revealed that bacteria are capable of being transformed, allowing the introduction of new genes from alternative sources. Consequently, the principal mechanisms by which DNA is assembled and utilized have been delineated. The evidence shows that DNA is highly organized, and its utilization is well-ordered, indicative of properties associated with design, because order is a property of craftsmanship, artistry, architecture, coding, language, "weaving/embroidery," not chance or negligence in nature. These attributes are predicted by the creation model. The discoveries over the years by man using operational science have been remarkable, yet the glory goes to **Jesus [http://answersingenesis.org/jesus/]** Christ who made and holds all things together (John 1:3; Colossians 1:17).

Genomic Codes and Understanding the Genesis of Germs and Parasites

We can also use the DNA codes of pathogens and parasites for the diagnosis of infectious diseases. Just like QR, barcodes, and computer codes are used today to scan specific information in the lay world, the genetic DNA or RNA code can tell biologists and medical workers the

pathogen or parasite in blood, urine, tissue, or body sample. Codes are precise: in computers, QR codes, and artificial intelligence, if they malfunction, they cause inconvenience. In the microbe and mankind's DNA world, the consequences are deadly. In addition, DNA genomics and DNA loss help us understand the origin of parasitism, such as brain-eating amoeba (Gillen 2019). It helps us with diagnostics of pathogenic loss of information. The change in coding, really a loss of information, appears to explain a free-living amoeba (and non-pathogen) emerging into an amoeba that today is called the brain-eating amoeba. I have discussed *The Genesis of Germs* in a book of that name (Gillen 2020) along with many examples there and in this online publication. Genomic codes help us to understand the genesis of germs and parasites, including pneumonia, plague, leprosy, the brain-eating amoeba, and malaria. Information is lost, and the original information is modified. Because health is often dependent on DNA information, the sequential and specified complexity that changes results in pathogens and parasites that were not part of **God [http://answersingenesis.org/god/]** 's very good creation that has been marred by man's **sin [http://answersingenesis.org/sin/]** and rejection of his Creator. The believer can look forward to a future where there will be an exodus of germs, instead of a genesis of germs, thanks to God.

References

Avery, O. T., MacLeod, C. M., and M. McCarty. 1944. "Studies on the Chemical Nature of the substance Inducing Transformation of Pneumococcal Types: Induction of Transformation by a Desoxyribosenucleic Acid Fraction Isolated from Pneumococcus Type III." *Journal of Experimental Medicine* 79, no. 2 (February): 137–158. **https://doi.org/10.1084/jem.79.2.137**.

McCarty, M. 1985. *The Transforming Principle: Discovering that Genes Are Made of DNA* London:

About the Author

Norton.

Dubos, R. J. 1976. *The Professor, the Institute and DNA*. New York: Rockefeller University Press.

Gillen, A. L. 2020a. *Body by Design: Fearfully & Wonderfully Made*. 6th printing. Green Forest, AR: Master Books.

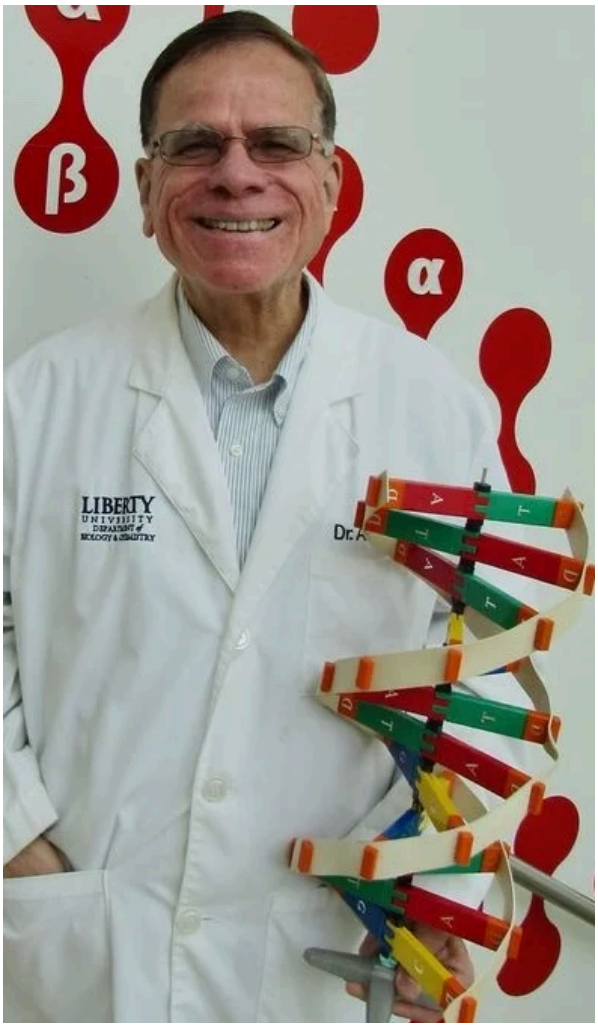
Gillen, A. L. 2020b. *The Genesis of Germs: Disease and the Coming Plagues in a Fallen World Rev. ed.* Green Forest, AR: Master Books.

