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# Scientific Interpretation and Its Significance in the Development of Science

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**Abstract**
Scientific interpretation is an approach to the interpretation of the Qur'an that utilizes modern scientific knowledge as an instrument to understand verses related to natural phenomena and natural laws. This article explores the role of scientific interpretation in bridging religious texts with science and its contribution to the development of science itself. The method used is a literature review and critical analysis of the relevance of Qur'anic verses to modern science. The results of the study show that scientific interpretation has the potential to expand the scientific horizons of Muslims and facilitate constructive dialogue between religion and science. In addition, this approach can significantly contribute to understanding the complexity of the relationship between religious texts and contemporary scientific discoveries. Nevertheless, the study also highlights the methodological and interpretive challenges faced in applying scientific interpretation, including the risk of subjectivity and bias in understanding the text. Therefore, a careful, systematic, and principle-based approach is needed to maximize the benefits of scientific interpretation. This article concludes that scientific interpretation has excellent potential to be an effective tool in developing science while strengthening the understanding of Islam that is relevant to the context of the times.



## Introduction

Since the time of the Prophet Muhammad SAW, the Qur'an has been the center of life and the main guide for Muslims in all aspects, including moral, legal, social, and even intellectual (Ridwan, 2016). In various disciplines, especially in the field of interpretation, the Qur'an is a comprehensive book containing universal messages relevant to its time and present (Al-faruq et al., 2024). One of the approaches that develops along with the progress of science is *scientific interpretation*, which is an effort to understand the verses of the Qur'an by connecting them with the findings of modern science (Muhammad Dalip, 2022). This phenomenon shows that, for some Muslims, the Qur'an not only talks about spiritual and moral aspects but also provides scientific cues that challenge humanity to continue to search, explore, and understand the universe.

In the history of Islam, the Qur'an has always been seen as a revelation capable of answering basic questions about the universe and human existence (Latif & Fikri, 2017). Verses such as *"He created the heavens and the earth and all their contents"* (Q.S. Al-Anbiya: 30) or *"And We created man out of*

*a clot of blood*" (Q.S. Al-Alaq: 2) are often used as a basis for associating the teachings of Islam with scientific knowledge. Several classical Islamic scholars and scholars, such as Al-Ghazali and Ibn Sina, argue that science and religion complement each other (Rahma et al., 2024). Ibn Sina, for example, in his work *Ash-Shifa*, emphasizes the importance of reason and reason in understanding revelation and natural phenomena that can be explained rationally (Tursunova, 2024).

However, the development of scientific interpretation only really emerged in the 19th and 20th centuries amid the advancement of modern science and technology. One of the pioneers in this regard is Sayyid Ahmad Khan, a reformer from India, who emphasized the importance of rationality and science in understanding the Qur'an (Amin, 2019). His approach was followed by other scholars such as Muhammad Abduh and Rasyid Ridha, who promoted the interpretation of the Qur'an taking into account modern scientific knowledge (Aziz, 2017). They argue that the Qur'an does not contradict science and even contains scientific cues that must be further explored and developed.

This approach to scientific interpretation has attracted the attention of many circles, especially in the contemporary era, where scientific discoveries such as the theory of evolution, embryology, and cosmology are often associated with the verses of the Qur'an. For example, some interpreters attribute the development of the human fetus described in *Q.S. Al-Mu'minun: 12-14* to modern discoveries in the field of embryology, which describe in detail the stages of fetal growth that include *nuthfah* (a drop of seminal semen), '*alaqah* (a clot of blood), and *mudghah* (a lump of flesh). Another example is the verse about the creation of the universe in *Q.S. Al-Anbiya: 30*, which is often associated with the Big Bang theory.

However, this approach has also drawn criticism. Some conservative scholars argue that scientific interpretation has the potential to deviate from the original meaning of the Qur'an if it tries too much to adapt to scientific discoveries that are temporary and changeable. Science is dynamic, while revelation is static. If the verses of the Qur'an are forced to adapt to scientific findings that can change over time, this can undermine the authority of revelation itself (Laila, 2014). This raises ethical and methodological questions: to what extent can modern science be used to interpret the Qur'an, and can scientific interpretation be entirely relied upon as a method of interpretation?

