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How Does the Qur'anic Concept of Sunlight, Interpreted by Fakhr al-Dīn al-Rāzī, Integrate Theological Wisdom and Scientific Understanding in Sustaining Life?

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Abstract

Studies of the sun in Qur'anic scholarship have largely been fragmented and reductionist, focusing mainly on astronomical calculations or physical characteristics while neglecting the broader influence of sunlight on living beings and its theological significance. Existing research often treats the sun as a cosmic object or a temporal marker, without integrating classical Qur'anic exegesis with contemporary scientific knowledge. This condition reveals an epistemological ***gap*** *between traditional tafsīr studies and modern scientific discourse, particularly within thematic Qur'anic interpretation rooted in the intellectual legacy of Fakhr al-Dīn al-Rāzī. This study* ***aims*** *to examine the Qur'anic concept of sunlight through the exegetical framework of Fakhr al-Dīn al-Rāzī, analyze its influence on humans, animals, and plants, and explore the divine wisdom behind its creation by engaging with modern scientific perspectives.* ***Methodologically****, this research employs a qualitative library-based design using a thematic (tafsīr mawdhū'ī) approach combined with descriptive-analytical analysis. The primary source is al-Rāzī's Mafātīḥ al-Ghayb, which is critically contextualized with contemporary scientific literature in ecology, health sciences, and natural sciences. The* ***findings*** *indicate that al-Rāzī conceptualizes sunlight not merely as a physical source of illumination, but as a multidimensional divine sign. Sunlight functions as a source of life energy, a regulator of biological rhythms, a determinant of time, a contributor to human health, a driver of animal ecosystems, and a fundamental factor in photosynthesis and plant growth. These insights demonstrate a strong conceptual resonance between al-Rāzī's rational-philosophical exegesis and modern scientific principles, despite differing epistemological foundations. At the global level, this study* ***contributes*** *to strengthening religion–science dialogue, promoting ecological consciousness, supporting environmental sustainability, and advancing a holistic ethical framework for understanding the interconnected relationship between humanity, nature, and the Divine.*

Keywords: *Science–Religion Integration; Ecological Ethics; Life-Sustaining Energy; Classical Islamic Thought; Quranic studies.*

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Introduction

The Qur'an contains various laws, warnings, encouragements, stories of past nations, depictions of the Day of Resurrection, and many other themes [1]. Some of these correspond with explanations found in modern scientific knowledge regarding natural phenomena. Many Qur'anic verses describe various events and clarify matters related to these phenomena [2]. It encompasses knowledge that covers all aspects of science within the universe, which in certain cases parallels modern scientific explanations of natural phenomena. The development of scientific knowledge has, in part, arisen from scientists' doubts about the validity of certain theories [3]. The belief that the Qur'an encompasses various forms of knowledge within the universe—including modern scientific insights—has encouraged some exegetes to develop Qur'anic interpretations using scientific methodologies [4]. Among the topics widely discussed in the context of natural phenomena is the sun.

However, in modern reality, human awareness of the sun's functions and influence tends to decline. Many people neglect its role as an environmentally friendly energy source, leading to greater dependence on fossil fuels, environmental degradation, increased greenhouse gas emissions, and weakened ecosystems. A lack of understanding of the benefits of sunlight also affects health, such as causing cell damage, pigmentation, and premature aging [5]. Global warming—which exacerbates ultraviolet intensity due to ozone depletion—has also contributed to a rise in forest fire risks [6]. Additionally, humans' dependence on digital technology has distanced them from the awareness that timekeeping systems are fundamentally based on the sun's astronomical movements [7]. This phenomenon shows that humans have not fully understood the wisdom behind the creation of the sun. Many perceive it merely as a shining object without recognizing its spiritual, philosophical, and scientific dimensions [8]. The universe has been arranged in such a way that sunlight is perfectly suited to the needs of living beings.

In the context of contemporary scientific studies, the research conducted by Derhana Bulan Dalimonthi (2017) with the title "*Manfaat Matahari Menurut al-Qur-an dan Kaitannya dengan Sains*" [9] emphasizes the role of the sun as the cause of the alternation between day and night. Her findings contribute to the understanding of the sun's astronomical phenomena, but they do not thoroughly discuss the influence of sunlight on all living beings [10]. Therefore, this study seeks to complement previous research by exploring the effects of sunlight on humans, animals, and plants, as well as uncovering the wisdom behind its creation as explained in the Qur'an and interpreted by Fakhr al-Dīn al-Rāzī. Thus, this research not only broadens the scope of earlier studies but also strengthens

the understanding of the fundamental role of sunlight in sustaining all forms of life.

