

The Relevance of Modern Genetic Concepts to the Al-Qur'an: DNA Analysis and Human Creation According to the Ministry of Religion's Scientific Interpretation

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Abstract: The intersection of modern genetics and Islamic theology is a burgeoning field of inquiry. This study delves into how technological advancements, especially in genetics, complement the teachings of the Al-Qur'an. Modern genetics, which traces its origins to Gregor Mendel's pioneering work on heredity, provides a scientific framework for understanding the transmission of genetic information across generations. Contrary to the view that science and religion are mutually exclusive, this research, supported by the Ministry of Religion through the scientific interpretation found in Tafsir Ilmi Kemenag, demonstrates their potential synergy. It particularly focuses on Quranic verses that align with genetic principles, such as the developmental stages of a human embryo detailed in Surahs Ar-Rahman, Al-Insan, As-Sajadah, Al-Mu'min, and Al-Hajj. These verses metaphorically describe the embryonic stages that echo modern genetic descriptions of DNA's role in human development. Our findings illustrate that the Quran anticipates certain modern scientific discoveries, offering a unique blend of scriptural interpretation and empirical science to bridge the gap between faith and rational inquiry.

Keywords: *Al-Qur'an, Scientific Tafsir, DNA, Human Development*

Abstrak: Pertemuan antara genetika modern dan teologi Islam merupakan bidang penyelidikan yang berkembang. Penelitian ini mengeksplorasi bagaimana kemajuan teknologi, khususnya dalam genetika, melengkapi ajaran Al-Qur'an. Genetika modern, yang berakar pada pekerjaan perintis Gregor Mendel tentang pewarisan, menyediakan kerangka ilmiah untuk memahami transmisi informasi genetik lintas generasi. Bertentangan dengan pandangan bahwa sains dan agama adalah dua entitas yang tidak dapat disatukan, penelitian ini, yang didukung oleh Kementerian Agama melalui interpretasi ilmiah yang ditemukan dalam Tafsir Ilmi Kemenag, menunjukkan potensi sinergi mereka. Khususnya, fokus pada ayat-ayat Al-Qur'an yang sejalan dengan prinsip-prinsip genetika, seperti tahapan perkembangan embrio manusia yang diuraikan dalam Surah Ar-Rahman, Al-Insan, As-Sajadah, Al-Mu'min, dan Al-Hajj. Ayat-ayat ini secara metaforis menggambarkan tahapan embrio yang mencerminkan deskripsi genetika modern tentang peran DNA dalam perkembangan manusia. Temuan kami menunjukkan bahwa Al-Qur'an mengantisipasi beberapa penemuan ilmiah modern, menawarkan gabungan unik antara interpretasi kitab suci dan sains empiris untuk menjembatani kesenjangan antara keimanan dan penyelidikan rasional.

Kata Kunci: *Al-Qur'an, Tafsir Ilmiah, DNA, Perkembangan Manusia*

Introduction

The modern understanding of genetics began with Gregor Mendel's discovery of introducing a gene or genetic units that could be passed from one generation to the next, bringing with it the ability to pass on specific traits. Genes can inherit various aspects, such as physical traits, structure, function, and biological characteristics. Fundamental biological processes occur within cells through metabolism, the basis of life. The concept of genetics has developed from the study of heredity into a broader discipline, covering aspects such as genetic structure, genetic reproduction, genetic function, and genetic changes including mutation and recombination. Additionally, genetics also includes the study of genetic populations and the use of genetic engineering in the manipulation of genetic material.¹

Current technological advances allow scientific researchers to conduct genetic engineering based on Darwin's theory of evolution. However, this genetic engineering process is still a subject of debate, even among scientists themselves. Genetic engineering has recently attracted severe attention from the government and scientists.² In this context, Muslim scientists have diverse viewpoints on modern science. First, some groups believe that modern science is universal, neutral, and that all scientific discoveries can be found in the Qur'an. Second, some groups seek to build scientific communities in Islamic countries, believing that science, once within an Islamic society, can be directed to meet Islamic needs and principles. Third, a group wants to develop a new paradigm in Islamic epistemology, which includes the knowledge and behavioral paradigms. This knowledge paradigm emphasizes vital Islamic principles, concepts, and values related to exploration in a particular field, while the behavioral paradigm establishes ethical boundaries within which scientists can act freely. Some groups argue that religion and science are two things that can not be combined and religion does not force science to submit to religion. The world of science has the opportunity to experience development and change; if it continues to be linked to the Qur'an, then only conformity will occur.³

The connection between science and the Qur'an will not reduce the quality. On the contrary, the two will complement each other because Islamic religious knowledge

¹ Ainatul Nadila, Siti Aisah, and Miftahul Rahmah, "Keterkaitan Genetika Menurut Al-Qur'an Terhadap Pembelajaran Biologi" 7, no. 1 (2024): Hal. 17.

² Nadila, Aisah, and Rahmah.

