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How do Astrophysics and the Qur'an Perceive the Extraterrestrial Life? A Qualitative Study

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Abstract – The topic of extraterrestrial life is still only a theory and the truth is still being investigated. Therefore, this research aims to analyze the beginning formation of the universe according to astrophysics and the Qur'an, astrophysics discoveries about extraterrestrial life, and letters in the Qur'an that hint at extraterrestrial life, as well as analyzing the relationship between astrophysics and letters in the Qur'an related to extraterrestrial life. This research is qualitative research with a method consisting of library research and interviews. The primary data of this research comes from scientific articles of previous research, relevant books, and interpretations of Qur'an verses. The secondary data were obtained through the results of interviews with experts. The data analysis technique in this study was adapted from the analysis technique of Miles & Huberman, while the verses of the Qur'an used the Kemenag interpretation with a scientific interpretation style. The results show that in line with the astrophysical discoveries, the creation of the universe and the existence of extraterrestrial life are also hinted at in the Qur'an. In addition, the alleged presence of water on other planets also supports the signs in the Qur'an. Based on the results, it can be concluded that there is no dichotomy between astrophysical discoveries and signs in the Qur'an regarding extraterrestrial life.

Keywords: astrophysics; extraterrestrial life; muslim physicists; qur'an

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I. INTRODUCTION

The discussion of extraterrestrial life among scientists and academics is endless. The topic is still only a theory and is still being investigated. Extraterrestrial life or life other than on earth is believed to exist because of the view that only humans can't occupy this vast universe (Ivanov et al., 2020). The wider community increasingly recognizes this presumption of extraterrestrial

life due to works of science fiction depicting extraterrestrial beings known as aliens, for example, the works of HG Well's "The War of the Worlds" (Johnson, 2020).

Along with the development of science and technology, many designs investigate the existence of extraterrestrial life. Some of them, such as the great revolution in modern astronomy that made observations of exoplanets (Snellen et al., 2013), the

recognition of a universe full of exoplanets (Helling & Rimmer, 2019), the discovery of liquid water in the solar moon, and a continued focus on Mars exploration (Kwiek, 2019). All of which accelerate the re-evaluation of potential biomarkers for extraterrestrial life (Avnir, 2021). Several studies, such as the discovery of two early candidates for (Nurcresia et al., 2019), discussions on the pros and cons of the existence of other life beyond Earth (Hana, 2020), the search for other life beyond earth based on the hypothesis that the universe is fractal from a macro scale. On a micro level, some of the efforts have been made to prove the existence of extraterrestrial life (Chen & Zhang, 2019).

Physics is one part of the natural sciences obtained from the research or discoveries of scientists. The development of physics occurs because discoveries and questions arise regarding the same phenomenon (Bancong & Song, 2020). Physical phenomena that study cosmic objects on earth and outer space are known as astrophysics. Astrophysics studies many things, starting from the origin of the universe's formation, the evolution of stars and galaxies, the formation of a planet, and the identification of the ideal cosmic environment to support extraterrestrial or extraterrestrial life (Ivanov et al., 2020).

On the other hand, the Al-Qur'an, which is the holy book of Islam, has hinted at the existence of other living beings in outer

space. One of the signs is QS Ash-Shura 42:29. The verse means, "And among His signs is the creation of the heavens and the earth and the creeping things He spreads over them. And He has the power to collect everything when He wills." By this verse, Allah hints at the existence of creatures (slithers) that He spreads in the heavens and on earth.

Thomas Djamaluddin, who currently serves as Research Professor of Astronomy-Astrophysics, Center for Space Research BRIN, also conveyed the thoughts about the existence of living things in outer space described in the Al-Qur'an. According to him, not only do astronomers believe in the existence of extraterrestrial beings, but the Al-Qur'an also hints at the existence of these intelligent creatures (Safitri, 2019). It's in line with the thoughts of Mufid (2014), who states that the Qur'an is a guide for everything in the world (*Rahmatan Lil 'Alamin*), not only for Muslims but also for non-Muslims. It is also revealed through its scientific truth, including astronomy, biology, medicine, earth, and the environment before being discovered by scientists (Widiyanti, 2013).