On the other hand, the approach of scientific interpretation is also seen as an important effort in advancing the understanding of Islam in the modern era. In facing the challenges of modernity and globalization, many contemporary Muslim scholars, such as Harun Yahya, have used scientific interpretation to prove that Islam is not only in line with science but also precedes many scientific findings (Kartanegara, 2007; Yahya, 1994). Harun Yahya, for example, in his famous work *The Miracles of the Qur'an*, presents various proofs that the Qur'an contains scientific clues that can only be understood after the discovery of modern science. Scientific interpretation, as such, offers space for dialogue between religion and science and encourages the advancement of more open and progressive Islamic thought.

However, it is important to remember that while scientific interpretation can enrich the understanding of Qur'anic verses, it should not replace established traditional methods of interpretation. Combining classical and scientific approaches can provide a more comprehensive and balanced understanding. This shows that scientific interpretation has a significant role in bridging religious thought and scientific knowledge, and this will continue to develop along with the advancement of technology and science. Therefore, the article is encouraged to explain more

deeply the historical, methodological, and intellectual context behind the phenomenon of scientific interpretation and its relevance in the development of contemporary science.

Based on the background that has been explained, this study is based on several main questions. First, how is scientific interpretation implemented in interpreting Qur'anic verses related to science? Second, what are some examples of the contribution of scientific interpretation to the development of modern science? Third, how can scientific interpretation affect the development of science in the future?

This study aims to analyze the approach of scientific interpretation in interpreting Qur'anic verses relevant to modern scientific knowledge. In addition, this study also aims to present concrete examples of how scientific interpretation contributes to the development of science. Finally, this study wants to explain the impact and significance of scientific interpretation in expanding scientific horizons in Islam and contemporary science.

This research has several important contributions. First, academically, this study will enrich the literature on interpreting the Qur'an with a new approach that integrates science and revelation. This approach to scientific interpretation can also strengthen the position of Islam as a scientific and rational religion, especially in the face of intellectual challenges from the modern world. Second, this research can practically provide new insights for Muslim scientists and scholars in responding to science development without sacrificing religious beliefs. Third, in increasing interest in interdisciplinary studies, this research is expected to motivate dialogue between religion and science and encourage the emergence of innovative thinking in the development of science.

## Methods

The writing of this article uses a scientific *interpretation (hermeneutic) approach,* which seeks to understand the verses of the Qur'an through the lens of modern science. This approach focuses on two main things: first, seeking harmony between the textual meaning of Qur'anic verses and contemporary scientific findings; Second, assessing the contribution of these verses to the development of science. In this approach, the Qur'an is not seen solely as a religious text but also as a source of knowledge that has broad implications for science and technology (Rosadisastra, 2007). This study uses primary data from Qur'an verses that contain direct and indirect scientific cues. These verses are taken from various suras in the Qur'an, such as Surah Al-Anbiya, Surah Al-Mu'minun, Surah Al-'Alaq, and other relevant surahs. These verses are selected based on their relevance to scientific discoveries in various disciplines, such as astronomy, biology, physics, and geology.

In addition, secondary data in the form of classical and contemporary interpretations relevant to this study are also used to enrich the analysis. In addition, scientific journals related to the discoveries of modern science and academic literature discussing scientific interpretation will also be used to relate the selected verses to contemporary scientific knowledge. The analysis procedure in this study involves several steps. The first step is to identify verses of the Qur'an that explicitly or implicitly discuss natural or life phenomena. These verses will then be classified according to their themes, such as the creation of the universe, the creation of man, and natural phenomena. Once the verses are identified, the analysis will be carried out by comparing the interpretation of classical interpretation and contemporary interpretation, especially those that use a scientific approach. Classical interpretation will provide a traditional perspective, while contemporary interpretation, especially those that utilize science, will provide a more modern perspective. This analysis will help to understand how the mufassirs of various periods viewed these verses.

Then, the verses that have been identified will be analyzed in the context of contemporary scientific discoveries. For example, the verse about the creation of the universe in *Q.S. Al-Anbiya: 30* will be associated with the Big Bang theory, while the verse about the development of the human fetus in *Q.S. Al-Mu'minun: 12-14* will be analyzed in the context of modern embryology. The final step is to evaluate the extent to which scientific interpretation can significantly contribute to the development of science. This process will involve a critical analysis of the conformity of scientific interpretation to existing scientific discoveries and their potential contribution to broader scientific discourse, both among Muslim academics and the global scientific community.