³ Geterudis Kerans, "Kemajuan Teknologi Rekayasa Genetika Ditinjau Dari Filsafat Evolusi Darwin," *Jurnal Filsafat Indonesia* 5, no. 2 (2022): Hal 4.

essentially does not conflict with scientific knowledge. It is the basis for science. Therefore, strengthening spiritual values is hoped to pave the way for resolving the gap between science and religion.⁴

So, modern genetics has become an essential cornerstone in understanding living organisms' biological inheritance and development. Since the discovery of DNA structure by James Watson and Francis Crick in 1953, genetics has advanced rapidly, revealing many mysteries about inheritance, evolution, and the role of genes in the development of organisms. Meanwhile, the Qur'an, as the primary source of teachings in Islam, presents in-depth perspectives on the creation of humans and their relationship with the creation of the universe as a whole.⁵

The Qur'an presents an in-depth view of human creation and the role of Allah SWT in creating the universe. Various verses in the Qur'an describe the creation of humans from different elements, including earth (QS. Al-Mu'minun: 12-14), water (QS. Al-Insan: 2), and feces (QS. Ar-Rahman: 14). The Qur'an also confirms that humans were created in a perfect form (QS. At-Tin: 4) and were given the responsibility of being caliphs on earth (QS. Al-Baqarah: 30). The Qur'an's view of human creation also highlights the perfection of design and purpose of creation, as well as the relationship between humans and their creator. In Islamic understanding, humans are considered extraordinary creatures, endowed with reason and the ability to think, and have moral and spiritual responsibilities.⁶

Modern genetic concepts, especially DNA, have exciting relevance to the Qur'an regarding the creation of humans. Although the Qur'an does not directly mention DNA, this concept can be considered as a manifestation of Allah SWT in creating living creatures. The complex structure of DNA, which carries genetic information about the inheritance of traits, is in line with the Qur'an's view of the perfection of design and the purpose of creation.⁷

⁴ Nadila, Aisah, and Rahmah, "Keterkaitan Genetika Menurut Al-Qur'an Terhadap Pembelajaran Biologi."

⁵ Lusiana Narsia Amsad, "Tinjauan Penalaran Ilmiah Pada Penemuan-Penemuan Sains Yang Tak Disengaja (Serendipity)," *Jurnal Filsafat Indonesia* 2, no. 1 (2019): Hal 15.

⁶ Muhammad Khoiruddin and Khusniyatu Zulaikha, "Harmonisasi Keterkaitan Proses Pembentukan Pewarisan Sifat Manusia Berdasarkan Perspektif Islam Dan Sains Modern," *Prosiding Konferensi Integrasi Interkoneksi Islam Dan Sains* 2, no. 1 (2020): hal 3-4.

⁷ Nadila, Aisah, and Rahmah, "Keterkaitan Genetika Menurut Al-Qur'an Terhadap Pembelajaran Biologi."

Several previous studies have examined the relationship between understanding the Qur'an and scientific concepts. Research conducted by Fitriani, et al. in 2021, entitled "The Process of Human Creation from the Al-Qur'an Perspective and Its Contextualization with Science: Reproductive Health Studies," shows that the process of human creation described in the Al-Qur'an follows phases in science, such as gametogenesis, evolution, implantation, and other stages up to childbirth.⁸ Another research conducted by Intan Purnama Sari in 2020, with the title "Human DNA in the Perspective of the Al-Qur'an," found that the factors that cause DNA similarities between individuals based on the Al-Qur'an can be related to family relationships and marriage, which forms ties of kinship.⁹ Furthermore, research by Yacintha Pertiwi and Moch. Iqbal in 2022, with the title "Genetic Engineering in the Integration of Islam and Modern Science", highlighted the importance of eliminating the dichotomy between science and religion. They emphasized that the excellence of science and religious spirituality must be integrated, especially in the use of technology such as cloning and organ transplantation, which must comply with applicable religious provisions.¹⁰ From the results of this research, it can be concluded that understanding the Qur'an and science can complement each other, opening up space for harmonious integration between the two fields, and leading to a deeper and more holistic understanding of the universe and human life.

This research is categorized as qualitative research through library research, so data collection uses library research with a religious and scientific approach. Data was obtained through the Tafsir Book, Al-Qur'an, books, journals, and related articles. The data collected is qualitative, originating from *Maudhu'i's* interpretation, which discusses a particular problem. By reviewing the Ministry of Religion's scientific interpretations, we can better understand how modern genetic concepts, such as DNA structure and the inheritance of traits, fit into Al-Qur'an. With this approach, modern genetics can be seen as a tool for understanding the creator's greatness, while the Qur'an remains a spiritual and moral guide for humanity. The relevance of modern genetic concepts to the Qur'an:

⁸ Fitriani Fitriani et al., "Proses Penciptaan Manusia Perspektif Al-Qur'an Dan Kontekstualitasnya Dengan Ilmu Pengetahuan Sains: Kajian Kesehatan Reproduksi," *Jurnal Riset Agama* 1, no. 3 (2021): 30–44, <https://doi.org/10.15575/jra.v1i3.15120>.

⁹ Intan Purnama Sari, "Dna Manusia Dalam Prespektif Al-Qur'an," 2020.

¹⁰ Yacintha Pertiwi, "Rekayasa Genetika Dalam Integrasi Islam Dan Sains Modern," *Jurnal Pendidikan Dan Studi Islam* 8, no. 2 (2022): 807–25, <https://doi.org/10.31943/jurnalrisalah.v8i2.279>.