Mukhlis's thesis (2023), titled "*Rotasi Matahari dan Bulan dalam Al-Qur'an (Studi Komparatif Antara Tafsir Ilmi dengan Astronomi*" [11], discusses the function of the sun as the center of the solar system and as a basis for time calculation. It also explains the alternation of day and night and the calculation of days and years as a result of the rotation and revolution of celestial bodies. However, this research focuses solely on the aspect of rotation and does not examine the influence of sunlight on living beings. In addition, there is a methodological difference: Mukhlis employs a comparative approach within the framework of scientific exegesis, whereas the present study uses a thematic approach (*tafsīr maudhu'ī*) to examine the influence of sunlight from the perspective of Fakhr al-Dīn al-Rāzī in a more comprehensive manner. This study focuses on an in-depth analysis of the effects of sunlight on humans, animals, and plants according to Fakhr al-Dīn al-Rāzī. Therefore, it offers a significant and substantively different contribution from previous research.

Based on the above explanation, several key research questions can be formulated as follows: how sunlight is described in the Qur'an and what its influence is on living beings according to Fakhr al-Dīn al-Rāzī, as well as what wisdom lies behind the creation of sunlight by Allah SWT. In line with these questions, this study aims to reveal Fakhr al-Dīn al-Rāzī's explanations regarding sunlight and its effects on living beings, and to examine the wisdom of its creation as implied in the Qur'an.

This research relies on *Mafātīḥ al-Ghayb* by Fakhr al-Dīn al-Rāzī as the primary reference. The work is known for its depth of analysis and broad scope in interpreting Qur'anic verses, particularly the *āyāt kauniyyah* that discuss natural phenomena. Employing a method of interpretation rooted in rational and philosophical inquiry, al-Rāzī not only explains the textual meaning but also provides logical and scientific analysis. This method is closely related to the study of the concept of sunlight and its effects on living beings in connection with modern scientific knowledge [12]. Through the integration of a thematic approach and scientific analysis, this study compiles relevant verses and synthesizes interpretations found in Mafātīḥ al-Ghayb with multidisciplinary scientific findings [13]. Thus, a comprehensive understanding of sunlight can be achieved, encompassing its scientific functions and benefits for humans, animals, and plants, as well as the theological wisdom that reflects the signs of Allah's power.

However, this study has certain limitations. The scope is restricted to the thematic analysis of Qur'anic verses related to sunlight based on the

interpretation of Fakhr al-Dīn al-Rāzī, without extending the discussion to other exegetes or to the technical aspects of modern astronomy. The thematic approach used also has its drawbacks, including its reliance on textual construction and the subjectivity inherent in al-Rāzī's rational-philosophical style of interpretation, which does not always include empirical explanations. Additionally, there are limitations in sources, as access to manuscripts or early editions of *Mafātīḥ al-Ghayb* is not always available; thus, this research depends on modern printed editions and relevant secondary literature. Despite these limitations, this study offers a comprehensive understanding of sunlight—both its scientific functions for humans, animals, and plants, and its theological wisdom as a sign of the greatness of Allah SWT.

Method

This study employs a library research method, which involves examining various reference sources such as books, articles, journals, and other literature relevant to the topic [14]. A thematic (*mawdhū'ī*) approach is used to obtain a comprehensive understanding by collecting and analyzing Qur'anic verses related to the research theme. The thematic method examines specific themes in the Qur'an across one or several surahs. This method is combined with a scientific approach to interpret Qur'anic verses and relate them to modern knowledge. Tafsīr 'ilmi itself is understood as the interpretation of Qur'anic verses based on the principles of contemporary scientific disciplines, with the aim of explaining the scientific content contained within these verses [15]. The data analysis technique used is descriptive-analytical analysis, a method carried out by collecting data to describe in detail a condition, event, object, or any other element related to research variables that can be thoroughly explained. It involves systematically describing data while analyzing it through explanation [16], interpretation, elaboration, categorization, and classification [17]. The results of this analytical process are then formulated into research conclusions. Meanwhile, the data collection technique is documentation, carried out by gathering various forms of written information directly related to the research object [18]. The collected data includes scientific facts, tafsir literature, and Qur'anic verses relevant to the focus of the study. Through this approach, the research is grounded in concrete data that is scientifically accountable.

