



Zarrah in the Qur'an and Science

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Abstract

This article aims to discuss verses from the Qur'an about zarrah and its integration with science. This research uses a qualitative design with literature study. The verses about zarrah are studied thematically using relevant scientific analysis. This research is to find out: (1) What is the meaning of zarrah in the Qur'an and science, (2) what is the relevance of zarrah in the Qur'an to the development of science. The results of the research are as follows (1) an atom is called the lafadz dzarrah, which means the smallest object that cannot be divided further. lafadz dzarrah is also expressed as the smallest ant (ant's head), in essence lafadz dzarrah is used to visualize something very small. Likewise, Greek scientists stated that atoms were the smallest particles and could not be divided further. With the development of science, research has been discovered which suggests that atoms are divided into three constituent parts, namely protons, electrons and neutrons. (2) The interpretation made by the mufassir of the word zarrah has relevance to the development of science. Mufassir's interpretation of the word zarrah has led scientific experts to research more comprehensively the smallest object in the world. And finally they discovered that atoms are the smallest objects in the world. 6-7: (a) Teacher as a mentor, (b) Teacher as a navigator, (c) Teacher as a role model, (d) Teacher communicates with students' parents

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INTRODUCTION

Talking about science, the Qur'an is the holy book of Muslims which is a revelation received by the Prophet Muhammad during his preaching period (Huda, 2016; Lukman, 2018; Niam, 2022). The Qur'an is an eternal Islamic miracle that contains the value of science. Several scientific facts about the Koran have been proven to be authentic by scientists. Scientists have been able to provide evidence of its truth through several scientific observation experiments. The Qur'an is always one step ahead of today's modern scientific discoveries (Hanafi, 2010; Puspitasari & Muriyatmoko, 2020).

The Qur'an is timeless, with increasingly modern science it is proven that the Qur'an has responded to the challenges of the times, it is important to remember that the Qur'an is not a book of "science" but is a book of "Sign" where the aim is to reveal the Al-Qur'an. -The Qur'an is to provide guidance for humans (Akbar, 2022; Fauzan, 2023; Ghoni, 2021; Haliza et al., 2022; Miftahul, 2022; Mujib, 2022).

The Qur'an instructs humans to use their minds in order to obtain muamalat widely and is found in many verses of the Qur'an which explain the universe and the events that occur in it. It has been a very long time and is very familiar, and the atomic theory is widely accepted. Likewise, Arabs believe the same thing, namely atoms or what is called "zarah" (Ajrina et al., 2023a; Azzuhro, 2021; Murtadlo et al., 2023). Allah says in Surah Al-Zalzalah verses 7-8:

فَمَنْ يَعْمَلْ مِثْقَالَ ذَرَّةٍ خَيْرًا يَرَهُ (٧) وَمَنْ يَعْمَلْ مِثْقَالَ ذَرَّةٍ شَرًّا يَرَهُ (٨)

Meaning: (7) Whoever does good deeds as heavy as dzarah, surel He will see (the reward).

(8) And whoever commits a crime as big as dzarah, surel He will see (retribution) for it too. (Indonesian Ministry of Religion, 2015)

From this verse there is the word dzarah, which is finer than dust, the word dzarah is usually used by Arabi physicists when mentioning the word atom (Napsawati et al., 2023; Sabarni, 2019). In this verse it is also seen that atoms have weight or are called mass and magnitude because this verse mentions the weight of dzarah meaning that atoms (dzarah) have mass.

METHODS

This research uses qualitative methods with literature study. The verses about dzarah are studied thematically. The type of data collected is primary data, namely tafsir books and secondary data, namely books, articles and supporting scientific journals related to dzarah and the Qur'an.

FINDINGS AND DISCUSSION

Understanding Atoms

According to the language, zarah comes from the word adz-dzarru which means small ant, and one hundred ants are equivalent to one grain of wheat (Muhammad, 2013). Meanwhile, in al-'Ashri's dictionary the word zarah is defined as molecules, atoms and the smallest part of an element (Mudhlor, 1998).

In general, Arab society, when the Qur'an was revealed, interpreted Zarah as flying dust which was only visible, among other things, through glass that was penetrated by sunlight (Azzuhro, 2021). As time goes by and the progress of science, al-Baqi' said that Zarah is a language to describe the smallest thing. When the atom was discovered, Arabic experts named it Zarah, because at that time it was considered the smallest chemical element. Of course, after the atom can be broken down or separated, the smallest parts are more appropriately named Zarah (Al-Hafidz, 2005).