DNA Analysis and the creation of Humans from the Ministry of Religion's Scientific Interpretation Perspective is a fascinating subject for further research and understanding. A scientific interpretation approach by the Ministry of Religion can bridge the gap between religion and science. Thus, a deeper understanding of modern genetic concepts can open the door to spiritual reflection and strengthening of faith in the Islamic worldview.

Result and Discussion

The history of the thematic Tafsir of the Qur'an from the Ministry of Religion cannot be separated from the dynamics of religious life in Indonesia. As the highest authority, the government is responsible for creating a harmonious and peaceful atmosphere of spiritual life in Indonesia. The development of scientific interpretation cannot be separated from the progress of science in the Islamic scientific tradition, which reached its peak during the Umayyad and Abbasid dynasties.¹¹

The Ministry of Religion's scientific Tafsir is the result of collaboration between Qur'an interpretation and modern science, which was initiated by the Ministry of Religion of the Republic of Indonesia through the Research and Development and Training Sector in collaboration with Lajnah Pentashihan Mushaf Al-Qur'an (LPMA) and the Indonesian Institute of Science (LIPI). This work can be considered the first initiative from the Indonesian government in the field of interpretation that adopts a scientific approach.¹²

Apart from using a scientific approach, Tafsir Ilmi also used the thematic method (*maudhu'*) by choosing several themes relevant to interpreting the Qur'an and science. Mustafa Muslim notes that Tafsir Ilmu appears to follow a thematic variant of tafsir by exploring the themes presented in the Qur'an. The Ilmi Tafsir Project began in 2009 and produced 10 crucial themes related to the Qur'an and science, published the following year. This project continued to develop, and in 2015, Lajnah Pentashihan Mushaf Al-Quran published sixteen works in the context of Tafsir Ilmi.¹³

¹¹ Abdul Hakim, Akhmad Supriadi, and Nor Faridatunnisa, "Analisis Surah Al-Baqarah Ayat 233: Studi Tafsir Ilmi Dan Tafsir Tematik Kementerian Agama," *Syams: Jurnal Kajian Keislaman* 3, no. 1 (2022): 26–34, <https://doi.org/10.23971/js.v3i1.4623>. Hal 28

¹² Faizin Faizin, "Integrasi Agama Dan Sains Dalam Tafsir Ilmi Kementerian Agama RI," *Jurnal Ushuluddin* 25, no. 1 (2017): 19, <https://doi.org/10.24014/jush.v25i1.2560>. Hal 24-25

¹³ Putri Maydi Arofatur Anhar, "Tafsir Ilmi: Studi Metode Penafsiran Berbasis Ilmu Pengetahuan Pada Tafsir Kemenag," *Prosiding Konferensi Integrasi Interkoneksi Islam Dan Sains* 1, no. September (2018): 109–13. Hal 111

The method applied in this study is similar to that used in thematic tafsir, where verses relating to an issue are collected and analyzed to find a comprehensive understanding of the Qur'an regarding the issue. However, there are unique differences between the thematic interpretation currently being developed by the Ministry of Religion and scientific interpretation. The thematic interpretation being developed by the Ministry of Religion places greater emphasis on *aqidah* (belief), *akhlak* (morals), *ibadah* (worship), and social issues. In contrast, scientific interpretation focuses more on scientific studies of verses relating to natural phenomena. Thus, scientific tafsir explores the relationship between verses of the Koran and scientific knowledge about the universe and natural phenomena, while thematic tafsir developed by the Ministry of Religion highlights religious and moral aspects.¹⁴

As part of efforts to increase understanding, appreciation, and practice of the Qur'an in community, national and state life, Lajnah Pentashihan Mushaf Al-Qur'an from the Research and Development and Training Agency of the Ministry of Religion of the Republic of Indonesia began activities for preparing scientific interpretations in 20019. Tafsir Ilmi is the study of verses from the Koran relating to natural phenomena. This activity aims to explore the relationship between the verses of the Qur'an and scientific knowledge about the universe and natural phenomena. Substantially, Genetic material is responsible for the genetic information system or inheritance of traits and contains biological information that regulates genetic function. This includes storing genetic information accurately in the inheritance of traits and controlling organisms (phenotypic function/gene expression). Based on Mendelian concepts, genes are considered basic units that influence phenotypic characteristics. After discovering that genes are located in chromosomes consisting of protein and DNA, debate arose regarding the genetic material. Now, we know that DNA, as a nucleic acid, is the genetic material that carries biological information, replacing the previous view proteins were responsible for carrying information.¹⁵

Genetics aims to explain the material that carries information that can be inherited, called genetic material. This includes how the information is expressed, known as genetic

¹⁴ Ahmad Muttaqin, "KONSTRUKSI TAFSIR ILMI KEMENAG RI-LIPI: Melacak Unsur Kepentingan Pemerintah Dalam Tafsir," *Religia* 19, no. 2 (2017): 74, <https://doi.org/10.28918/religia.v19i2.751>. Hal 4-5