Gillen, A. L., Augusta, J., and K. Schneckenburger. 2019. "The Genesis of the 'Brain-Eating' Amoeba." June 19, 2019. **https://answersingenesis.org/biology/microbiology/the-genesis-of-brain-eating-amoeba/ [http://answersingenesis.org/biology/microbiology/the-genesis-of-brain-eating-amoeba/]** .

Meyer, Stephen C. 2009. *Signature in the Cell: DNA and the Evidence for Intelligent Design*. San Francisco: HarperOne.

Morris, Henry. 1995. *The Defender's Study Bible*. Green Forest, AR: Master Books.

Watson, J. D. 1968. *The Double Helix: A Personal Account of the Discovery of the Structure of DNA.* New York: Atheneum.



Dr. Alan Gillen is a Professor of Biology at Liberty University. Image credit: Sarah Streetman

Watson, J. 2012. *The New Annotated and Illustrated Edition of The Double Helix*. New York: Simon & Schuster.

Jobs at Answers in Genesis

Explore a wide variety of seasonal, full-time career opportunities at the Ark Encounter, Answers in Genesis, and the Creation Museum.

JOB OPENINGS

Answers in Depth

2024 Volume 19

[http://answersingenesis.org/answers/in-depth/v19/]

Footnotes

1. "Studies on the Chemical Nature of the Substance Inducing Transformation of Pneumococcal Types: Induction of Transformation by a Desoxyribonucleic Acid Fraction Isolated from Pneumococcus Type III" was published February 1, 1944. This year was the 80th anniversary of this publication by Avery, McCleod, and McCarty giving the first proof that genes are made of DNA. Avery was a Baptist (whose father was greatly influenced by Spurgeon). Dr. Oswald Avery became a bacteriologist and medical doctor instead of a preacher because he felt called to cure people of pneumonia. Instead, he found DNA as the hereditary molecule for life in his sugar-coated microbe (*Streptococcus pneumonia*). Of course, credit goes also to "Mac" Maclyn McCarty because he is the one who actually did the chemistry to make the experiment work. Watson and Crick, as well as Rosalind Franklin, based their study on his work. They got more "press," but he did the quiet foundational work 80 years ago. Fredrick Griffith was an Anglican/Episcopalian. They had a reserved temperament who rarely shared their inner thoughts, except to those closest to them. They are the unsung heroes of the DNA discovery as the genetic material of life.

2. In April 1953, James Watson and Francis Crick wrote, "This structure has novel features which are of considerable biological interest" as part of the opening paragraph in their *Nature* magazine article that first described the structure of DNA. In this surprisingly brief article, Watson and Crick shook the biological world by describing in accurate detail much of the structure and function of DNA, also noting, "It has not escaped our notice that the specific base paring we have postulated immediately suggests a possible copying mechanism for the genetic material." From James D.Watson and Francis H.C. Crick, "Molecular Structure of Nucleic Acids: A Structure for Deoxyribose Nucleic Acid," *Nature* 171, no. 4356 (1953): 737–738.
3. Alan Gillen, *Body by Design (*Green Forest, AR: Master Books, 2006), 6.
4. National Library of Medicine, "Oswald T. Avery—Profiles in Science," Biographical Overview, National Library of Medicine, accessed March 8, 2024, https://www.profiles.nlm.nih.gov/spotlight/cc/feature/biographical-overview.
5. National Library of Medicine, "Oswald T. Avery," 2024.
6. National Library of Medicine, "Oswald T. Avery," 2024.

Support the creation/gospel message by donating or getting involved!