DOES THE MOON SHINE OR REFLECT? A QUR'ANIC AND SCIENTIFIC EXPLORATION OF LUNAR LIGHT

Nusairah Ramli [i], Hafizah Noor Binti Isa [ii], Affa Rozana Abdul Rashid [iii]

i (Corresponding author). Senior Lecturer, Faculty of Quranic and Sunnah Studies, Universiti Sains Islam Malaysia. Email: nusairah@usim.edu.my
ii (Ts. Dr.) Assistant Professor IIUM Kuantan Campus. hafizahnoorisa@iium.edu.my
iii Fizik Gunaan, Faculty of Science and Technology, Universiti Sains Islam Malaysia.

ABSTRACT

This study investigates the nature of moonlight by combining analysis of the Qur'an, the Sunnah, and contemporary scientific perspectives. Previous scholarship has rarely acknowledged Qur'anic allusions to natural phenomena later verified by science. Most studies have contrasted Qur'anic descriptions with established scientific theories or dismissed them as allegorical—especially regarding the origin of moonlight. Critics, in the past, have argued that the Qur'an's reference to the moon as a luminous body conflicts with the scientific claim that moonlight is only reflected sunlight. This has generated ongoing debate over the compatibility of revelation and empirical inquiry. Recent scientific findings, however, show that the moon, besides reflecting visible light, emits thermal infrared radiation—an invisible form of illumination that humans cannot see but which advanced instruments can detect. This research builds on that observation, arguing that phenomena unseen by ordinary vision may still belong, in principle, to the broader spectrum of the visible and may be perceptible with alternative methods of detection. The study uses qualitative analysis of Qur'anic terminology and scientific data on electromagnetic radiation. It suggests that the moon's illumination may involve simultaneous reflection and emission of unseen light. These findings affirm the Qur'anic description of the moon as a source of *nūr* (light), which is distinct from the sun's *ḍiyāʾ* (radiant light). This demonstrates harmony between revealed knowledge and empirical observation. It also reinforces the Qur'an's reputation as a text of profound cosmological insight.

Keywords: Moonlight in Islam, Quran and science, lunar observation, Thermal Infrared Radiation, theological astronomy.

INTRODUCTION

Ibn Rushd argues that visibility is not the same as existence. A thing must possess a quality, such as color, that allows it to be perceived by sight (Ibn Rushd, *Manāhij al-Adillah*, as cited in Ibn Taymiyyah, *Bayān Talbīs al-Jahmiyyah*, vol. 2, p. 443). In a modern context, this parallels the reality of electromagnetic radiationsuch as infrared light which exists and illuminates but is beyond human vision. It can only be detected with instruments. A scientific perspective also values the unseen. Many phenomena like wind, emotions, electromagnetic forces, and tastes cannot be observed directly. Science uses indirect evidence and specific methods to understand these. Not all truths are accessible through immediate sensory experience alone. This parallel highlights

that Islamic teachings and scientific inquiry both recognize the unseen. Islam encourages a belief in both the visible and the unseen, promoting harmony between faith and reason. This approach fosters a comprehensive understanding of reality (Nasr, 2006; Sardar, 2011). Just as science explores unseen forces in nature, religious faith guides believers to metaphysical truths through revelation. This enriches the human quest for knowledge and meaning.

QURANIC REFERENCES TO LUNAR AND SOLAR ILLUMINATION: A LINGUISTIC AND THEOLOGICAL ANALYSIS

To begin the discussion with Surah Yunus (10:5).

هُوَ الَّذِي جَعَلَ الشَّمْسَ ضِيَاءً وَالْقَمَرَ نُورًا وَقَدَّرَهُ مَنَازِلَ لِتَعْلَمُوا عَدَدَ السِّنِينَ وَالْحِسَابَ ۚ مَا خَلَقَ اللَّهُ ذَٰلِكَ إِلَّا بِالْحَقِّ ۚ يُفَصِّلُ الْآيَاتِ لِقَوْمٍ يَعْلَمُونَ