## Research Results

### Analysis of Scientific Interpretation of Qur'anic Verses

Through a scientific interpretation approach, this study succeeded in identifying several verses of the Qur'an related to scientific phenomena. Some of the verses analyzed include the universe's creation, the human fetus's development, and the cycles of nature. Each of these verses is analyzed in the context of classical interpretation and is associated with modern scientific knowledge to understand a broader meaning.

*Table 1.1. Example of a comparison of classical interpretation and scientific interpretation*

| Topic | Ayat Al-Qur'an | Tafsir Classic | Scientific Interpretation |
|---|---|---|---|
| Creation of the Universe | Q.S. Al-Anbiya: 30 | Heaven and Earth were originally one unit, separated by the power of God. | Associated with the Big Bang theory, "Solid" describes the universe's single origin. |
| Fetal Development | Q.S. Al-Mu'minun: 12-14 | A symbolic and spiritual description of the stages of human creation from the ground to becoming a perfect being. | Aligned with modern embryology; The stages in the verse describe the development of the human embryo scientifically. |
| Water Cycle in Nature | Q.S. Az-Zumar: 21 | Describing the rain cycle as a sign of Allah's power in bringing creatures to life and death. | Associated with the water cycle in modern hydrology, Evaporation, condensation, and precipitation are explained in a way relevant to scientific knowledge. |

1. Creation of the Universe: Q.S. Al-Anbiya: 30

This verse states:

*"Whether they do not see that the heavens and the earth were once joined, then we separated them, and we made every living thing from water? So, do they not believe?"* (Q.S. Al-Anbiya: 30)

In classical commentaries such as *Tafsir Al-Mishbah* by M. Quraish Shihab and *Tafsir Al-Jalalain*, this verse is understood as a general explanation of the creation of heaven and earth. The two were considered the same before being separated by the power of Allah. This separation is interpreted

as the process of creating nature that begins with something "cohesive" or "united" (Mahalli & Suyuti, 2016; Shihab, 2002).

However, this verse is often associated with *the Big Bang* theory in scientific interpretation. This theory explains that the universe began with a tremendous explosion about 13,8 billion years ago, in which all matter and energy were concentrated in a single point before expanding into the universe we know today (Asiva Noor, 2023). Scientific interpretation argues that the verse's word "unity" or "unity" indicates that the Qur'an already hints at a single origin of the universe.

The Big Bang theory, supported by scientific evidence such as the background of cosmic radiation and the redshift of galaxies, provides a strong explanation for the creation of the universe (Syawalia Arifin et al., 2024). This relationship suggests a harmony between the revelation of the Qur'an and modern scientific discoveries, although the terms and concepts used are different. Scientific interpretation sees this verse as one of the proofs that the Qur'an contains knowledge that predates the development of modern science.

2. Fetal Development: Q.S. Al-Mu'minun: 12-14

This verse states:

*" And indeed, We created humankind from an extract of clay. Then placed each human as a sperm-drop in a secure place. Then We developed the drop into a clinging clot, then developed the clot into a lump ˹of flesh˺, then developed the lump into bones, then clothed the bones with flesh, then We brought it into being as a new creation.[1] So Blessed is Allah, the Best of Creators."* (Q.S. Al-Mu'minun: 12-14)

Classical interpretation interprets this verse as a general description of the stages of human creation. Tafsir's classic explains that the creation of human beings begins with the essence of the soil, which goes through the process of semen and then develops into a fetus in the womb. Each stage is explained symbolically and spiritually to demonstrate God's power in creating life.

However, scientific commentary interprets this verse more specifically, linking it to scientific discoveries in modern embryology. The explanation of semen turning into something attached (*alaqah*), then into a lump of flesh (*mudghah*), as well as the subsequent stages, shows harmony with the scientific description of the development of the human fetus. In embryology, the process of embryo formation does go through similar stages: the zygote attaches to the uterine wall, develops into an embryo, then forms body tissues, bones, and finally the entire human body (Moore, Keith L., Persaud, T. V. N., Torchia, 2016).

This relationship between Qur'anic verses and scientific discoveries confirms that the Qur'an has hinted at embryological processes that were only scientifically understood in the 20th century. It also shows that the Qur'an is not only a book of moral and spiritual guidance but also contains knowledge that reflects natural phenomena scientifically.