Result and Discussion

This section presents and analyzes the research findings concerning the concept of sunlight in the Qur'an by integrating classical Qur'anic exegesis with contemporary scientific perspectives. The discussion is structured thematically to reveal how Qur'anic terminology, particularly as interpreted by Fakhr al-Dīn

al-Rāzī, conveys a multidimensional understanding of sunlight that transcends purely physical descriptions. By examining linguistic, terminological, and scientific dimensions, this section aims to demonstrate the coherence between Qur'anic discourse and modern knowledge while highlighting the theological wisdom embedded in natural phenomena. Such an approach not only enriches thematic tafsīr studies but also contributes to bridging the epistemological gap between religious interpretation and scientific explanation.

The Meaning of Sunlight in the Qur'an

In the Qur'an, there are three different words used to refer to light or illumination, namely *nūr*, *ḍiyā'*, and *sirāj*. When the Qur'an describes the sun, it uses the word *ḍiyā'*, which is the plural form of *ḍaw'*. Linguistically, the word *ḍaw'* comes from the root *ḍa-wa-a* which means light (*ḍaw'*), and *ḍaw'* with dhammah denotes radiance or bright light, with its plural being *aḍwā'* [19]. This meaning indicates light or something that emits visible rays. Meanwhile, *ḍiyā'* refers to something that shines with radiance emanating from itself. In *Mu'jam Alfāẓ al-Qur'ān* [20], it is mentioned that the word *ḍiyā'* signifies light with strong radiance; therefore, the light of the sun is called *ḍiyā'* because it possesses strong and perfect luminosity, unlike *nūr*, which indicates a weaker form of light.

Terminologically, "light" is understood as energy in the form of electromagnetic waves that can be perceived by the human eye, possessing a certain wavelength and functioning as a source of illumination. The sun is the natural source of light in the solar system. The utilization of light energy in solar cells operates through the photovoltaic effect, which is a process in which incident photons excite electrons in semiconductor materials, thereby generating electric current [21]. However, in conventional photovoltaic devices that generally employ silicon-based p–n junctions, the absorption of solar radiation is still limited to certain wavelength ranges.

In physics, as explained in the Encyclopedia of Natural Sciences, light is electromagnetic radiation that can be seen by the human eye, with wavelengths ranging between 400 and 700 nanometers. The sun is a glowing ball of gas whose age is estimated to be around 5 billion years. Its diameter is more than 1.33 billion kilometers, and its circumference is approximately 325 times that of the Earth. The temperature at the sun's core can reach around 20 million degrees Celsius, while its surface temperature ranges around 6,000 degrees Celsius. From its surface, fiery flares emerge and extend up to about 500 thousand kilometers in height, continuously emitting energy of about 168,400 horsepower per square meter [22]. However, of this vast amount of energy, only about one two-millionth part successfully reaches the Earth.

In his exegesis of Surah *Ash-Shams*, Fakhr al-Dīn al-Rāzī presents three interpretations of the word "*ḍuḥāhā*", namely: the sunlight, the entirety of daytime, and the heat of the sun. He explains that Allah swears by the sun and its light because it is a magnificent source of life. The night is likened to death, while the emergence of morning light is compared to the sounding of the trumpet that restores life to the universe [23]. The time of *ḍuḥā* is viewed as the peak of activity and movement, resembling the state of resurrection and eternal bliss in Paradise. Sunlight is the primary source of energy for all living creatures on Earth.

In the context of modern scientific studies, the understanding of sunlight as explained by physicists shows a harmony with the interpretation of Fakhr al-Dīn al-Rāzī. Science explains that light is electromagnetic radiation with specific wavelengths, and the sun is a source of light that emits energy from within itself through the process of nuclear fusion. This characteristic corresponds to the use of the term *ḍiyā'* in the Qur'an, which is understood as an intense light that radiates from its very essence, in contrast to nūr, which refers to reflected light. Although al-Rāzī does not describe physical processes empirically, his interpretation presents philosophical and spiritual dimensions that highlight the relationship between sunlight and life, movement, and resurrection. Thus, modern scientific explanations provide empirical reinforcement for the meaning perceived by al-Rāzī, while al-Rāzī's interpretation complements the scientific perspective.

The Influence of Sunlight on Creatures

This section examines the multifaceted influence of sunlight on living beings as articulated in the Qur'an and elaborated through Fakhr al-Dīn al-Rāzī's exegetical framework, while engaging critically with contemporary scientific knowledge. The discussion is organized by categorizing the impact of sunlight on humans, animals, and plants, thereby highlighting its integrative role in sustaining biological life, regulating natural rhythms, and maintaining ecological balance. By combining classical tafsīr with insights from astronomy, biology, medicine, and ecology, this section demonstrates that sunlight functions not merely as a physical phenomenon, but as a divinely ordained system embedded with purpose, order, and wisdom. Such an approach underscores the coherence between revelation and empirical science and affirms the Qur'anic portrayal of nature as a meaningful sign (āyah) within a unified cosmological and ethical framework.