The word ضياء has been mentioned in the Quran here to describe the sunlight, while the word نُور has been mentioned here to describe the moonlight. According to the famous Arabic dictionary 'Lisan al-Arab', the word ضياءoriginates from the root word ضوأ الضَوءُ والضُوءُ معروف : الضياء، وجمعه أضواءٌ, which means light, as the Prophet mentions in a hadith, "when Allah illuminates something, it becomes radiant and bright. The Arabs used to say: "I saw the flash of light (daw') in the sky", or " I hear the voice of the angel and saw the light (daw') beside him". The same (daw') is used to describe light reflection from glass or the glint in one's eyes, and it differentiates from the word (Siraj) lamp or luminary, where Siraj denotes the source that produces light, whereas (daw') refers to the radiation or illumination itself. The two terms can be employed interchangeably. For example, "The fire glowed and emitted light," or "the moon shone brightly," or "The fire gave light to itself and also illuminated its surroundings". A Bedouin said, "We lit a fire, and it gives us light and illuminates our faces". Abu Ubayd explained in the Prophet's hadith that: "The fire shone; it lit up other things".

On the Other hand, the word نُور is specifically mentioned as the Names of Allah, the Exalted, from the beginning of the discussion, while according to Ibn Arabi, النور means by which vision occurs, and through which things become visible. Other scholars state it is the One who guides to the right path, the Possessor of light, and the one who dispels darkness. While in linguistic usages, النور means the light radiated and shone. In prophetic tradition (hadith), the Prophet said regarding the believers: They will have light on the Day of Resurrection. The word النور can also describe daytime, for example, an-Nahar Nur (The day is light).

In short, the word ضياء tends to have a more physical and direct quality. It is often tied to the visible effect of a light source that may also generate heat, like fire, sun, or lamp flame. It seems more tangible, referring to the brightness itself and something implying intensity as mentioned in the ayah Quran above. While النور has a broader and more abstract scope where it can be physical light but also invisible light that refers to guidance, spiritual illumination, clarity, and purity, and not necessarily tied to heat, it can be soft, encompassing, and gentle, where the same Quranic ayah, the moonlight, is called Nur.

This same word can also carry metaphorically for divine guidance (*Nur Allah*) and moral enlightenment. According to Tafsir al-Tabari, an ayah from Surah Yunus (10:5)

هُوَ الَّذِي جَعَلَ الشَّمْسَ ضِيَاءً وَالْقَمَرَ نُورًا

Means by "He is the One who made the sun a radiant light and the moon a derived light and determined for it phases that you may know the number of years and the calculation. Allah has not created this except in truth. He details the signs for people who know"

(Yūnus 10:5).

God Exalted is His remembrance says: Your Lord is Allah, who created the heavens and the earth. He is the One who made the sun a radiant light during the day and the moon a light during the night. The meaning of this is that He is the One who caused the sun to shine and the moon to give light (al-Ṭabarī, 2001, Vol. 15, p. 7). Abū Jaʿfar Muḥammad ibn Jarīr al-Ṭabarī also mentions another ayah that mentions the sun's and moon's light is from Surah Nuh: 16, and an-Naba:3.

يقول تعالى: {وَجَعَلَ الْقَمَرَ فِيهِنَّ نُورًا وَجَعَلَ الشَّمْسَ سِرَاجًا} (٦١)

ويقول تعالى: {وَجَعَلْنَا سِرَاجًا وَهَّاجًا} (٣)

Wahhājan means "blazing" or "radiant." There is no doubt that anything which blazes produces heat, warmth, and burning; consequently, it also gives rise to discomfort, fatigue, and hardship. The sun, therefore, is scorching—not only because of its heat but even when merely looked at *(Ahmad ʿAbd al-ʿAzīz al-Shaykh Muḥammad Qushou, 2019, p. 134.*

Tafsir al-Shaʿrāwī, by *Muḥammad Mutawallī al-Shaʿrāwī* mentioned that The Exalted says: *"He is the One who made the sun a radiant light and the moon a derived light"* (Yūnus 10:5). The term *ḍiyāʾ* (radiant light) refers to light that originates from the celestial body itself, while *nūr* (light) refers to light reflected from another body; it is, therefore, not self-generated (al-Shaʿrāwī, M. M. (1997, p10494).

While Imām al-Samʿānī (d. 489 AH / 1096 CE) distinguishes between "ḍiyāʾ" (radiant, self-luminous light) and "nūr" (reflected or derivative light) — a distinction later echoed by other classical commentators such as al-Ṭabarī and al-Rāzī. This differentiation provides theological and linguistic grounding for understanding the Qur'anic depiction of the sun as an emitting source and the moon as a reflecting body (Tafsīr al-Samʿānī, 1997, vol. 2, p. 326).