¹⁵ Yonny Koentjoro, "Struktur Bahan Genetik , Mekanisme Dan Regulasi Program Doktor Ilmu Pertanian," *Jurnal Ilmu Pertanian*, 2015. Hal 4

expression, and how the information is transferred from one individual to another, known as genetic inheritance. If we study the human genetic code, we will find that all individuals inherit characteristics whose accumulated genetic code originates from the Prophet Adam. The levels and variations in this character are following the knowledge, wisdom, power, and guidance of Allah SWT.¹⁶

In the Qur'an, the study of genetic science has been described through verses taken from tafsir books. Many study results from tafsir books discuss the science of genetics. Genes are known to be composed of nucleotides that form long sequences that code for several types of proteins, and each gene has a partner on its homologous chromosome. Information about this pairing as God's creation can be found explicitly in the Qur'an. Allah SWT says in Surah Al-Zariyat (51):49, which means: "*You remember the greatness of Allah, and We created everything in pairs so that you remember the greatness of Allah.*" This verse reminds humans of the power and glory of Allah SWT, which is reflected in the harmony of His creatures. In this way, humans can recognize the presence of God in all aspects of His creation, confirming that He is real and can be found everywhere.¹⁷

Allah mentions genetic matters in the Koran Surah Abasa (80):18-20, which means: "*(didn't he think about) what Allah created him from? From a drop of semen, He created him, then determined him, then his path was made easier.*" In the context of genetics, the mention of the creation of humans from semen in the Qur'an follows knowledge about human fertilization. Apart from that, the word "*qaddarahu*" which is interpreted as "completed condition," can be understood as the process of regulating and determining human nature by Allah SWT, including determining the genetic characteristics that shape an individual's uniqueness and ability to understand and make decisions in life.

Thus, although the Qur'an does not explicitly discuss the concept of modern genetics, some verses can be interpreted according to scientific knowledge about biological processes, including the creation of humans. This shows the harmony between religious teachings and the discoveries of modern science.

¹⁶ Khoiruddin and Zulaikha, "Harmonisasi Keterkaitan Proses Pembentukan Pewarisan Sifat Manusia Berdasarkan Perspektif Islam Dan Sains Modern." Hal 4-5

¹⁷ Nadila, Aisah, and Rahmah, "Keterkaitan Genetika Menurut Al-Qur'an Terhadap Pembelajaran Biologi." Hal 4

Deoxyribo Nucleic Acid, commonly known as DNA, is a nucleic acid that stores all genetic information. DNA is a very important compound because it carries genetic information that can be passed on from generation to generation, determining particular human traits such as hair type and skin color. If compared to a body, DNA is likened to the part of the brain that regulates every process in the body. According to Aisjah Girindra, DNA has the task of storing and transferring genetic information and then translating that information.¹⁸ In the reproduction process, DNA replicates, and the results are transferred into tiny particles that spread into cells, whether into complex cells or eukaryotic cells found in plants, animals, or other multi-celled organisms. DNA has a macromolecular chemical structure consisting of a pentose sugar, nitrogen bases, and phosphoric acid, most of which are found in the nucleus, which will then regulate the next hereditary program.¹⁹

DNA is found in cells. The largest part of DNA is in the nucleus, especially chromosomes. Cells are the most minor units of life that cannot be divided. Cells also act as micro-factories that can receive carbohydrates, fats, amino acids, and minerals, which are then processed, and the results of his process are used as ingredients for life. In the results of research conducted by Meischer, it was found that many substances found in the cell nucleus were later named nuclein and then changed to nucleic acids. Nucleic acids are found in almost all living cells. It stores and transfers genetic information.²⁰ In the chromosomes of the cell nucleus, there is DNA that has the form of a double strand, or what is known as a double helix. When the division of the cell nucleus occurs, the chromosomes and DNA molecules also divide. Apart from chromosomes, DNA is also found in mitochondria and cytoplasm, but at lower levels than in chromosomes.²¹

Humans have 23 pairs of chromosomes, a total of 46 chromosomes. Of these pairs, 22 chromosomes are called autosomes, while the last pair is the sex chromosomes. In women, the sex chromosome pair is XX, while in men, the pair is XY. Both parents have

¹⁸ Ali Muhtarom, "INTEGRASI SAINS DAN AGAMA (Kontribusi Teknolgi DNA (Deoxyribo Nucleic Acid) Dalam Perkembangan Hukum Islam)," *El-Wasathiya: Jurnal Studi Agama* 1, no. 1 (2013): 92–111.

¹⁹ M. Tamimi, "Tes DNA Dalam Menetapkan Hubungan Nasab," *Istinbath: Jurnal Hukum Islam IAIN Mataram* 13, no. 1 (2014): 83–98.

²⁰ Fitriani et al., "Proses Penciptaan Manusia Perspektif Al-Qur'an Dan Kontekstualitasnya Dengan Ilmu Pengetahuan Sains: Kajian Kesehatan Reproduksi."