A) The Influence of the Sun on Humans

1. The Sun as a Source of Life Energy

The sun is a blessing from Allah *Subḥānahu wa Ta'ālā* that He has bestowed upon this universe. Among the many chapters in the Qur'an, there is one named *Asy-Shams* (The Sun). The sun plays a vital and essential role in life on Earth, as it serves as the source of life energy. As Allah Ta'ālā states in QS. Ash-Syams: 1-5

وَالشَّمْسِ وَضُحٰىهَا (١) وَالْقَمَرِ اِذَا تَلٰىهَا (٢) وَالنَّهَارِ اِذَا جَلّٰىهَا (٣) وَالَّيْلِ اِذَا يَغْشٰىهَا (٤) وَالسَّمَآءِ وَمَا بَنٰىهَا (٥)

In the words of Allah, *"wa asy-shamsi wa ḍuḥāhā"*, there is a diversity of interpretations that reflects the richness of approaches in Qur'anic exegesis. Mujāhid and al-Kalbī understand *ḍuḥāhā* as the sunlight, while Qatādah and al-Farrā' interpret it as the entire daytime, and Muqātil understands it as the sun's heat. This variety is linguistically acceptable because the root word *aḍ-ḍuḥā* indeed carries the meaning of spreading brightness [24]. However, when analyzed from the perspective of the Qur'anic oath (*qasam*) structure and the cosmic role of the sun, the meaning "sunlight" (*ḍiyā'*) is more persuasive argumentatively, as light is the most fundamental aspect that makes the sun worthy of being the object of a divine oath.

Fakhr al-Dīn al-Rāzī provides a more profound elaboration than other exegetes. He not only explains the linguistic meaning of the term but also connects it to the cosmological and theological significance of the sun. According to al-Rāzī, Allah swears by the sun because it is the greatest created entity perceivable by human senses. By manifesting its light, heat, and energy, the sun becomes a clear sign of Allah's greatness [24]. Al-Rāzī's emphasis that all pronouns (*ḍamīr*) in verses 1–5 refer back to the sun reflects a consistent structural approach while affirming the sun's central position in the sequence of oaths.

Contemporary astronomical knowledge shows that the sun is a massive sphere of gas that produces light and heat through nuclear fusion reactions in its core, with only a small fraction of its radiative energy reaching the earth. This scientific fact not only supports al-Rāzī's assertion about the sun's greatness but also broadens the understanding of *ḍuḥā* as an outpouring of energy that enables life. Solar energy forms the foundation of all ecosystems, especially through the

process of photosynthesis, which allows plants to produce food and oxygen [25]. Zaghlūl an-Najjār's view that solar energy is the origin of all energy on earth (except nuclear energy) reinforces al-Rāzī's statement that the sun is an irreplaceable source of life.

Thus, the integration between al-Rāzī's interpretation and the findings of modern science provides a comprehensive perspective: sunlight is not merely a physical phenomenon but also a symbol of divine greatness that affirms the order of the cosmos. Classical exegesis offers the theological and spiritual foundation, while science provides an empirical framework that concretely demonstrates the sun's immense role in sustaining life. Together, they complement and enrich one another, resulting in a holistic understanding that the sun is a blessing from Allah with inseparable scientific, cosmological, and theological value.

2. The Sun as a Means of Time Calculation

In addition to being a source of light and energy, the Qur'an affirms that the sun also functions as an instrument for time reckoning. Allah's words in Q.S Al-An'ām: 96

فَالِقُ الْاِصْبَاحِۚ وَجَعَلَ الَّيْلَ سَكَنًا وَّالشَّمْسَ وَالْقَمَرَ حُسْبَانًاۗذٰلِكَ تَقْدِيْرُ الْعَزِيْزِ الْعَلِيْمِ

The phrase "*wa asy-shamsa wal-qamara ḥusbānā*" explicitly emphasizes that the sun and the moon are appointed by Allah as cosmic instruments that can be precisely calculated and measured. This assertion forms the epistemological basis for calendrical systems in human civilization [26]. Fakhr al-Dīn al-Rāzī explains this verse through a multidisciplinary approach involving linguistics, classical astronomy, and theology, demonstrating the breadth of his exegetical method.