So it can be concluded that the word zarah has a variety of different meanings, but has an essence, namely the smallest thing that is the same in this world. Currently, the meaning of atom is most widely used to interpret the pronunciation of

zarrah.

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So it can be concluded that the word *zarrah* has a variety of different meanings, but has an essence, namely the smallest thing that is the same in this world. Currently, the meaning of atom is most widely used to interpret the pronunciation of *zarrah*.

Atomic Structure

The atomic structure is the basic unit of matter consisting of the atomic nucleus and the negatively charged electron cloud that surrounds it (Tentor Indonesia, 2019). An atom consists of an atomic nucleus and electrons which are outside the atomic nucleus (Hani, 2015). The atomic nucleus is composed of protons and neutrons. All atoms are formed by the same subatomic particles and the only thing that differs is the number of subatomic particles.

Today, scientists know that there are many subatomic particles (this greatly stimulates the curiosity of physicists). But to understand chemistry well we only need to pay attention to the three main subatomic particles as follows (Chang, 2005; Watini & Devana, 2021):

Electrons

Electrons are subatomic particles that have a negative charge and are generally written as e^- (Pasaribu & Reza, 2021; Yuliananda et al., 2015). Electrons do not have any known basic components or substructure, so they are believed to be elementary particles. An electron has a mass of about $1/1836$ the mass of a proton. Electrons are one of the three particles that make up atoms and are most responsible for the chemical elements.

Proton

Protons are stable basic particles that form atoms found in the atomic nucleus (Song et al., 2019; Xiao et al., 2024). This proton has a positive charge of 1.6×10^{-19} C and a mass of 938 MeV ($1.6726231 \times 10^{-27}$ kg, or about 1836 times the mass of an electron). Protons were discovered by Goldstein in 1886, and have a positive charge.

Neutrons

In 1932, J. Chadwick discovered a third elementary particle which is located in the nucleus and has no charge, this particle is known as the neutron (Feather, 1974; Nesvizhevsky & Villain, 2017; Rogers, 2013). Neutrons are the building blocks of atoms that are located in the atomic nucleus and have a neutral charge (Ajrina et al., 2023). Neutrons are slightly heavier than protons. However, neutrons have no charge or are neutral so they do not play much of a role in chemical reactions.

The discovery of neutrons has made the structure of the atom even clearer, that atoms are composed of an atomic nucleus with electrons surrounding it in the orbit of its shell. The atomic nucleus consists of positively charged protons and uncharged neutrons. Meanwhile, electrons have a negative charge (L'Annunziata, 2020; Rahmawati et al., 2024).

Zarrah in the Koran

The pronunciation of *zarrah* in the book *Mu'jam al-mufahros li al-fadz al-Qur'an* is found in several letters in the Qur'an, including Surah Yunus: 61, Surah Saba': 3 and 22, Surah an-Nissa: 40, al-Zalzalah: 7 and 8 (al-Baqi, 1996). Surah Yunus Verse 61:

وَمَا تَكُونُ فِي شَأْنٍ وَمَا تَتْلُو مِنْهُ مِنْ قُرْآنٍ وَلَا تَعْمَلُونَ مِنْ عَمَلٍ إِلَّا كُنَّا عَلَيْكُمْ شُهُودًا إِذْ

تَفِيضُونَ فِيهِ وَمَا يُعْزَبُ عَن رَّبِّكَ مِنْ مِّثْقَالِ ذَرَّةٍ فِي الْأَرْضِ وَلَا فِي السَّمَاءِ وَلَا أَصْغَرَ مِنْ ذَلِكَ وَلَا أَكْبَرَ إِلَّا فِي كِتَابٍ مُبِينٍ (٦١)

Meaning: 61. You are not in a state and do not read a verse from the Koran and you do not do a job, but We are witnesses over you when you do it. it cannot escape the knowledge of your Lord even if it is as big as a zarrah (atom) on earth or in the sky. there is nothing smaller and nothing (also) greater than that, but (everything is recorded) in a real book (Lauh Mahfuzh).

The Word of Allah SWT "مَا تَكُونُ فِي شَأْنٍ" you are not in a situation.", the letter مَا in this sentence functions as a rejection and disclaimer. This means, whatever your situation and whatever you do, Allah will watch over you. This pronunciation was also shown to the Prophet Muhammad SAW and what is meant is him and his people.

According to al-Qurthubi in his book tafsir al jami' li ahkam al-Qur'an, says that Lafaz ذَرَّةٍ مِنْ مِّثْقَالٍ ذَرَّةٍ "Even if it is as big as a Zarrah (atom)." The word means the weight of an atomic scale or also means a small red ant' (al-Qurthubi, 2008).