²¹ Ali Muhtarom, *TES DNA (DEOXIRYBO NUCLEIC ACID) SEBAGAI ALAT BUKTI HUBUNGAN NASAB DALAM PERSPEKTIF HUKUM ISLAM SKRIPSI*, n.d.

reproductive cells, sperm in the father and ovum in the mother. Sperm and ova contain half the number of chromosomes, namely 23 pairs or 46 chromosomes. Thus, a person inherits half of their genetics from each parent because each reproductive cell only carries half the complete number of chromosomes.²²

In chromosomes, some genes contain the genetic code. The discovery that made a significant contribution to the world of science in understanding the structure of DNA was the discovery of the double helix structure of DNA by scientists Watson and Crick. DNA is shaped like a double chain and twisted together called a double helix. In a polynucleotide DNA chain, each polynucleotide consists of deoxyribose sugar, nitrogen base, and phosphate. The nitrogen bases in DNA are purines, which consist of adenine and guanine, and then pyrimidines, which consist of thymine and cytosine.²³ Purines and pyrimidines will pair with each other and be connected by hydrogen bonds. Adenine always pairs with thymine, while guanine always pairs with cytosine. The pair cannot be swapped. Every human being has this basic structure, meaning that each person gets the inherited characteristics accumulated in the genetic code of Prophet Adam to a certain degree following the knowledge, power, and guidance of Allah.²⁴

Every human individual has unique traits and characteristics in inheritance, both physically visible and invisible. The invisible qualities in the body include reason, soul, health, etc. Evidence of a scientific miracle in the creation of humans is that Allah created part of DNA in the form of a helical coil, which has a double wall structure and gaps between them. Each gap complements each other and forms a double-walled helical sheet that is neatly arranged and structured.²⁵ When fertilization occurs between reproductive cells, namely ovum and sperm, the chromosomes will become complete, namely 46 chromosomes or 23 pairs. After fertilization, gametes will form, and inherited characteristics will begin to form, both visible and invisible. These traits will likely appear in the next generation.²⁶ As mentioned in the Qur'an:

²² Dadan Rosana, "Struktur Dan Fungsi DNA Dan RNA," *Biofisika*, 2012, 16–17.

²³ Muhtarom, *TES DNA (DEOXYRIBO NUCLEIC ACID) SEBAGAI ALAT BUKTI HUBUNGAN NASAB DALAM PERSPEKTIF HUKUM ISLAM SKRIPSI*.

²⁴ Khoiruddin and Zulaikha, "Harmonisasi Keterkaitan Proses Pembentukan Pewarisan Sifat Manusia Berdasarkan Perspektif Islam Dan Sains Modern."

²⁵ (Kementrian Agama RI, Tafsir Ilmi: Penciptaan Manusia dalam Perspektif Al Qur'an dan Sains (Jakarta: Kementrian Agama RI, 2012) : 94-106

²⁶ Ahmad Fadly Rahman Akbar et al., "Nafs Wahidah Dalam Al-Qur'an Al-Karim Menurut Zaghulul Raghil Muhammad An-Najjar," *Zad Al-Mufassirin: Jurnal Ilmu Al-Qur'an & Tafsir* 5, no. 1 (2023): 60–77, <https://doi.org/10.55759/ZAM.V5I1.70>.

خَلَقَ الْإِنْسَانَ مِنْ صَلْصَالٍ كَالْفَخَّارِ

Meaning: “*He has created man from dry land like pottery*” (Q.S. Ar-Rahman: 14)

The Ministry of Religion’s Scientific Tafsir explains that pottery is like porcelain, which when in a chemical reaction process, is used as a catalyst for the polymerization process to occur. Polymerization is the reaction of elongating the molecular chain from amino acids to proteins or from nucleotides, including DNA, which is a constituent of the genes of living things. In the next stage, the earliest molecules of life enter the structure of the most superficial cells formed from oil.²⁷ As also explained in the Qur’an:

أَوَلَا يَذْكُرُ الْإِنْسَانُ أَنَا خَلَقْنَاهُ مِنْ قَبْلُ وَلَمْ يَكْ شَيْئًا

Meaning: “*Does man not realize that we have created him before, even though previously he had no form at all?*” (Q.S. Maryam: 67)

This verse suggests that the form of monocellular living things or pre-life forms is like protein molecules or DNA. These monocellular creatures then gradually developed into multicellular creatures. Genetic material is vital for life because life can inherit characteristics and cell division. The cell membrane is the main part where physiological processes occur. This membrane will protect the cell's contents in the form of chemical material to carry out chemical reactions and protect genetic material. Therefore, genetic material and cell membranes are two essential components that must be present at the beginning of life. In both materials, many materials are found that are the same as clay. These findings were proven by research on *montmorillonite clay*. This type of clay can quickly stimulate the formation of fluid-filled membrane sacs. The fluid contained in the membrane sac is also stored in the clay. The sac can grow by simple division. The existence of membranes is vital to successful physiology in cells because of their role in isolating genetic material and protecting cell fluids.²⁸

Research DNA in the Qur’an is not much different from modern science. The connection between Islamic theory and contemporary science is not accidental. In the modern era and current technological advances, the meaning of the Qur’an is becoming

²⁷ (Kementrian Agama RI, 2012)