Thus, based on these *tafasīr*, both terms *ḍiyāʾ* and *nūr* carry significant meanings, each describing a distinct role in explaining the function and mechanism of the sun and the moon. It is undeniable that some classical *mufassirūn* interpreted the moon's light as being reflected from the sun, while others suggested that the moon possesses its own form of illumination. Both interpretations reflect the intellectual context and scientific limitations of their time, as scholars relied on reason (*ʿaql*) and available knowledge to understand the Qur'anic verses. In light of modern scientific advancements, particularly in sensor technology, it has been confirmed that the moon also emits invisible wavelengths—such as thermal infrared radiation. This discovery renders the Qur'anic description even more remarkable, as it alludes to a deeper reality of illumination that modern science has only recently begun to uncover.

HISTORICAL CHALLENGES IN TRANSLATING AND INTERPRETING QURANIC REFERENCES TO MOONLIGHT

The history of Qur'an translation and tafsir development highlights how early translations—especially those into Latin and English may have introduced biases or inaccuracies regarding the nature of moonlight. The influence of colonial-era Orientalist scholarship, such as Edward William Lane's lexicon, is examined, alongside the impact on contemporary understanding of lunar light's nature (Lane, 1801–1876; Fakhr al-Din al-Razi, ca. 1209 CE). Table 1 captures the phases of Qur'anic translation evolution, especially focusing on the shift in interpretation of the moon's light from "shine" to "reflection."

Table 1: Phases of Quranic translation

1	610 CE	Revelation of the Qur'an begins	Original Arabic revelation usingfor sun and for moon without explicit "reflection" mention	The Qur'an (M.A.S. Abdel Haleem, Trans., 2008)
2	~650 CE (25 AH)	Compilation & official publication under Caliph ʿUthmān ibn ʿAffān	Standardization of Quranic text, preservation of original terms	Islamic historical sources
3	~865 CE (251 AH)	Earliest known Persian translations (partial)	Initial attempts to interpret illumination terms, possibly less nuance on lunar light	Historical translation records
4	1143 CE (537 AH)	First Latin translation by Robert of Ketton, commissioned by Peter the Venerable	Introduction of interpretative bias; moonlight began to be seen as reflected light	Lane's lexicon influence, Orientalist perspectives
5	1209 CE (606 AH)	Writing of Tafsir al-Kabir by Fakhr al-Din al-Razi	Emphasis on theological differentiation of sun's (radiance and heat) and moon's (illumination without heat)	Tafsir al-Kabir
6	1734 CE (1147 AH)	First complete English translation by George Sale	Translation influenced by Latin sources; moonlight often rendered as reflected light	Sale translation
7	1934 CE (1353 AH)	First English translation by Muslim scholar Abdullah Yusuf Ali	Retains original Quranic words for moonlight as , translated as "light" without explicit "reflection"; possibility of "cold light" interpretation	Yusuf Ali, 1934
8	Contemporary Era	Modern translations and tafsir emphasize unique qualities of moon's light beyond reflection	Scholars argue moonlight may have own source or qualities (e.g., coldness, spiritual light)	Modern Tafsir and linguistic studies

Despite the challenges arising from the translation of the Qur'an into Latin and other languages which often altered the meaning of the moon's illumination from "emitting light" to merely "reflecting light". By the 10th–11th centuries, several Muslim scholars including al-Tabari, al-Qurtubi, Nasir-i Khusraw, and Ibn al-Haytham, had discussed the moon's luminous nature in detail. While early exegetes treated the moon's radiance descriptively, philosophers and scientists in later centuries developed accurate physical explanations of reflected solar illumination, centuries before similar consensus emerged in European astronomy (Review of Religions, 2025; The Quran Love, 2025; National Library of Medicine, 2006).

Al-Biruni (973–1048 CE) offered one of the most empirically rigorous explanations of moonlight in premodern astronomy. In his scientific treatises—*Kitab al-Tafhim li-Awail Sina'at al-Tanjim* and *al-Qanun al-Mas'udi* he demonstrated that the Moon's brightness results from reflected sunlight rather than self-emission (UNESCO, 2011; *Encyclopaedia Iranica*, 2024; *Muslim Heritage*, 2020).