Meanwhile, according to Abu Ja'far Muhammad bin Jarir Ath-Thabari in his book Tafsir al-Jami' al-Bayan an Ta'wil Ayl al-Qur'an, says that lafaz ذَرَّةٍ ذَرَّةٍ: "Even if it is as big as Zarrah (atom)," the meaning is from the smallest ant weight. The Arabs used to say, "Take this, because it is lighter than that." What this means is that the scales are lighter.

Abu Ja'far said: this is news as well as confirmation that nothing is even the smallest, even though the scales are very light. There is also no greatest object, even if it is hidden from Allah (At-Thabari & Jarir, 2009).

Hamka in his tafsir work, namely tafsir al-Azhar, which explains the pronunciation of zarrah. He interpreted the pronunciation zarrah, which to be more popular means dust. Even though zarrah is finer than dust. In this modern era, after the development of science and people investigating atomic energy and being able to utilize it, the atom is used in languages throughout the world using the phrase zarrah (Amir et al., 2017; Hamka, 1990; Rahim Dani, 2023; Ramadhan et al., 2024).

The same thing was also expressed by M. Quraish Shihab in his commentary on al-Mishbah, the pronunciation of zarrah is understood by several scholars in various meanings, including very small ants, ant heads, and flying dust that is only visible in the sun. While today's people understand it in atomic terms. And indeed that is the word that is now used to refer to atoms, even though atoms were not yet known at the time of the revelation of the Qur'an. In the past, language users used this word to refer to the smallest thing (Shihab, 2002).

The Qur'an uses the word zarrah for the smallest thing, and the usual meaning of this word is a small ant or a small dust particle. Because the word zarrah is associated with the smallest and smallest object, while the general understanding of the smallest object refers to an atom, zarrah is often interpreted as an atom (Hazrina et al., 2024; Maulahibati et al., 2023; Purwanto, 2008; Yulita et al., 2019).

Zarrah is also mentioned in the letter Saba': 3

وَقَالَ الَّذِينَ كَفَرُوا لَا تَأْتِينَا السَّاعَةُ قُلْ بَلَىٰ وَرَبِّي لَتَأْتِيَنَّكُمْ عَالِمِ الْغَيْبِ لَا يَعْزُبُ عَنْهُ مِثْقَالُ ذَرَّةٍ فِي السَّمَاوَاتِ وَلَا فِي الْأَرْضِ وَلَا أَصْغَرَ مِنْ ذَلِكَ وَلَا أَكْبَرَ إِلَّا فِي كِتَابٍ مُبِينٍ (٣)

Meaning: 3. And those who disbelieve say: "The Day of Resurrection will not come to us." Say: "It will surely come, by my Lord who knows the unseen, verily the apocalypse will surely come to you. There is nothing hidden from Him as great as the zarrah that is in the heavens and that is on the earth and there is nothing (also) smaller than that and bigger, but it is in a real book (Lauh Mahfuzh)"

The verse above explains about disbelievers who acknowledge the beginning of the incident, but deny the repetition of the incident. This is contrary to what they profess, namely the power of awakening. They said, "Even if He had power, He would not do it." This was clearly an attitude of defiance, after being told verbally by the apostles that He would resurrect all creatures. If news comes of something that is possible and capable of being done, then anyone's lies about that thing do not make sense (al-Qurthubi, 2009).

Therefore, Allah ordered the Prophet Muhammad to say to the disbelievers who deny the coming of the Day of Judgment that the Day of Resurrection will come to you by my Lord who knows everything that is unseen and that from Him nothing is hidden even as heavy as *Zarrah*, in the sky. This thing or on earth is not smaller than that blood or bigger, but it is stated in the real book, namely *laahul mahfuz* (Katsier et al., 1990). In this interpretation, *Zarrah's* words are compared to the weight of a drop of blood.

According to M. Quraish Shihab in *Tafsir al-Mishbah*, the word *Zarrah* is used in the Qur'an to refer to something very small. Previously, it was understood by ignorant people to mean the head of an ant or dust that could be seen flying under the glare of sunlight or ant eggs (Boulu, 2019).