From a linguistic perspective, al-Rāzī highlights differing opinions regarding the word ḥusbān: whether it is the plural form of ḥisāb or a verbal noun (*maṣdar*) that conveys an intensified meaning (*mubālaghah*). This explanation shows that al-Rāzī views the cosmic structure not merely as a physical phenomenon but also as an orderly system that can serve as a mathematical foundation for time calculation [26]. Thus, al-Rāzī understands ḥusbān not simply as "calculation," but as "highly precise calculation," reflecting the orderliness of natural laws as a manifestation of God's will.

Cosmologically, al-Rāzī emphasizes that the regularity of the sun's revolution over the course of a year and the moon's orbit over the course of a month forms the foundation of a stable system of life: the alternation of seasons, the growth and ripening of crops, and the structuring of human activities. Al-Rāzī presents a theological argument that even a slight alteration in their orbital

patterns would cause great damage to ecological and social order. This reasoning reflects his integrative perspective that astronomical order has direct implications for the continuity of life—an idea that aligns with the principle of causality in modern science.

When compared with contemporary scientific approaches such as those explained by Zaghlūl al-Najjār, the difference in emphasis becomes clear. Al-Najjār interprets this verse through the lens of modern astronomy: the earth's rotation produces day and night, while its revolution generates the annual cycle and the change of seasons. This perspective is reinforced by physical explanations that one day is measured by the earth's 24-hour rotation, and one year by its revolution of approximately 365¼ days [27]. The apparent motion of the sun, shifting 23°26′26″ from the celestial equator, is also a direct result of the earth's axial tilt relative to its orbital plane a phenomenon impossible to determine with precision in al-Rāzī's era.

In this context, al-Rāzī's interpretation demonstrates strength in its philosophical and theological dimensions, while modern science provides a detailed empirical explanation of the physical mechanisms involved. Critical analysis reveals that although these two approaches differ in their methods, they actually complement one another. Al-Rāzī offers a conceptual framework in which astronomical order is seen as a sign of God's greatness, whereas modern science explains how that order operates through natural laws. When read harmoniously, the two create an epistemological bridge between revelation and science. Revelation provides metaphysical meaning, while science explains the observable physical mechanisms [28]. Thus, this verse can be understood as a theological foundation for the timekeeping systems constructed by humanity, whether in the form of the lunas (*qamariyyah*) or solar (*syamsiyyah*) calendar. This interpretation remains relevant because it offers a flexible interpretive framework that can be integrated with modern astronomical data without creating epistemological contradictions.

3. The Sun as a Healer of Diseases

Fakhr al-Dīn al-Rāzī's interpretation of the Qur'anic verses related to sunlight in QS. *Asy-Shams* and *Yunus* positions the sun as a cosmic phenomenon connected to health and well-being. Allah says:

وَالشَّمْسِ وَضُحٰىهَا ۖ

Al-Rāzī presents three interpretations regarding the meaning of the word "ḍuḥāhā" in Surah Ash-Shams. Mujāhid interprets it as sunlight. Qatādah, al-Farrā', and Ibn Qutaibah interpret it as the entire daytime period. Muqātil

interprets it as the heat of the sun. Linguistically, *aḍ-ḍuḥā* refers to the time when the sun begins to rise higher and its light becomes clearly visible on earth. Thus, these three interpretations are interconnected: light, heat, and daytime are all manifestations of the sun's rays [29]. Allah swears by the sun and its radiance because from it emerges life and human activity after the calmness of the night [24]. The time of *ḍuḥā* becomes a symbol of vitality and tranquility, similar to the bliss experienced by the inhabitants of Paradise.

Zaghlūl al-Najjār adds that during the ḍuḥā period, solar energy reaches its highest intensity, affecting layers of the earth's atmosphere such as the ozone and ionosphere, which expand in the morning and contract toward the night [30]. Moreover, sunlight regulates the production of the hormone melatonin through the pineal gland, which plays an important role in sleep cycles and bodily health [27]. At this time, solar energy begins to reach the earth with maximum intensity, influencing ecological systems, atmospheric balance, and the biological functions of living beings, including humans.