Similar research has also been carried out by Safitri (2019) and Maulana (2017). The author hopes that in the future, physics-astronomy integrated with the Qur'an can be taught in schools. The hope is that the naturalist and spiritual intelligence of students can increase after the tadabbur of nature (Hambali, 2017). However, qualified teacher

resources are needed to do so (Mujizatullah, 2019). On the other hand, the ability of pre-service teachers to think reflectively about subjects such as Earth physics is still considered low (Rosmiati et al., 2020). Hence, it becomes a shared task to be able to teach integrated learning with religion in the future. The main thing is learning physics which requires instructions for the existence of God.

Based on the discussion about the existence of extraterrestrial life, juxtaposing astrophysics with the Qur'an, which is supported by the views of experts, becomes an exciting research. The objectives of this study were as follow: (1) analyzing the beginning formation of the universe according to astrophysics and the Qur'an; (2) analyzing astrophysics discoveries about extraterrestrial life; (3) exploring the letters in the Qur'an that hint at extraterrestrial life; (4) analyzing the relationship between astrophysics and letters in the Qur'an related to extraterrestrial life.

II. METHODS

This research is a qualitative research that comes from personal views, process explanations, and extracting in-depth information from the research subjects. The methods of collecting data consisted of library research and interviews. The primary data of this research comes from scientific

articles of previous research, relevant books, and interpretations of Quranic verses that discuss the research topic. The secondary data were obtained through the results of personal interviews with two experts. There were 9 scientific articles analyzed, while there were 3 supporting books. After all the data were collected, triangulation was carried out to draw conclusions. This research involves several data sources, so data triangulation techniques are used to obtain valid results.

The data analysis technique in this study was adapted from the analysis technique of (Miles et al., 2018). Data analysis was carried out through three stages, including (1) data reduction, namely removing unnecessary things; (2) data display, namely understanding what happened and planning the following steps; and (3) conclusion drawing/verification, namely answering the problem formulation that was made. This technique was chosen considering that qualitative research is temporary and continues to evolve as conditions change in the field.

In this study, the author uses the interpretation of the Kementerian Agama Republik Indonesia (Kemenag) with a scientific interpretation style (Tafsir Ilmi). Tafsir Ilmi is an interpretation that comes with nuances of science and technology. This interpretation was chosen to be able to combine astrophysical discoveries with Qur'an verses related to the research topic.