Still in the same letter but with a different verse, namely in the letter *Saba'* Verse 22:

قُلِ ادْعُوا الَّذِينَ زَعَمْتُمْ مِنْ دُونِ اللَّهِ لَا يَمْلِكُونَ مِثْقَالَ ذَرَّةٍ فِي السَّمَاوَاتِ وَلَا فِي الْأَرْضِ
وَمَا لَهُمْ فِيهِنَّ مِنْ شَرِكٍ وَمَا لَهُ مِنْهُمْ مِنْ ظَهِيرٍ (٢٢)

Meaning: Say: "Call those whom you consider (as God) besides Allah, they do not have (power) even the weight of *zarrah* in the heavens and the earth, and they do not have any share in (the creation of) the heavens and the earth and there is absolutely nothing among those who became His helpers (Department of Religion of the Republic of Indonesia, 2015).

In Ibn Kathir's interpretation, Allah confirms that He is the One and Only God who has no allies and no friends, no children and no children and that the gods who are worshiped besides Allah are gods who do not have as much power as *Zarrah* in the heavens or on earth, either. have no stake as helpers in the creation of the heavens and the earth and none of those gods are considered to be helpers as Allah Almighty.

In Hamka's *Tafsir al-Azhar*, at the beginning of Surah *Saba'* verse 22, "Say: "Call on those whom you consider other than Allah." That is, what you think has power is also God's power, which is able to give humans the power to soften iron, command birds or command jinn. God confirms that no matter how you cry, "They do not have as much power as *Zarrah* in all the heavens and not even in the earth." Because all power is absolute in Allah.

With the development of science today, lafaz *Zarrah* is interpreted as atom, because atoms are small objects that cannot be seen with the ordinary eye. Atoms are not small things but big things, because it has been proven that atoms are just objects and there are also those who think atoms are energy. Looking at the traces it turns out that the properties of objects and energy are in atoms. It is the Almighty, All-Wise and All-Knowing who arranges the atoms in such a way (Hamka, 1990).

According to al-Qurthubi in his book *tafsir al jami' li ahkam al-Qur'an*, the pronunciation of *Zarrah* is also mentioned in Surah *An-Nissa'* verse 40 which reads:

إِنَّ اللَّهَ لَا يَظْلِمُ مِثْقَالَ ذَرَّةٍ وَإِنْ تَكَ حَسَنَةً يضاعفها وَيؤت من لدنه أجراً عظيماً (٤٠)

Meaning: Indeed, Allah does not wrong anyone even as big as *zarrah*, and if

there is virtue as big as zarrah, surely Allah will multiply it and give from His side a great reward (Department of Religion of the Republic of Indonesia, 2015).

Al-Qurthubi or Shaykh Imam in Tafsir al-Jami' li Ahkam al-Qur'an explains the word of Allah *إِنَّ اللَّهَ لَا يَظْلِمُ مِثْقَالَ ذَرَّةٍ* which means "Indeed, Allah does not wrong anyone even as big as *Zarrah*". The meaning of this verse is that Allah will not harm or reduce the reward they have done, even if it is only the size of a *Zarrah* seed, but Allah will reward them and reward them for the deeds they have done. Ad-*Zarrah* here means red ant, this meaning is taken from the words of Ibn Abbas.

Al-Qurthubi said, "The Qur'an and Sunnah explain that *Zarrah* has scales or can be weighed, just like dinars and half dinars which have scales or can be weighed. Another opinion says *Zarrah* means *Khardala* (mustard seed), as Allah SWT says, which means:

"So no one will be harmed in the slightest. and if (the deed) is only as heavy as a mustard seed, We will surely bring (reward) it" (Qs. Al-Anbiyaa' [21]: 47).

Another opinion says the meaning is not mustard seeds, but in general the word *Zarrah* is the name for something that is the least and smallest, and in Sahih Muslim, there is a hadith narrated by Anas, he said, the Prophet SAW said, which means:

"Indeed, Allah SWT will not do injustice to believers, for the good they do in this world, and will be rewarded in the afterlife. "As for the disbeliever, he will be fed (rizki) with the good things he does for Allah in the world, so that when he reaches the afterlife, he will no longer have any good deeds that must be rewarded" (al-Qurthubi, 2009).

Nowadays the word is used in the sense of atom. Meanwhile, His words which are smaller than *Zarrah* are protons and neutrons which are two atomic elements."

Allah's Word in Surah Az Zalzalah: 7-8

فَمَنْ يَعْمَلْ مِثْقَالَ ذَرَّةٍ خَيْرًا يَرَهُ (٧) وَمَنْ يَعْمَلْ مِثْقَالَ ذَرَّةٍ شَرًّا يَرَهُ (٨)

Meaning: 7. Whoever does good deeds as heavy as *dzarrah*, surely He will see (the reward). 8. and whoever commits a crime as big as *dzarrah*, surely he will see (retribution) for it too (Department of Religion of the Republic of Indonesia, 2015).