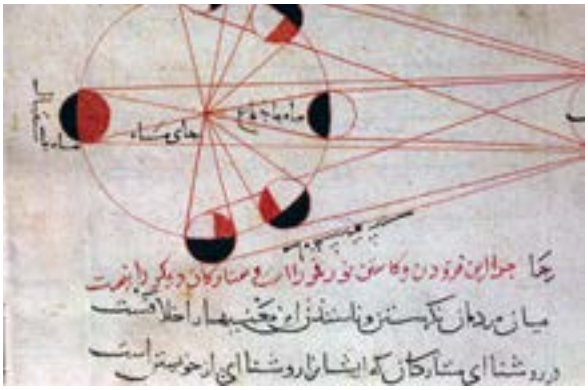

Figure 1: Lunar phases al-Biruni.jpg

Through his detailed observations of lunar phases and eclipses, Al-Biruni showed that the Moon's varying luminosity corresponds directly to its position relative to the Sun and Earth, providing early empirical evidence that the Moon shines with "borrowed" light (Al-Biruni, trans. 1436/2011; *Encyclopaedia Iranica*, 2024). In *al-Qanun al-Mas'udi*, he further analysed this phenomenon mathematically within the framework of celestial geometry, advancing beyond the largely descriptive cosmologies of earlier scholars (Britannica, 2025). This interpretation diverged from certain early Qur'anic exegetes (*mufassirun*) who held that the Moon emitted its own light. Some commentators, such as Ibn Taymiyyah, understood the Qur'anic term النور in verses like 10:5 and 71:16 as denoting intrinsic luminosity. Others, like al-Qurtubi, interpreted النور linguistically as "reflected radiance," a view consistent with Al-Biruni's empirical findings (Review of Religions, 2025).

Modern scientific understanding, however, adds further nuance. While the Moon primarily reflects sunlight, it also emits a very small amount of its own radiation, including thermal infrared and faint luminescence produced by interactions with solar particles—forms of light invisible to the human eye. Such details were beyond the observational capabilities of premodern astronomers. Therefore, both classical interpretations can be seen as partially valid: Al-Biruni's reflected-light model captures the visible phenomenon, while the notion of intrinsic emission aligns with more recent discoveries of the Moon's subtle, non-visible radiation. This synthesis shows that the Qur'anic terminology and early interpretations are not scientifically inaccurate but rather incomplete within their historical context.

Owing to certain linguistic and interpretive limitations, earlier translators and commentators often described the moon's illumination as "reflected" light, even though the Qur'anic term itself appears in other contexts carrying broader and richer meanings. This research suggests that the moon's emission of invisible wavelengths such as thermal infrared radiation offers a new interpretive dimension to the Qur'anic description, aligning with later scientific findings that moonlight is primarily sunlight reflected off the lunar surface. Although the first significant Latin translation explicitly introducing the concept of "reflection" appeared only in 1734, Islamic scholars had debated this notion centuries earlier. For instance, Jābir ibn Farudun stated that "the rule of light and the stars [is that] the origin of light is not from the Moon itself" (as cited in Matrosov

& Gudach, 2023). Such early insights demonstrate a sophisticated engagement within Islamic astronomy that combined theological reflection with empirical observation—long before modern scientific research, such as that of Wattson and Danielson (1965), confirmed the moon's thermal and reflective light properties.

METHODOLOGY

This study adopts a cross-disciplinary approach to investigate the phenomenon of lunar light by integrating Qur'anic exegesis with modern astrophysical data on reflected solar radiation and thermal emissions. The methodology explores both the metaphoric and cosmic significance of the moon as a sign of Allah's precision and divine order, while maintaining consistency with empirical observation (Nasr, 2006; Sardar, 2011). This approach underscores the necessity of employing specialized methodologies to perceive the unseen—whether spiritual, as in matters of religious faith, or physical, as in phenomena beyond human sensory capacity—thereby enriching understanding of reality beyond immediate perception.