²⁸ (Kementrian Agama RI, Tafsir Ilmi: Penciptaan Manusia dalam Perspektif Al Qur'an dan Sains (Jakarta:Kementrian Agama RI, 2012) : 94-106

increasingly open. The connection between the Qur'an and experimental science reveals that Allah facilitates human candidates with various genetic components.²⁹

The relationship between DNA and human creation is very closely related. The birth of humans on earth carries a large amount of genetic information. When the sperm combines with the ovum (egg cell), a baby will form.³⁰ As explained in Surah Al-Insan verse 2:

إِنَّا خَلَقْنَا الْإِنْسَانَ مِنْ نُطْفَةٍ أَمْشَاجٍ نَبْتَلِيهِ فَجَعَلْنَاهُ سَمِيعًا بَصِيرًا

Meaning: "Indeed, we have created man from a drop of mixed semen that we wanted to test him (with commands and prohibitions), therefore We made him near and see." (Q.S. Al-Insan: 2)

The Ministry of Religion's scientific interpretation explains that the word "nutfah" means a drop of water. The water contains sperm. Semen contains a mixture of several ingredients, including essence, which is the main component. *Germes* are also referred to as low water, which term refers to the place where the water comes out, namely the organ that also functions to dispose of urine.³¹ Similar verses are found in Surah As-Sajadah verses 7 and 8:

الَّذِي أَحْسَنَ كُلَّ شَيْءٍ خَلَقَهُ وَبَدَأَ خَلْقَ الْإِنْسَانِ مِنْ طِينٍ ﴿٧﴾
ثُمَّ جَعَلَ نَسْلَهُ مِنْ سُلَالَةٍ مِّنْ مَّاءٍ مَّهِينٍ ﴿٨﴾

Meaning: "The one who beautified everything that He created and who started the creation of human from the earth, then He made their descendants from the essence of lowly water." (Q.S. As-Sajadah: 7-8)

This water talks about the content of semen. In modern knowledge, it is explained that semen consists of four different mucus and is produced from four different mucous glands, namely the similar duct glands, prostate glands, urinary tract glands, and testicular glands. Sperm is produced by the testicular glands.³² The other three glands produce other reproductive materials. After sperm cells fertilize each other, it takes 5 hours for the fertilization process to occur and attach to the uterine wall until it takes 6 days to form

²⁹ Ahsin Wijaya, "Reproduksi Dan Genetika Manusia Dalam Al-Qur'an Perspektif Tafsir Tematik Interkoneksi," 2016, 34–390.

³⁰ (Kementrian Agama RI, Tafsir Ilmi: Penciptaan Manusia dalam Perspektif Al Qur'an dan Sains (Jakarta: Kementrian Agama RI, 2012): 94-106

³¹(Kementrian Agama RI, Tafsir Ilmi: Penciptaan Manusia dalam Perspektif Al Qur'an dan Sains (Jakarta: Kementrian Agama RI, 2012): 94-106

³²(Kementrian Agama RI, Tafsir Ilmi: Penciptaan Manusia dalam Perspektif Al Qur'an dan Sains (Jakarta: Kementrian Agama RI, 2012): 94-106

'*alaqah*. DNA and gene inheritance of dominant and recessive traits is passed on to the prospective fetus. The zygote divides and changes size.³³

ثُمَّ أَنشَأْنَاهُ خَلْقًا ۖ ثُمَّ خَلَقْنَا النُّطْفَةَ عَلَقَةً فَخَلَقْنَا الْعَلَقَةَ مُضْغَةً فَخَلَقْنَا الْمُضْغَةَ عِظْمًا فَكَسَوْنَا الْعِظْمَ لَحْمًا
أَخْرَجَ فَتَبَرَكَ اللَّهُ أَحْسَنُ الْخَالِقِينَ

Meaning: “Then We made the semen into something that adhered, then We made the sticky thing into a lump of flesh and then made the lump of flesh into bones, then We wrapped the bones on flesh. Then We made him a creature in (another) form. Glory be to Allah, the best creator.” (Q.S. Al-Mu'minun: 14)

In Surah Al-Mu'minun verse 14, it divides four stages of embryo growth. The first stage is when the new egg is fertilized. The Qur'an describes it as '*alaqah* which has several meanings, including being shaped like a leech, a clot of blood, and a connected object. '*Alaqah* is a pre-embryonic form after the mixing of sperm and ovum. The change from *nutfah* to '*alaqah* takes 10 days and ends with information about a zygote attached to the uterine wall and accompanied by a primitive placenta called *the umbilical cord*. The next change from '*alaqah* to the *mudghah* stage takes only two days, namely days 24 to 26.³⁴

The next stage is the formation of *mudghah*, which is shaped like a piece of meat or chewed gum. The lump of flesh referred to in Surah Al-Mu'minun verse 14 is an embryo that changes from the '*alaqah* stage to *mudghah* on the 24th to 26th day. On the 28th day, several bulges with several curves began to form on the back of the embryo.³⁵ Cell proliferation and growth occur extraordinarily during the *mudghah* stage. This lump of meat consists of tissue and cells that are differentiated or not. This word differentiation refers to Surah Al-Hajj verse 5 on the meaning of “perfect.” Az Azzindani translated this word as differentiation.³⁶