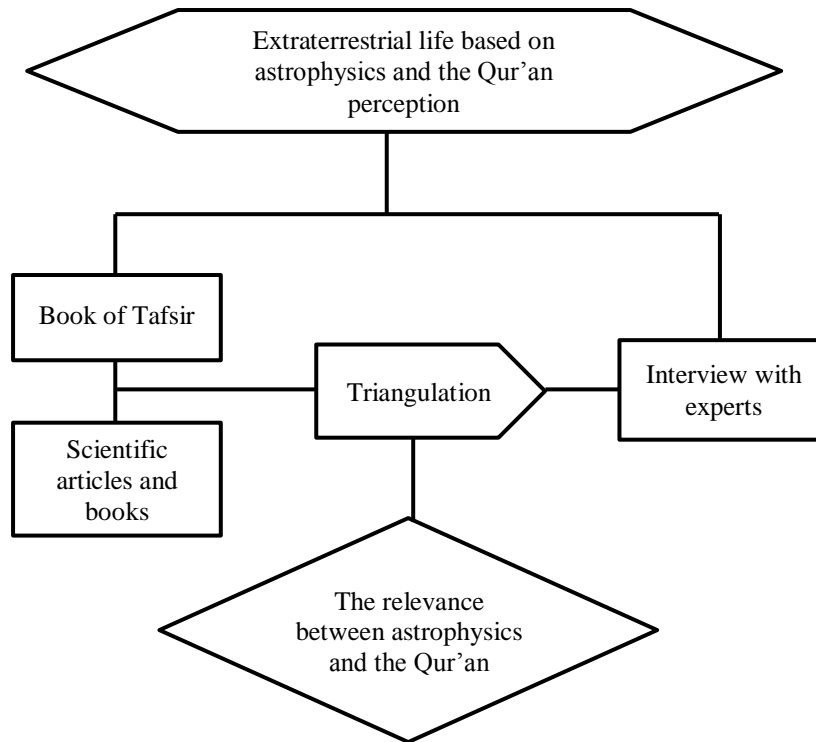


Figure 1. The research procedure scheme

III. RESULTS AND DISCUSSION

Formation of the universe

The Qur'an, since 14 centuries ago, has indicated that the universe was created in six periods (QS Fussilat 41:9-12). Each consists of two periods. The first is to create the sky in the form of *dukhan* (a mixture of dust and gas), the second is to create the earth, and the third is to create plants and animals as a source of life for their inhabitants (Djamaluddin, 2022). The universe is inconceivable which means that the expansion of nature continues throughout time. It follows the expansion theory, which states that nebulae, prospective stars, move away from the Milky Way galaxy at different speeds (Widiyanti, 2013). The celestial bodies in one galaxy move away from each other

(QS Ad-Dzariyat: 47). Table 1 shows the formation of the universe based on the Qur'an perception.

The accepted scientific theory to explain the creation of the universe is the Big Bang (BB) theory (Naik, 2007). BB theory is very complex and has been developed by scientists. The first scientists who contributed to formulating the BB theory were Lemaitre in 1927 and Gamow in 1948 and then reintroduced by Edwin Hubble and clarified by Stephen Hawking (Snellen et al., 2013). The following excerpts from interview with Muslim physicists related to this point.

The only theory accepted to date to explain the creation of the universe scientifically is the Big Bang theory proposed by Edwin Hubble and later redefined by Stephen Hawking.

(Interview respondent 1)

Table 1. The formation of the universe according to the Qur'an (Kementerian Agama RI, 2012)

Means	Tafsir ilmi Kemenag
"He (Allah) is the creator of the heavens and the earth. How (could) He have a son when He has no wife? He created all things, and He is Aware of all things." (QS. Al An'aam, 6:101)	That verse explains that God is the creator of the heavens and the earth, the universe, and its contents. He created from nothingness to exist absolutely without the help of energy or other objects. At the end of the verse, it is emphasized that He (Allah) is All-Knowing, and His eternal Knowledge is not limited by space and time.
Do not those who disbelieve know that the heavens and the earth were joined together, then We separated them, and made all living things out of water? So, do they not believe? (QS Al-Anbiya, 21:30)	Heaven and earth, which used to be a solid unity, then God separated the two. The earth's satellite was originally very hot because it rotated continuously and eventually became cold and dewy. The old dew became a clump of water. It is the source of life of beings.
The heaven We raise with our hands, and verily We enlarge (it). (QS Al Dzariyaat, 51:47)	The word "heaven" is widely used in various verses of the Qur'an. This word, in some verses, has the meaning of the universe. The universe is not something static. The universe is something dynamic, ever-changing, and expansive.
Then he went to the sky and (the sky) was still in the form of smoke. He said to him and the earth, "Submit to Me obediently or compulsorily." They both replied, "We submit obediently." (QS Fussilat, 41:11)	God created the sky, which was still in the form of smoke. Heaven and earth come from the same "smoke" material, then separated from each other.
He has raised the building, then perfected it (QS An-Naziat, 79:28)	This verse explains that Allah raised the sky, expanded it, and equipped it with celestial objects. God also gave the decree to arrange the celestial objects to stay in place and not fall. Space and time continue to expand widely. That is called "raising the building (the sky)."