3. Water Cycle in Nature: Q.S. Az-Zumar: 21

This verse states:

*" Do you not see that Allah sends down rain from the sky—channelling it through streams in the earth—then produces with it crops of various colours, then they dry up, and you see them wither, and then He reduces them to chaff? Surely in this is a reminder for people of reason."* (Q.S. Az-Zumar: 21)

In the classical interpretation, this verse describes the rain cycle as a sign of God's power in bringing life and death to living things on earth. The water that descends from the sky is a blessing that brings life to plants, animals, and humans.

Scientific interpretation sees this verse as an initial explanation of the water cycle in nature. In hydrological science, this process is known as the water cycle or *hydrological cycle*, in which water from the ocean evaporates into water vapour, then condenses in the atmosphere into clouds, and finally descends back to the earth as rain. The water that seeps into the soil then flows into rivers or is stored as groundwater, which is important in maintaining life on earth (Hasanah, 2024).

Scientific interpretation finds a correlation between the explanations in the Qur'an and the water cycle identified in modern science. This confirms that the Qur'an is spiritually relevant and scientific, especially in understanding the natural processes that support life.

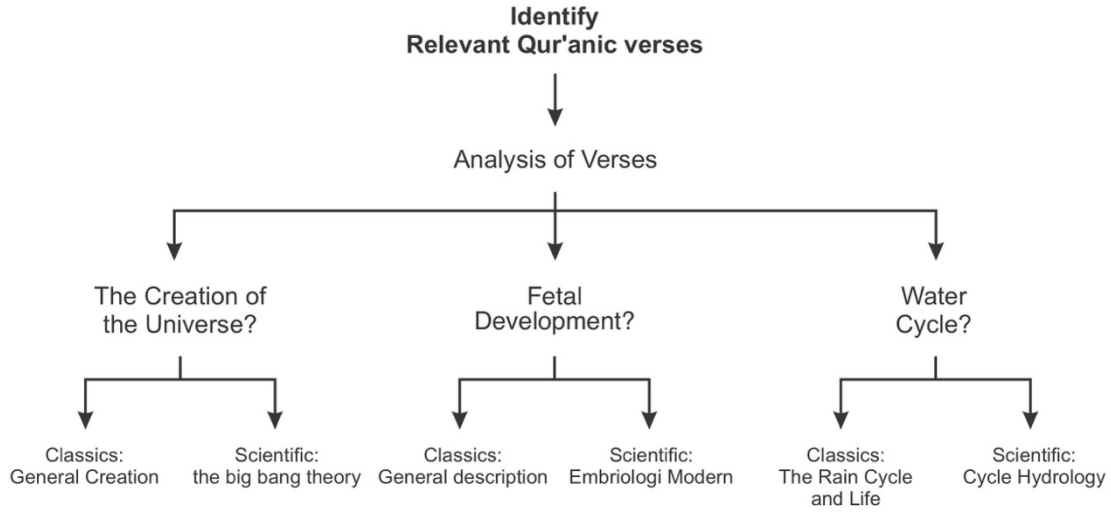


*Figure 1.1. Scientific Interpretation Simulation*

**The Relationship between Scientific Interpretation and Modern Science**

The research results above show that scientific interpretation offers an interesting perspective on the relationship between religion and science. Although the Qur'an was revealed as a revelation that focused more on spiritual and moral aspects, its verses contain scientific cues that become relevant when associated with modern knowledge. This shows that the Qur'an has a depth of meaning that can be explored through various approaches, including science.

Scientific interpretation also parallels some modern scientific concepts and the descriptions present in the Qur'an, such as the Big Bang theory and embryological processes. This relationship can be used to build a bridge between Islamic thought and modern science, showing that Islam is not a religion separate from the development of science but rather in line with the progress of human intellectuals (Kumara et al., 2020).

Although all scholars have not universally recognized scientific interpretation, this study shows that this approach can enrich our understanding of the Qur'an, especially in an era where science and technology are rapidly developing. Scientific interpretation is not the only method of understanding the Qur'an. However, it can be used as one of the approaches that help Muslims associate religious beliefs with empirical knowledge, answering intellectual and spiritual challenges in the modern world.