This corresponds with Allah's statement in QS. Yunus verse 5, which affirms that the sun was created as a source of energy—not merely as a measure of time, but also as a regulator of the entire system of life. Allah says:

هُوَ الَّذِيْ جَعَلَ الشَّمْسَ ضِيَآءً وَّالْقَمَرَ نُوْرًا

In this surah, it is explained that the creation of the sun is not merely a cosmic beauty but also a means of benefit for life. Scientifically, sunlight plays a major role in human health, particularly through the formation of vitamin D from exposure to UV-B rays, which is essential for bones, the immune system, and the body's metabolism [31]. Sunlight is also used in light therapy (heliotherapy) for various conditions such as hyperbilirubinemia in infants, skin disorders, muscle and bone problems, and for maintaining biological rhythms and emotional stability [32]. However, these benefits depend on proper intensity and dosage of exposure.

In the tafsīr of Tantāwī al-Jawharī, it is explained that many people travel to beaches or mountains during summer to obtain fresh air and health-enhancing sunlight. According to him, all health benefits originate from sunlight, especially ultraviolet (UV) rays, which are abundant in areas with clear air such as mountains and coastlines [33]. He emphasizes the importance of sunbathing (*tasyammus*) with caution. Sunlight should directly touch the skin without barriers and be done gradually to avoid burns or inflammation [34]. The best times to sunbathe are in the morning after sunrise and in the late afternoon before sunset, because UV rays at those times are gentler [35]. Individual factors such as

age, skin color, and physical condition also need to be considered, and it is recommended to drink plenty of water during sun exposure.

Modern science, from biomedical and physiological perspectives, explains several concrete mechanisms through which sunlight contributes to human health. Among these are the synthesis of vitamin D through UV-B radiation, which plays a crucial role in calcium-phosphate homeostasis and bone health; the regulation of circadian rhythms through light exposure, which affects the production of melatonin and serotonin, thereby influencing sleep quality and mood; and the application of phototherapy, which has been proven effective for certain dermatological conditions and seasonal mood disorders [36]. These findings offer operational explanations for the healing functionalities that are implicitly suggested in classical exegetical expressions.

From the perspective of scientific knowledge, although the healing mechanisms and health benefits of sunlight are strongly supported by evidence, science also shows significant risks—for example, excessive UV exposure increases the risk of DNA damage, skin aging, and skin cancer. Thus, the medical understanding of the "benefits" of sunlight always carries a dose–response dimension: benefits arise at the right level and timing of exposure, whereas excessive exposure can be harmful. This critique requires that theological claims praising the sun as a "healer" not be misused as justification for unrestricted sunbathing or for neglecting medical preventive practices.

4. The Sun as the Cause of Day and Night

The phenomenon of the alternation of day and night is part of the cosmic system that demonstrates the precision and orderliness of Allah's creation. As stated in QS. Yā Sīn, verse 38:

وَالشَّمْسُ تَجْرِيْ لِمُسْتَقَرٍّ لَّهَا ۗ ذٰلِكَ تَقْدِيْرُ الْعَزِيْزِ الْعَلِيْمِ

Islam encourages its followers to contemplate the universe that surrounds them as a means of understanding the signs of Allah's greatness [37]. In this verse, Fakhr al-Dīn al-Rāzī understands the phrase "*wa al-shamsu tajrī li mustaqarrin lahā*" as an affirmation that the movement of the sun is among the signs of Allah's power related to the phenomena of day and night. By explaining that the particle wāw at the beginning of the verse is connected to the previous verse discussing night and day, al-Rāzī positions the sun as an integral element within a well-ordered cosmic structure [38]. He interprets *mustaqarr* with two possible meanings: a specific location within the sun's orbit, and a specific time related to the annual cycle and the variation of day-night lengths [39]. This approach reflects al-Rāzī's broad exegetical methodology, which opens the verse

to both astronomical and metaphysical dimensions [39]. However, his interpretation remains within the framework of classical scientific understanding that still adopted a geocentric paradigm—that is, the assumption that the sun revolves around the earth.

In modern science, the sun is not stationary but moves in three ways: it rotates on its axis approximately every 27 days at the equator, it orbits the center of the Milky Way galaxy at a speed of about 828,000 km/h, and it moves together with the solar system toward the star Vega. These motions indicate that the sun indeed "runs its course," as described in the Qur'an. Meanwhile, the earth is tilted relative to the sun's equatorial plane and moves in an elliptical orbit, causing the earth's position relative to the sun to continually change [40]. This results in variations in the length of day and night and in the succession of seasons, which recur consistently every year.

Thus, the sun is not only a source of light but also a determinant of time, a regulator of daily cycles, and a manifest proof of the power and knowledge of Allah, the Almighty and All-Knowing. This entire orderly system is part of Allah's decree and divine determination, which is not subject to the laws of created beings, for He is the Creator of the laws and the order of the universe.