In short, the BB theory stems from the big bang that occurred when all the matter in the cosmos with a considerable density and a very high temperature came out of a tiny volume. In other words, the beginning and formation of the universe began with a big explosion from a single point (Naik, 2007). After one billion years, the big bang occurred, galaxies began to form and subsequently formed galaxy clusters (Purwanto, 2015).

Edwin Hubble proved that non-local galaxies in the universe experienced expansion (Naik, 2007). Edwin Hubble's

observations began in 1924-1929. With the help of his telescope, Hubble managed to find a shift in the light of the stars towards the red end of the spectrum. This shows that the galaxies are moving away from each other at a speed proportional to the distance (Purwanto, 2015). As a result of this expansion, the pressure and temperature of the universe decreased. Furthermore, the basic particles that makeup matter such as quarks and leptons were born. According to Purwanto (2015), the universe began to expand from time to zero (the Big Bang).

Physically it is believed that before the event occurred, there was no event whatsoever that could be verified even using scientific methods.

The discovery that the universe is expanding, for now, is following the interpretation of QS An-Nazi'at 79:28. The perception of Muslim physicists on this aspect can be seen in the following interview excerpts:

Tafsir al-Qur'an can change according to human ability (interpreters) in understanding the natural universe. The words "expand and rise" mentioned in verse, for the time being, may fit the current scientific understanding of the creation of the universe. The possibility of interpretation will change the future following the development of theories about the universe.

(Interview respondent 1)

Stephen Hawking explained that the universe had neither a beginning nor an end. He analogized the universe as a circle line that is unclear at the starting and ending points (Purwanto, 2015). An expanding universe does not hinder a creator, but it limits when he may do his work (Avnir, 2021). In line with this, Muslim physicists believe that the Big Bang did not happen by itself but that Allah created it. The following excerpts from interview with Muslim physicists related to this point.:

The creation of the universe began with the Big Bang event (see QS 21:30) around 13.7 billion years ago. The universe began from nothingness or singularity. In terms of faith, this verse teaches that the Big Bang did not happen by itself but that Allah created it. Allah is

the trigger of the Big Bang as the beginning of the formation of matter and time.

(Interview respondent 2)

The search for extraterrestrial life

The existence of extraterrestrial life is implicitly explained in QS Al-Jasiyah 45:13. In this verse, Allah explains that "He" has subdued all beautiful creatures in the heavens and on earth to be used by humans in carrying out their duties as vicegerents of Allah on Earth. The word "subdue" can be interpreted if humans can take advantage of celestial bodies. For example, make time markers or calendars based on observations of the moon and sun that orbit regularly.

According to respondent 2, the search for extraterrestrial life is carried out by looking for three characteristics of the existence of life: (1) planets have heat sources (mainly from their parent stars) that allow water in a liquid state, (2) there is liquid water, and (3) there are organic elements that form life, especially the C-H-O-N chain. Several attempts to search for extraterrestrial life carried out by scientists were carried out by looking for signs of life such as liquid water. This search has begun to be studied for its development, but until now the appropriate method for further investigation has not been found. Muslim physicists claimed that Mars was once thought to contain water; however, it disappeared because of the long-term solar wind. In addition, on Jupiter's moon, Europa, it is suspected that there is liquid water under

the ice sheet, but it is difficult to prove it. The following excerpts from interview with Muslim physicist about this aspect.

It is suspected that there used to be life on Mars, although it has not developed into higher-order life. On other planets, it is difficult to find liquid water. On Jupiter's moon, Europa, it is suspected that there is liquid water beneath the ice sheet, but it is difficult to prove it. While outside the solar system, look for planets that meet the criteria for habitable zones (the distance from their parent star allows the temperature to be adequate for the presence of liquid water).

(Interview respondent 2)

Respondent 1 also conveyed that although there are traces of water flow on Mars, there is no valid information about other types of creatures that Allah has spread in the sky. The following excerpts from interview with respondent 1 related to this poin.