يَا أَيُّهَا النَّاسُ إِن كُنْتُمْ فِي رَيْبٍ مِّنَ الْبَعْثِ فَإِنَّا خَلَقْنَاكُمْ مِّن تُرَابٍ ثُمَّ مِّن نُّطْفَةٍ ثُمَّ مِّن عَلَقَةٍ ثُمَّ مِّن مُّضْغَةٍ
مُخَلَّقَةٍ وَغَيْرِ مُخَلَّقَةٍ لَّنُبَيِّنَ لَكُمْ وَتُقَرَّرُ فِي الْأَرْحَامِ مَا نَشَاءُ إِلَىٰ آجَلٍ مُّسَمًّى ثُمَّ نُخْرِجُكُمْ طِفْلًا ثُمَّ لِتَبْلُغُوا أَشَدَّكُمْ

³³Abdul Halim Nasution, “EMBRIOLOGI MANUSIA DALAM PERSPEKTIF AL-QUR'AN,” *Jurnal Nizhamiyah* 10, no. 1 (2020): 1–11, <https://doi.org/10.30821/niz.v10i1.737>.

³⁴(Kementrian Agama RI, Tafsir Ilmi: Penciptaan Manusia dalam Perspektif Al Qur'an dan Sains (Jakarta: Kementrian Agama RI, 2012) : 94-106

³⁵Muhammad Yusuf, “PENCIPTAAN MANUSIA DALAM TAFSIR ‘ILMI KEMENTERIAN AGAMA REPUBLIK INDONESIA,” *Range Management and Agroforestry* 4, no. 1 (2020): 1–15, <https://doi.org/10.1016/j.fcr.2017.06.020>.

³⁶(Kementrian Agama RI, Tafsir Ilmi: Penciptaan Manusia dalam Perspektif Al Qur'an dan Sains (Jakarta: Kementrian Agama RI, 2012) : 94-106

وَمِنْكُمْ مَنْ يَتُوفَىٰ وَمِنْكُمْ مَنْ يُرَدُّ إِلَىٰ أَرْذَلِ الْعُمُرِ لِكَيْلَا يَعْلَمَ مِنْ بَعْدِ عِلْمٍ شَيْئًا وَتَرَىٰ الْأَرْضَ هَامِدَةً فَإِذَا أَنْزَلْنَا عَلَيْهَا الْمَاءَ اهْتَزَّتْ وَرَبَتْ وَأَنْبَتَتْ مِنْ كُلِّ زَوْجٍ بَهِيجٍ

Meaning: “O people, if you doubt (the day of) resurrection, indeed we created your parents (Prophet Adam) from dust, then (we created you as their offspring) from a drop of sperm, then a clot of blood, then a lump of flesh, whether it happened perfect or imperfect, so that We may explain to you (to sign of our power in creation). We determine in the womb what We will do until a predetermined time. Then take you out as a baby, then (We keep you) until you reach adulthood. Among you are those who have passed away and (there are also) those who have returned to a very old age so that they no longer know anything they once knew (senile). You see, the earth is dry. If We send water (rain) on it, it will live and become fertile and grow various kinds of beautiful (plants).” (Q.S. Al-Hajj: 5)

This verse also explains the occurrence of two stages of *mudghah*, namely those that have been formed and those that have not yet been formed. “What has been formed” is the embryo itself. The embryo has formed several organs that have specific functions. Meanwhile, “not yet formed” is the placenta that forms on the 35th day. The *mudghah* stage will end in the 6th week or more or less on the 40th day. The *mudghah* period, which is characterized by the stages of organ formation, is referred to in the Qur’an as *takhalluq*.³⁷ Several organs have begun to form at this stage, carrying the genetic characteristics of a male and female pair, including the eyes, lips, and tongue. Although the human-like shape cannot yet be seen, at this stage, the shape of the hands and feet are starting to appear.³⁸

In Surah Al-Mu’minun verse 14, bone formation is also explained. This stage is crucial. After the lump of flesh is filled with cells and tissue, it changes quickly to form a skeleton. This phase occurs during the 40th to 45th day. In the 7th week, the human form becomes more visible, along with the formation of the skeleton. The human form will become more visible if the bone formation is covered by muscle formation. You can see the difference between the head and the arms, and eyes and lips will appear on the head. As the Prophet Muhammad said in a hadith narrated by Muslims, after the 42nd day passed, Allah sent down an angel who would shape him into a human. Then, the angel

³⁷ Yusuf, “PENCIPTAAN MANUSIA DALAM TAFSIR ‘ILMI KEMENTERIAN AGAMA REPUBLIK INDONESIA.”