5. The Sun as a Determiner of Prayer Times

Allah says in QS. Isra': 78:

أَقِمِ الصَّلٰوةَ لِدُلُوْكِ الشَّمْسِ اِلٰى غَسَقِ الَّيْلِ وَقُرْاٰنَ الْفَجْرِۗ اِنَّ قُرْاٰنَ الْفَجْرِ كَانَ مَشْهُوْدًا

Fakhr al-Dīn al-Rāzī interprets the phrase *li-dulūki al-syams* as the sun's decline from its zenith or its setting, which marks the beginning of the sequence of daytime and nighttime prayer times. This interpretation places the movement of the sun as the cause of the obligation to perform the prayers, as indicated by the lam particle which conveys a meaning of causality[39]. He also interprets ghasaq al-layl as the onset of the night's darkness, signaling the end of Maghrib time and the beginning of ʿIshāʾ. This view is consistent with explanations by linguistic scholars such as Ibn ʿAbbās and al-Azhari, although it remains phenomenological in nature, based on how people of that era perceived celestial phenomena. Critically, al-Rāzī's interpretation is still rooted in the classical cosmological paradigm that uses the sun's movement as the basis for dividing time, whereas in modern astronomy the progression of time is determined by the earth's rotation [39]. Nonetheless, this difference does not undermine the meaning of the verse, because the Qur'an employs phenomenal language, that is, language based on human observation of the heavens.

Furthermore, al-Rāzī adds a spiritual dimension to the phrase wa Qur'āna al-fajr by emphasizing the importance of reciting long passages of the Qur'an in the dawn prayer (*Ṣalāt al-Fajr*), noting that this prayer is "witnessed" by both the angels of the night and the angels of the day [39]. This explanation highlights the interaction between cosmic rhythms and the spiritual grandeur of worship at daybreak. Al-Sha'rāwī reinforces this aspect by explaining that the choice of the expression Qur'āna al-fajr reflects the harmony between the calmness of nature at the emergence of morning light and the human soul's readiness to receive the recitation of the Qur'an [41]. From an astronomical perspective, the determination of prayer times based on the sun's position relative to the horizon demonstrates that Islamic law possesses a strong scientific foundation and is not at odds with modern knowledge [42]. The precision involved in determining the times of Ẓuhr, ʿAṣr, Maghrib, ʿIshāʾ, and Fajr shows that human worship proceeds in perfect harmony with the cosmic order established by Allah.

This demonstrates that the relationship between the sun and prayer times is not merely technical, but also theological. The sun functions as a cosmic sign (*āyah kauniyyah*) that links celestial phenomena with the rhythm of human worship, giving the impression that prayer is a spiritual response to the order of God's creation [43]. Thus, al-Rāzī's interpretation remains contextually relevant, provided that one distinguishes between the text's phenomenological meaning and modern scientific explanations, allowing the verse to be understood comprehensively without losing its theological and spiritual message.

B) Sunlight as a Source of Energy for Animals

The interpretation of sunlight as an energy source for animals, as indicated in QS. Ibrāhīm: 33

وَسَخَّرَ لَكُمُ الشَّمْسَ وَالْقَمَرَ دَائِبَيْنِۚ وَسَخَّرَ لَكُمُ الَّيْلَ وَالنَّهَار

This verse reflects the integration between *tadabbur* of cosmic signs (*āyāt kauniyyah*) and modern scientific findings on ecology and animal physiology. The verse emphasizes that the sun and the moon are subjected by Allah for the benefit of humankind, which implicitly includes all living creatures, including animals [44]. Within the context of tafsir, the movement of the sun is understood as a cosmic mechanism that sustains life, as it provides light, regulates time, and triggers continuous natural processes [39]. This interpretation aligns with modern biological findings which show that sunlight plays a fundamental role in the food chain through photosynthesis, given that plants are the primary producers.

Light intensity is a photometric measure of the amount of light that strikes a surface. Measurements of light intensity in relation to animal life are based on photometric assessments adjusted to human visual perception. The standard unit is lux (lx), equivalent to 1 lumen/m² or 0.08 candela/m². Animal behavior is greatly influenced by light intensity; bright light accelerates daily activity in broiler chickens, whereas dim light is more effective in controlling aggressive behavior and reducing cannibalism [34]. Short-term increases in light intensity can also enhance animal growth and reduce skeletal disorders and metabolic problems.