**Discussion**

**The Contribution of Scientific Interpretation to Science**

Scientific interpretation is an effort to understand the verses of the Qur'an related to natural phenomena and science by referring to modern scientific discoveries. Since the early days of the development of Islam, there have been attempts to link religious teachings with scientific phenomena. However, it was not until the 20th century that this approach was systematically developed by scholars such as Tantawi Jawhari and Harun Yahya. These two figures and others believed that the Qur'an was a book in harmony with science and that revelation and human knowledge had a close relationship. They tried to bring religious understanding closer to the development of science.


*Figure 1.2. The Contribution of Scientific Interpretation to Science*

The main contribution of scientific interpretation lies in bridging the gap between religion and science. Over the past few centuries, many have viewed religion and science as separate, contradictory domains (Mujib, 2019). However, with the advent of scientific interpretation, the view emerged that the Qur'an contains not only moral and spiritual principles but also information related to the laws of nature that are in harmony with modern scientific knowledge. Scientific interpretation offers a new paradigm that shows that the Qur'an can support, even inspire, the development of science. This approach encourages Muslims to view scientific phenomena as signs of Allah's greatness (kauniyah verse) that support His revelation and open up broader scientific insights for humans.

For example, many scholars and scientific commentators refer to Qur'anic verses about the creation of the universe to support modern scientific theories such as *the Big Bang*. In Surah Al-Anbiya verse 30, it is stated, *"Do the disbelievers not know that the heavens and the earth were once a solid thing, and then We separated between them?"* (Qur'an 21:30). This verse is interpreted as a gesture about the separation of the cosmos that is relevant to the *Big Bang theory*. Although this theory is derived from scientific methodology, similar concepts in the Qur'an suggest that religion and science can complement each other. Sources such as *"The Bible, The Quran and Science"* by Maurice Bucaille reinforce this belief by comparing verses in the Qur'an with modern scientific discoveries and finding an impressive fit between the two (Kaltner & Mirza, 2017).

The scientific interpretation approach also enriches the understanding of the verses of the Qur'an by providing detailed scientific explanations. For example, in biology, scientific interpretation also makes a significant contribution. For example, verses about the development of the human embryo have been used as the basis by some Muslim scholars to show that Islam has

hinted at a scientific phenomenon that has only recently been comprehensively understood by medical science. In Surah Al-Mu'minun verse 14, the Qur'an explains the stages of fetal development in the womb: *"Then We made the semen into something attached, then We made something attached to it, then We made it into a lump of flesh, and a lump of flesh We made a bone, and then We wrapped the bone in the flesh"*. The fact that these verses are in line with modern embryology strengthens the argument that the revelation of the Qur'an has long hinted at scientific truth, as explained by Keith L. Moore in *"The Developing Human: Clinically Oriented Embryology" (Moore, Keith L., Persaud, T. V. N., Torchia, 2016).*

In addition, scientific interpretation is also a driver of innovation and scientific research among Muslims. Realizing that the verses of the Qur'an contain scientific cues, Muslim researchers are encouraged to undertake further exploration to understand existing natural phenomena. This encourages the creation of a paradigm that science is a tool to know the greatness of Allah so that it can strengthen faith. For example, scientific commentators have explored natural phenomena such as the water cycle, mountain structure, and atmospheric dynamics described in the Qur'an. Surah An-Naba verses 6-7 state that the mountains function as "the pillars of the earth." Modern geological research has found that mountain structures have roots embedded in the earth's crust, which helps maintain the stability of tectonic plates (Hidayah, 2024; Ibrahim, 2019). This provides a more scientific explanation of the verse and, at the same time, emphasizes that the Qur'an contains scientific truth.

In the modern era, when science is developing rapidly and society begins to question the relevance of religion in answering the challenges of the times, scientific interpretation provides significant answers. This approach shows that Islam is not only compatible with modern science but also serves as a significant inspiration in the development of science. With scientific interpretation, Muslims can be more confident in showing that their religion is not contrary to progress but encourages innovation and knowledge exploration.

**Criticism and Challenges to Scientific Interpretation**

Although scientific interpretation offers many positive contributions, this approach has also received criticism from various circles. One of the main criticisms is that scientific interpretation risks reducing the depth of the spiritual and moral meaning of the Qur'an (Daruhadi, 2024). Critics consider that the attempt to find scientific truth in every verse of the Qur'an can lead to reductionism, in which the metaphysical and moral aspects of the Qur'an are ignored in favour of scientific interpretation. The fact that scientific discoveries are often temporary and constantly evolving raises concerns about the stability of scientific interpretation. For example, theories such as *the Big Bang* are currently widely accepted, but the history of science shows that scientific theories can be revised or even replaced by new ones.