We do not have any information about the distribution of Allah's creatures in the "Sky" (Planets, stars, meteors, etc.), and we also have not found other types of creatures that Allah has spread in the sky. If we look at the information

provided by NASA, there are traces of water flows such as the former "rivers" on several planets (for example, the surface of the planet Mars).

(Interview respondent 1)

Based on the results of interviews with experts, it was found that the obstacles in the search for extraterrestrial life include: (1) astronomical searches so far have not found planets other than earth whose temperature allows water to be in a liquid state; (2) new astronomical techniques to the discovery of planets outside the solar system (extrasolar planets); (3) analysis of non-natural radio waves only until the discovery of objects that have radio waves that are thought to be non-natural but have not been able to detect the presence of planets; and (4) the location of the planets is far from the position of the earth so that it requires money, time, and sophisticated technological equipment to carry out such research. Table 2 shows the efforts of scientists to search for extraterrestrial life.

Table 2. Efforts by scientists to search for extraterrestrial life

No	Efforts made	Constraints/opinions
1.	Search for extraterrestrial life using high-dispersion.	The cancellation of the Terrestrial Planet Finder and Darwin missions signaled that it is unlikely that special space telescopes to search for biomarker gases in the atmospheres of exoplanets will be launched within the next 25 years.
2.	The search for extraterrestrial life using the ^G infrared uses a large amount of energy, revealing the philosophical difficulties of the SETI search and Hart's argument.	On the other hand, ground-based telescopes are considered an alternative for finding biomarkers in the atmospheres of exoplanets through transit observations (Snellen et al., 2013). By utilizing great energy, WISE and Spitzer considered it possible to search for extraterrestrial life (alien) and test some of Hart's conclusions empirically. On the other hand, successful search detection will result in limitations and the possibility of advanced ETI (Extraterrestrial Intelligence). Meanwhile, an unsuccessful detection is considered to violate the fundamental laws of physics (Wright et al., 2014).
3.	Measurements based on principal thermodynamic chemical equilibrium principles, such as the missions of the Mars rover and probes for sampling the ice floes of Enceladus or Europa, to detect extant or extinct life on planets other than earth.	Conditions early in the planet's history may have increased phosphate availability. For example, when liquid water was abundant on Mars more than 3 billion years ago, the release rate of phosphate from phosphate minerals was estimated to be 45 times faster than that on earth. That is thought to reduce one of the barriers to abiogenesis on Mars (Georgiou & Deamer, 2014).
4.	We are combining a multidisciplinary approach to increase the likelihood of detecting signals by expanding understanding of the evolutionary and systemic components of the search for extraterrestrial intelligence (ETI), providing more radio and optical SETI targets, and identifying new targets to decode and encode messages using universal markers.	Past and present astrobiological roadmaps have not substantially emphasized alien intelligence, communications, or technology. In the coming months, the SETI Institute will embark on efforts in this direction and invite the United States and the international research community to contribute to developing a new scientific roadmap for SETI (Cabrol, 2016).
5.	Demonstration of a particular SETI survey of the search for aliens described as looking for a “needle” in an n-haystack.	The search fraction by SETI is still meager, as the ratio of the volume of a large hot tub or small swimming pool to the volume of earth's oceans. If the total volume of the earth's oceans is about $1,335 \times 10^{21}$ liters the comprehensive search conducted to date is ~8000 l of seawater (Wright et al., 2018).