Ibn Abbas once said, "Whoever of the disbelievers does good deeds as heavy as *Zarrah*, surely he will see (the reward) in this world, and there is no reward for him in the afterlife, he is punished with his polytheism, and whoever of those A believer who does bad deeds will surely see (the reward) in this world, there will be no punishment for him in the afterlife when he dies, his bad deeds will be exploited, and if he does good deeds as heavy as *Zarrah*, good deeds will be accepted and multiplied in the afterlife" (Fahliza et al., 2024; Gustianda, 2022; Habibi, 2021).

According to Hamka, in his tafsir work, namely tafsir al-Azhar, explains Lafa \tilde{z} *Zarrah*. In both verses it reads lafa \tilde{z} *Zarrah*, which to make it more popular we can just interpret it as dust (Faiziah & Mujahid, 2023). Even though *Zarrah* is finer than dust. In this modern era, after the development of science and people investigating atomic energy and being able to utilize it, the atom is used in languages throughout the world using the phrase *Zarrah*. Arabi physicists also call *Zarrah* al-Jauharul-fard, a very subtle object that cannot be divided further (Zulkarnaini & Badawi, 2021).

Shaykh Muhammad Abduh in his interpretation emphasized that this verse states that all deeds and efforts, good and bad, big and small will be judged by God. Whether those who do it are believers or unbelievers. Strictly speaking, the good deeds of people who disbelieve are appreciated by God, even though they are not free from punishment for their disbelief (Adzima et al., 2023; Hamka, 1990; Irfamni, 2024; Syafi'i, 2014).

1. The relevance of the meaning of *zarrah* in the development of modern science

Based on the description above, the meaning of *Zarrah* in relation to its

relevance in the current era of development is that the atom is the smallest element in which there is a particle structure that forms it, namely protons with a positive charge, electrons with a negative charge and neutrons which are nuclear particles that have neither negative nor positive charge.

As technology advances now, the existence of atoms that have several arrangements in the periodic system, one of which is radioactive substances. Radioactivity is the emission of particles from the atomic nuclei of certain elements (Karmaker et al., 2021; Qi et al., 2019). In the periodic table, radioactive elements are shown as elements that have an atomic number above 83. Radioactive substances themselves are alternative energy that was developed to find a replacement for fossil energy which continues to be depleted in quantity. To make it easier to describe, one of the uses of radioactive substances is nuclear energy sources. The benefits of this radioactivity are very popular in the field of modern weapons.

In the medical field, radiation rays are used to treat leukemia, as therapy for tumor and cancer sufferers (Yunus & Bandu, 2019). In agriculture it is used to eradicate pests and as a preservative for storing onions and turnips.

Apart from being useful in various fields, radioactivity can also present losses or dangers. One of the losses or dangers caused by radioactivity is that radiation that hits the body can ionize tissue or cells, so that the effect of this ionization can harm the body. Ionization that occurs in tissues or cells by radioactive radiation can produce highly reactive atoms or groups of atoms with unpaired electrons called free radicals. These free radicals can disrupt chemical reactions in tissues or cells. This is because free radicals are very reactive and unstable. Therefore, free radicals play a role in the spread of various diseases, such as arthritis, heart disease and brain disorders. If enzymes in the human body cannot control free radicals, then these free radicals can attack lipids, proteins and nucleic acids.

The interpretations made by classical and modern interpreters have very close relevance to the development of science. The meaning of the word *Zarrah*, which was previously limited to mustard seeds, dust, ants and so on, has made scientific experts research more comprehensively about the smallest objects in the world. Their results were ultimately not in vain, namely the discovery of the smallest object in the world, namely the atom. This ultimately triggered modern commentators to replace the meaning of *Zarrah* with findings made by science experts, namely atoms (Billah et al., 2020; Fadlullah & Hidayah, 2020). Like the interpretations from Hamka and M. Quraish Shihab, these two interpretations have used the word atom to interpret the word *Zarrah*.

CONCLUSION

An atom is called *dzarrah*, which means the smallest object that cannot be divided further. *lafadz dzarrah* is also expressed as the smallest ant (ant's head), in essence *lafadz dzarrah* is used to visualize something very small. Likewise, Greek scientists stated that atoms were the smallest particles and could not be divided further. With the development of science, research has been discovered which suggests that atoms are divided into three constituent parts, namely protons, electrons and neutrons.

The interpretation made by the mufassir of the word *zarrah* has relevance to the development of science. Mufassir's interpretation of the word *zarrah* has led scientific experts to research more comprehensively the smallest object in the world. And finally they discovered that atoms are the smallest objects in the world.

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