³⁸(Kementrian Agama RI, Tafsir Ilmi: Penciptaan Manusia dalam Perspektif Al Qur'an dan Sains (Jakarta: Kementrian Agama RI, 2012): 94-106

asked Allah about the gender that would be given to the embryo. Then Allah determines based on His will.³⁹

The next phase is muscle formation; after the bones are attached to the meat, the muscles wrap around the bones. Muscles are located around the bones of the body. Parts of the embryo that were originally separate will become connected as muscles form and the embryo begins to move. At the end of the 8th week, the embryo looks very different. The fetal development stage will follow this final embryonic phase. When the fetus begins to move regularly, namely kicking movements, then at this stage, all organs can function and live outside the womb at the age of around 22 to 26 weeks or approximately 6 months after fertilization occurs when the nervous and respiratory systems function normally.⁴⁰

The suitability of the explanation in the Qur'an is also following knowledge in the field of science. After fertilization occurs, cells will undergo division and enter the *morula stage*. After dividing, they will form hollow cells filled with fluid. This phase is called the *blastula phase*. Next, it enters the *gastrula phase*, forming three layers: the outer, middle, and inner layer. The final phase is organogenesis, namely the formation of human body organs.⁴¹

The relationship between DNA and human creation includes the role of DNA in reproduction, growth, and individual development. DNA, with all its components, produces 7 billion people on Earth with different faces and shapes. This shows that DNA has a complicated and complex structure and is unlimited in number.⁴² Very small DNA can be seen with the naked eye after magnification 100 thousand times. One DNA helix ribbon reaches 1.8 meters in length. So overall, humans have 60 trillion DNA which, if described, can reach 100 billion kilometers in length.⁴³

DNA is God's instructions for forming every aspect of the human body. The science of DNA is seen as a means of seeing the miracle of God's creation. The Qur'an provides scientific and spiritual guidance regarding the creation of humans, emphasizing the other, power and wisdom of Allah. Science, through empirical evidence, helps

³⁹(Kementrian Agama RI, Tafsir Ilmi: Penciptaan Manusia dalam Perspektif Al Qur'an dan Sains (Jakarta: Kementrian Agama RI, 2012): 94-106

⁴⁰ Yusuf, "PENCIPTAAN MANUSIA DALAM TAFSIR 'ILMI KEMENTERIAN AGAMA REPUBLIK INDONESIA."

⁴¹Tri Haryanto et al., "Contemporary Music Composition 'Embryo'" 01, no. 01 (2021): 1–10.

⁴² Hasbullah, "Konvergensi Hadis Dan Sains Dalam Rekayasa Genetika Manusia," 2017, 1–159.

⁴³ Akbar et al., "Nafs Wahidah Dalam Al-Qur'an Al-Karim Menurut Zaghluul Raghīb Muhammad An-Najjar."

humans understand the complexity of the human creation process. Meanwhile, faith teaches us to acknowledge and believe that every aspect of life is part of God's plan that has a specific purpose.⁴⁴

Humans are God's chosen creatures who were created perfectly and with the best form compared to other creatures. The specialty possessed by humans is reason, which is used to differentiate between good and bad.⁴⁵ As explained in Surah At-Tin verse 4:

لَقَدْ خَلَقْنَا الْإِنْسَانَ فِي أَحْسَنِ تَقْوِيمٍ

Meaning: *Indeed, we have created humans in the best form.*" (Q.S. At-Tin: 4)

Human existence carries the noble task of becoming a caliph on earth. The creation of humans was not in vain and without purpose. Allah has raised the status of humans compared to other creations. God can grasp knowledge so that humans have the mandate to protect the earth and are responsible for the survival of other living creatures around them.

Conclusion

Research on DNA in the Qur'an is related to modern science, showing that Allah gave various genetic components to humans. The Qur'an explanation of human formation also follows scientific knowledge, where after fertilization, cells undergo division and form phases such as *morula*, *blastula*, *gastrula*, and *organogenesis*, reflecting the stages in the development of the human embryo. The relationship between DNA and human creation involves DNA's role in individuals' reproduction, growth, and development processes. With all its components, DNA allows the forming of more than 7 billion human individuals with different faces and shapes. This shows the complexity of the intricate structure of DNA and its unlimited number. Even though very small, DNA can be seen with the naked eye after being magnified up to 100 thousand times. One DNA helix is about 1.8 meters long, so humans have around 60 trillion DNA, which if deciphered, could reach 100 billion kilometers.

The Qur'an explanation of genetics regarding DNA and human formation is proven empirically through scientific knowledge. The Ministry of Religion's Tafsir Ilmi

⁴⁴ (Kementrian Agama RI, Tafsir Ilmi: Penciptaan Manusia dalam Perspektif Al Qur'an dan Sains (Jakarta: Kementrian Agama RI, 2012) : 94-106

⁴⁵ Heru Juabdin Sada, "Manusia Dan Perspektif Agama Islam," *At-Tadzkiyyah: Jurnal Pendidikan Islam* Vol. 7 (2016): hlm. 133.

Surah Ar-Rahman verse 14 explains that pottery is like porcelain, which when in a chemical reaction process, is used as a catalyst for the polymerization process to occur. In the next stage, the earliest molecules of life enter the structure of the most superficial cells formed from soil. Furthermore, in Surah Al-Insan verse 2, As-Sajadah verses 7-8, Al-Mu'minun Verse 14 and Al-Hajj verse 5, the process of human creation is explained in which the prospective fetus carries genetic information through DNA starting from the fertilization stage and then *'alaqah*, *mudghah* are formed, bone formation, muscle formation until it develops into a fetus.

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