6. The depiction of the different structures of mechanical motion between the universe and tiny space. The search for extraterrestrial civilizations by adjusting the frequency of dense structures can open a way to find SETI signals and is one of the research methods in the future ([Chen & Zhang, 2019](#)).
 7. It tested the feasibility of a planet considered to be similar to earth (doppelganger), with parameters including Planetary Conditions; Planetary Surface Temperature; Parent Star Condition; and Conditions of the Habitable Zone After conducting four analyzes based on the parameters set, two initial candidates for earth's doppelganger have been found, namely Kepler-186 f and Kepler-69 C. The conditions on these two planets are considered capable of retaining water in liquid form ([Nurcresia et al., 2019](#)).
 8. Consider the implications of searching for Extraterrestrial Civilizations (ETCs) by juxtaposing qualitative classification findings with Kardashev's quantitative scheme. Propose a classification for ETCs based on their level of interaction and integration with the environment. Progress may occur without being followed by an increase in energy consumption, so the detection capability is lower. The only hope for future SETI searches to find advanced ETCs is to look for the beacons deliberately created by them ([Ivanov et al., 2020](#)).
 9. We are analyzing the strengths, limitations, and potential weaknesses of relying on chirality and homochirality as biomarkers of extraterrestrial life support. Within the framework of molecular investigations, chirality should be a component of the entire molecular picture, including not only amino acids but also fatty acids, simple sugars, non-randomly fragmented polymers, potential components of biochemical cycles, and the richness of organic chemistry in general ([Avnir, 2021](#)).
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Water as a source of life

Based on science and technology, water is the source of living things and the origin of life. Water is a source of living things because most animals come from sperm fluid (QS An-Nur 24:45). Furthermore, water is the origin of life because all creatures cannot survive without water. Through His word, "... and from water, We made all living things", has indicated that life originated from water (QS Al-Anbiya' 21:30)

Mars was once thought to have a fairly warm and watery atmosphere but then changed to be cold and dry. The cause is thought to be the absence of a magnetic field on the planet Mars so that meteorite collision and erosion by the solar wind can occur. This event causes a decrease in the greenhouse effect so that Mars becomes cold. This causes the loss of liquid water on Mars. Apart from Mars, Titan, a satellite of the planet Saturn and Jupiter's satellite Europa, is also thought to allow life. Voyager 1 observations with an infrared spectrometer on the Huygens space shuttle mission with the Cassini spacecraft (1997) to Titan found hydrogen cyanide (HCN) molecules combined with aerosols. This molecule is an important component of DNA, the fundamental genetic molecule of life on earth. On the other hand, there are two important reasons why Europa is thought to have life in it: the ocean (water in the form of fluid) and the source of energy in the form of volcanic holes (Kemenag, 2015).

If there is water on a planet other than earth, extraterrestrial life is possible. That is because living things need liquid water for their metabolism. Therefore, the existence of liquid water is a prerequisite for life. The following excerpts from interview with respondent 1 related to this poin.

In the Qur'an, it has been hinted ... that from water, Allah has made something living... That is an absolute truth (definitely true). If there is actual data on the planet that there is water equal to water on earth on that planet, then there must be life-like creatures on earth. However, if the obtained water is NOT water like the water we already know, then life may exist, but not as we know it on earth.

(Interview respondent 1)

The dabbah (creeping creatures)

Qur'an clearly states that Allah SWT has spread in the heavens and earth living things as a result of His creation. Of course, through this signal, extraterrestrial life may exist. Respondent 2 revealed that astronomy, especially astrobiology, which studies extraterrestrial life, has yet to find evidence of life. But both the Qur'an and science believe in the existence of extraterrestrial life. In line with this statement, the Qur'an teaches that in addition to knowledge obtained from experimental results (physical), there are other objects of knowledge beyond the reach of the five human senses (metaphysics) that cannot be obtained through experimentation (Kemenag, 2015). Allah said, "So I swear by what you can see and what you do not see." (QS Al-Haqqah 69:38).

Water has an essential role in cell formation, the smallest unit of living organisms (Kemenag, 2015). In several letters in the Qur'an, such as QS Ash-Shura: 29, An-Nahl: 49, and An-Nur: 45, it is implied that extraterrestrial beings are called *dabbah* (creeping creatures). The word *dabbah* is a moving organism, both known and unknown to humans. Usually, this word is used to designate one-celled (unicellular) organisms, although not always those that cannot be seen with the naked eye (Kemenag, 2015).

Creeping animals outside the earth are believed to be the same as reptiles on earth if the term water on earth is the same as on other planets. The perception of a Muslim physicist about this aspect can be seen in the following interview excerpt.