For example, *the steady-state* theory once rivalled the *Big Bang theory,* shows that the cosmos is static and does not undergo significant changes. If the scientific interpretation of the time associated the verses of the Qur'an with *the steady state theory*, then the interpretation will now lose its relevance. This critique emphasizes the need for a more flexible scientific interpretation and not to be tied to a specific scientific theory that may evolve or change over time. According to Nasr (1996), scientific interpretation must be balanced with an awareness of the limitations of scientific methodology. It must not reduce the position of religion to merely a complement to science. (Nasr, 1996).

Another challenge is related to the divergence of views among scholars. Some traditional scholars consider scientific tafsir as bid'ah or an innovation that deviates from the method of tafsir taught by the saaf (the early generation of Islam). This criticism is based on the concern that scientific interpretation often imposes interpretations that do not fit certain verses' linguistic or historical context (Faiz & Usman, 2016). In many cases, the language of the Qur'an that is symbolic or allegorical is forced to conform to particular modern scientific concepts, which can lead to *over-interpretation*. For example, the attempt to associate the word "*'alaqah*" (meaning something hanging) in a verse about the creation of man with modern medical terms can be seen as a forced interpretation (Ali, 2009).

**Implications of Scientific Interpretation on the Development of Science**

Scientific interpretation impacts religious discourse and has practical implications for the development of science. One of the main impacts is how this approach encourages the integration of religious studies and science in education (Chanifudin & Nuriyati, 2020; Daruhadi, 2024). By acknowledging the existence of scientific cues in the Qur'an, Islamic educational institutions can formulate a balanced curriculum between religious science and science. This is important in facing the challenges of modern times, where Muslims need to master technology and science without losing their religious identity.

In addition, scientific interpretation can provide a moral boost for Muslim scientists to engage in scientific research. By understanding that the Qur'an accepts scientific knowledge but instead supports it, Muslim scientists can conduct their profession with a strong spiritual foundation. According to Sardar (1998), the relationship between science and religion in Islam can create an intellectual environment that encourages scientific exploration but always with moral and ethical awareness (Smart, 1986).

However, it should be noted that scientific interpretation also comes with risks. If scientific interpretation is pushed too far, it can create an unnatural separation between religion and science. For example, if every verse of the Qur'an attempts to be interpreted within the framework of science, there is a risk that Muslims will lose the spiritual and ethical dimension of their sacred texts. Furthermore, interpretations that rely heavily on scientific discoveries can lead to debate when the findings undergo revisions.

Scientific interpretation can potentially enrich the relationship between religion and science, but it should be cautiously approached. Islamic education must ensure that scientific interpretation does not replace core religious values but instead strengthens them by opening up the people's insight into the natural wonders revealed through science.

**Conclusion**

Scientific interpretation is an interesting and relevant approach to bridging the relationship between the revelation of the Qur'an and the development of modern science. By interpreting verses related to natural phenomena, scientific interpretation opens a new perspective for Muslims to see the connection between religious teachings and science. This approach not only enriches religious discourse but also has the potential to provide an impetus for the development of science, especially in the context of Islamic education.

In particular, scientific interpretation has contributed to a broader understanding of natural phenomena and science by providing evidence that shows the compatibility between revelation and scientific knowledge. This tafsir is also a motivation for Muslim scientists to explore the fields

of science with the belief that scientific knowledge is part of the effort to understand Allah's creation.

However, this approach cannot be separated from criticism and challenges. The excessive use of scientific interpretation can raise the risk of reductionism, in which the spiritual and moral dimensions of the Qur'an are neglected in favour of scientific interpretations that may not always be relevant. In addition, dependence on specific scientific theories that are temporary also raises the problem of stability of interpretation in the long term.

The implications of scientific interpretation on the development of science lie in how this approach can promote integration between the study of religion and science and provide a more balanced view of the relationship between faith and scientific rationality. Thus, scientific interpretation has excellent potential to enrich Islamic thought while encouraging Muslims to continue contributing to global science's development.

In the end, the approach to scientific interpretation must be carried out with caution and awareness of limitations both in terms of text and science so as not to lose the spiritual essence of the Qur'an. Only in this way can scientific interpretation continue to make a meaningful contribution to the development of science and a more holistic understanding of religion.

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