It can be concluded that sunlight functions as a regulator of animals' biological rhythms and as a determinant of ecosystem dynamics. The tafsir of *āyāt kauniyyah* provides a meaningful foundation for understanding the orderliness of Allah's creation, while modern biology explains the detailed mechanisms that allow life to persist. Both perspectives complement each other and offer a comprehensive understanding that the sun is a vital element in sustaining animal life and maintaining overall ecosystem balance.

C) Sunlight as a Process of Plant Growth and Photosynthesis

Allah SWT says in Q.S. An-Naba': 13–16:

وَّجَعَلْنَا سِرَاجًا وَّهَّاجًا (13) وَّاَنْزَلْنَا مِنَ الْمُعْصِرٰتِ مَآءً ثَجَّاجًا (14) لِّنُخْرِجَ بِهٖ حَبًّا وَّنَبَاتًا (15) وَّجَنّٰتٍ اَلْفَافًا (16)

When interpreting the phrase *sirājan wahhājan*, Fakhr al-Dīn al-Rāzī emphasizes that the sun is a source of extremely powerful light and heat, and it is this intensity that makes it a primary element for the continuity of life. Al-Rāzī then links the role of the sun to the process of rainfall as described in Allah's words *wa anzalnā mina al-muʿṣirāti māʾan thajjājan*, explaining that the sun's heat causes the evaporation of water, the formation of clouds, and finally the descent of abundant, continuously poured water (*thajjājan*). The term al-muʿṣirāt is understood as clouds that are almost "pressed" by the wind until they release their water [39]. Through this rainfall, Allah brings forth three types of vegetation: grains as staple foods for humans, grasses as fodder for animals, and trees that form lush gardens, described by the term alfāfā, meaning dense and intertwined.

This analysis demonstrates a harmony between classical exegetical understandings and contemporary scientific findings: the sun indeed functions as a cosmic "lamp" that provides energy in the form of electromagnetic radiation, enabling various biological processes. When al-Rāzī associates the sun's heat

with evaporation, cloud formation, and rainfall, he not only presents a natural cause-and-effect relationship—what is called sunnat al-kausalitas—but also implicitly outlines a scientific framework, although without using modern terminology such as the hydrological cycle.

From a biological perspective, sunlight is the primary factor that triggers the light reactions of photosynthesis within the grana of chloroplasts, in which light energy is converted into chemical energy that is subsequently used to synthesize glucose as the plant's source of energy [45]. Plant growth and development are complex processes influenced by a combination of various environmental factors, and light is one of the main environmental factors affecting plant growth and development [46]. The connection between water, sunlight, and plant growth described in the verse *linukhrija bihi ḥabban wa nabātan wa jannātin alfāfā* reflects three categories of vegetation that are also relevant to modern ecological classification—food crops, grasses as animal feed, and trees forming forest ecosystems [47]. The integration between tafsir and scientific findings shows that the Qur'an not only depicts natural phenomena in a spiritual sense but also presents a coherent scientific framework that can be empirically examined.

It is therefore concluded that the sun functions as a central energy source supporting ecological processes, from water evaporation and rainfall formation to photosynthesis that produces food for all living beings. This analysis affirms that sunlight is not merely a metaphorical symbol of life but a functional energy source forming the foundation for the continuity of life on earth.

Conclusion

In al-Rāzī's view, sunlight is not merely a cosmic phenomenon but a divine sign (*āyah*) that serves vital functions for the continuity of life. The main finding of this study is that al-Rāzī interprets the Qur'anic verses about the sun by integrating rational–philosophical reasoning with scientific observation, demonstrating that the sun functions as a source of energy, a regulator of life rhythms, a determinant of time, and an essential factor in the growth and health of living beings. The implications of these findings indicate that the Qur'an not only presents a theological depiction of the sun, but also alludes to scientific principles that align with modern knowledge, such as photosynthesis, the day–night cycle, and the influence of light on human and animal physiology. This research enriches the study of al-Rāzī's tafsīr by affirming that his work exhibits a strong scientific orientation (*tafsīr 'ilmī*), as he does not merely explain the textual meaning of the verses but also presents rational arguments that illustrate the harmony between revelation and the natural order. Thus, this study opens space for the development of a more integrative approach to Qur'anic

interpretation—one that connects classical scholarly perspectives with contemporary scientific discoveries.

Author Contributions

Ali Mahfuz Munawar & Halimatussa'diah: Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration. **Ahmad Suharto & Muhamad Shofwan Muttaqin**: Methodology, Writing – review & editing, Investigation. **Rochmad**: Conceptualization, Methodology, Writing – review & editing, Investigation.

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Conflict of Interest

The authors declare no conflicts of interest.

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