If water on other planets is the same as the water on earth, then the reptiles on other planets are also reptiles like those on earth. I believe the word "water," which is indicated in the Qur'an, has a broad meaning. It could be water we know on earth, maybe also for the term water that exists on other planets. (Interview respondent 1)

Man (intellectual creature)

The Qur'an has hinted at a verse that uses the word *as-samaawaat* (plural words), which expresses the sky on a large scale or can mean the entire universe (Djamaluddin, 2022). The word sky is juxtaposed with the word *man*, which is usually used to indicate a human-like creature with intelligence (Kemenag, 2015). In addition, Allah also makes it clear that the creatures in the sky are physical creatures, not

supernatural beings such as angels and jinn through the sign "(Prostration also to Him) their shadows in the morning and evening" (QS Al-Ra'd 13:15). According to respondent 1, the only indication of intelligence is that "all these creatures have their way of worship (praying and tasbih)." (Interview respondent 1).

The exaltation of creatures other than humans is not by remembering Allah's name but by using specific methods that only Allah knows best (QS Al-Isrā'17: 44). As a human being who has an exaggerated reason, it will be shameful if he is negligent in glorifying Allah. Even though small creatures in the universe or without reason always glorify God.

In astrophysics, the main methods of detecting extraterrestrial civilizations are heat, radio transmission, light, and possibly gravitational waves. Therefore, this type of superintelligence is almost impossible to detect. The exact energy requirements of superintelligence are unknown (Elani, 2020). In line with this statement, in the context of the paradox, Fermi argues that almost all advanced biological civilizations must experience a technological singularity (Verendel & Haggström, 2017; Wright et al., 2018). Singularity is a term used in physics to describe the center of a black hole where all predictions and equations break down (Wright et al., 2018). Therefore, trying to predict events after the singularity becomes almost impossible to detect in the universe

using conventional methods because of its complexity (Gray, 2015).

Muslim physicist believes that physical beings like humans exist outside the Earth. But regarding whether extraterrestrials have superintelligence, experts agree that they do not know. The perception of a Muslim physicist about this aspect can be seen in the following interview excerpt.

Signs in the Qur'an, such as (QS 24:41, 13:25), state that physical beings like humans exist outside the earth. Astronomy also believes in it, so a branch of astronomy specializes in studying extraterrestrial life, namely Astrobiology.

(Interview respondent 2)

Extraterrestrial beings with super intelligence are often called "Aliens" (Hana, 2020; Elani, 2020). Respondent 1 believes that aliens are only animated and do not exist in the real world in absolute terms. The following excerpts from interview with respondent 1 related to this poin.

Suppose the creatures in the sky refer to Allah's creatures called Angels. In that case, their intelligence exceeds human intelligence, and their existence cannot be based on the presence of water in space because angels do not desire any food or drink. Meanwhile, the "Alien" illustrations that are simulated or animated in various forms and conditions are only limited to simulations or animations and have never been found in real terms in the real world.

(Interview respondent 1)

Expert's view

Based on data obtained through scientific articles, the astrophysical search for extraterrestrial life is carried out by several methods including utilizing the help of tools/robots (Snellen et al., 2013; Wright et al., 2014), detecting signals from outer space (Chen & Zhang, 2019), to combine several disciplines such as astrophysics, astrobiology, chemistry and big data analysis (Avnir, 2021; Cabrol, 2016; Wright et al., 2018). Astrophysical research is still limited to the discovery of thousands of exoplanets and discoveries that prove the existence of Earth-like planets in the habitable zone (Quintana et al., 2014; Cassan et al., 2012). In line with the discoveries of astrophysics, the Qur'an also hints at the existence of extraterrestrial life. (Maulana, 2017; Safitri, 2019).

Based on interviews with Muslim physicists, extraterrestrial life related to living things can be believed to exist either through signs in the Qur'an or scientifically. However, until now, no proper method has been found to show the truth. The following excerpts from interview with muslim physicist about this issue.