The study employs a qualitative analysis of classical and contemporary Qur'anic exegesis (tafsīr), focusing on the linguistic and theological distinction between the terms ضياء (ḍiyāʾ, referring to the sun's radiance) and النور (nūr, referring to the moon's light). This textual analysis is complemented by a review of scientific literature on the physical properties of moonlight, including its origins, spectral characteristics, and intensity variations. Within this framework, the study examines multiple sources of lunar illumination: primarily reflected sunlight, thermal infrared emission detectable by modern sensors, and lesser-known emissions such as gamma-ray radiation and sodium taillight. Additionally, the ecological and physiological effects of moonlight on nocturnal organisms and plant biology are reviewed to contextualize the broader impact of lunar illumination on Earth's biosphere.

By synthesizing theological interpretation with empirical scientific data, this integrative methodology offers a holistic understanding of lunar light—one that bridges the domains of revelation and reason, thereby fostering dialogue between Islamic scholarship and contemporary astrophysical research (NASA, 2025; National Geographic, 2024).

FINDING & DISCUSSION

Scientifically, it is well established that moonlight is primarily sunlight reflected off the lunar surface; the moon does not generate visible light by itself (NASA, 2025). Beyond visible light, the moon emits ther-mal infrared radiation, which is invisible to the human eye but can be detected with specialized instruments (Wattson, 1965). This thermal emission represents the moon's own radiation of heat energy, distinct from the reflected solar component. It is therefore accurate to state that moonlight consists of both reflected visible sunlight and emitted unseen infrared light.

Remarkably, the Qur'an seemingly alludes to this differentiation by using distinct terms for the sun's light ضياء and the moon's light النور in Surah Yunus (10:5) (The Qur'an, M.A.S. Abdel Haleem, Trans., 2008). The softer, cooler nature of the moon's light النور aligns conceptually with the non-heat, thermal infrared radiation later identified by science.

This congruence between the Qur'anic description and modern scientific discovery serves to bridge traditional spiritual understanding with empirical evidence, enriching the discourse on lunar illumination (The Qur'an, 10:5; NASA, 2025).

THE MOON'S EMISSION OF INFRARED AND OTHER INVISIBLE LIGHT

The Moon not only reflects sunlight but also gives off its own "invisible" light beyond what our eyes can see. During the day, the surface heats up and radiates warmth as infrared light, much like a hot stove glowing in the dark; temperatures swing from about –150 °C at night to nearly 120 °C in sunlight, causing most of the Moon's glow between 8 and 14 micrometers in wavelength (Wattson & Danielson, 1965; Hayne et al., 2017). It also reflects some ultraviolet and near-infrared sunlight differently than visible light, revealing clues about its dust and rocks.

Beyond heat and reflected sunlight, the Moon emits X-rays and gamma rays when high-energy particles hit its surface. Solar X-rays strike minerals and are re-emitted at lower X-ray energies, helping scientists map lunar chemistry from orbit (Schmitt, Lucey, & McFadden, 1991). Cosmic rays from space spark nuclear reactions in the soil, causing the Moon to shine more brightly in gamma rays than the Sun in that band—information that guides the design of radiation shielding for future astronauts (Abdo et al., 2012; Burns et al., 2025).

CONCLUSION

As a conclusion, to date, extensive research on the nature of moonlight has confirmed that it is primarily sunlight reflected from the lunar surface, with no documented studies suggesting that the Quran anticipated this scientific understanding (NASA, 2025; Wattson, 1965). Historically, some critics have dismissed the Quran as incompatible with modern science, arguing that the description of moonlight as a reflection aligns with empirical findings only after scientific validation. However, recent perspectives propose that the Quran's use of the term النور —which also refers to divine light associated with Allah Himself—may encompass more than just the visible reflection, potentially symbolizing the "unseen" or غير مرئي light, such as thermal infrared radiation. This interpretation aligns with the idea that Quranic language employs terms with layered meanings, inviting readers to explore deeper spiritual and scientific truths without misjudging the text (Al-Razi, ca. 1209; Ibn Arabi, classical tafsir). The word النور itself remains largely unexplored in terms of its full semantic range, as Allah uses it to describe Himself, emphasizing that divine light transcends physical properties and includes spiritual and metaphysical dimensions. Rather than dismissing the Quran's descriptions as literal or mythical, scholars and believers are encouraged to approach these terms with an open mind—seeking not only literal understanding but also deeper spiritual insights—thus drawing closer to Allah, the Creator, through contemplation of His revealed words.

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