The existence of living things, even those with intelligence like humans, outside the earth is believed to be based on faith based on the Qur'an cues and scientifically based on the assumption that life on earth is not the only thing in this vast universe. However, a to prove its existence has not been found a method. The development of new astronomy-astrophysics technology to find planets outside the earth (extrasolar

planets). Even that can't be sure that a planet is in the habitable zone. Planets that appear very small or even invisible (only the effects have been identified) cannot yet be identified with surface characteristics, let alone identify life on the planet's surface.

(Interview respondent 2)

More than that, either through astrophysical discoveries or signs in the Qur'an, a person who believes in Allah SWT must receive information about extraterrestrial life. Indeed, what is meant in the Qur'an is genuinely extraterrestrial beings. The perception of a Muslim physicist about this aspect can be seen in the following interview excerpt.

The findings of astrophysicists are only in the form of radio signals that are sent into space and then analyzed from the reflection of these radio waves. That is the only information obtained by experts, especially the team of workers at NASA. On the other hand, the Qur'an has implicitly hinted that other creatures inhabit other planets besides earth by using the term "sky." As people who believe in Allah, the creator, they must receive information about the existence of other creatures (besides human beings) on other planets, if indeed what is meant in the Qur'an is genuinely extraterrestrial beings. Currently, it has not been able to be studied in absolute terms, but I am sure that in the future, it will be appropriately investigated and in real terms.

(Interview respondent 1)

The search for extraterrestrial life will continue with astrophysics projects to reveal its existence. Even NASA has launched several telescopes and missions to detect the presence of extraterrestrials (Hana, 2020).

Whether this search will lead to a new theory and reveal the existence of extraterrestrial life definitively or will waste the budget, no one knows for sure. Of course, as humans who have a reason, we believe that Allah in this vast universe creates other living creatures.

One of Allah's instructions in the Qur'an regarding the existence of extraterrestrial life and describing extraterrestrial beings is by giving parables or terms such as *dabbah* (creeping creatures) and juxtaposing the word *as-samaawaat* (plural sky) with the *man* (human-like creatures). As has been explained in QS Al-Ankabut 29:43, which means, "And We make these parables for mankind, and no one will understand it except those who know." On the other hand, the Qur'an has explained that humans have limited knowledge (QS Al-Isra' 17: 85). Therefore, a scientist is not allowed on the pretext of science to reject "something" that is non-empirical (metaphysical) (Kemenag, 2015).

IV. CONCLUSION AND SUGGESTION

Based on the data obtained, it can be concluded that the creation of the universe in astrophysics, known as the Big Bang theory, is also hinted at in the Qur'an. Until now the development of new astrophysics technology to find planets outside the earth (extrasolar planets). However, some planets and satellites are thought to support the existence of life, such as the planet Mars, and the satellites of Titan, and Europa. In line with the discovery

of astrophysics, the Qur'an also hints at the existence of extraterrestrial life through the word *dabbah* and *man*, including QS 42: 29, 45:13, 16:49, 13:15, and 24:45. In addition, the alleged presence of water on other planets also supports the signs in QS 24: 45 and QS 21:30. As a holy book, the Qur'an has been able to explain the findings of astrophysics to date. Therefore, it can be said that there is no dichotomy between astrophysical discoveries and signs in the Qur'an regarding extraterrestrial life.

This research involves several sources of data. Therefore, the discussion of the topic in this research is broad. On the other hand, this study did not involve high school students/equivalent due to the limited understanding of students on the topic of astrophysics involving the interpretation of the Qur'an. The author hopes that researchers of similar studies can choose a topic that is narrower than astrophysics to explain the existence of extraterrestrial life so that the discussion presented is more focused. In addition, respondents from high school students can also be involved, especially students who attend Islamic boarding schools or Islamic schools that have Qur'an interpretation subjects. On the other hand, the author supports integrated physics learning that is integrated with the Qur'an that can be taught in high schools throughout Indonesia.

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