

MYRMECODIA IN QUR'ANIC INTERPRETATION AND SCIENCE

THESIS

Submitted as Partial Fulfillment Requirements for Getting the Bachelor Degree
of Religious Studies (S.Ag) in Qur'an and Exegesis Sciences Department



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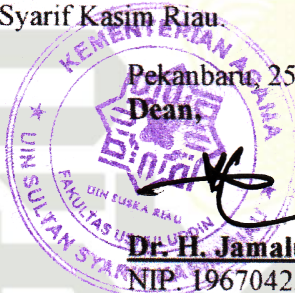
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After carefully providing guidance and instructions for improving this thesis, as supervisors we think that this thesis by Khairunnisa Nadhilah Ismail [Student Number: 12030221248] entitled "MYRMECODIA IN QUR'ANIC INTERPRETATION AND SCIENCE" has been submitted as partial fulfillment of the requirements to obtain the degree of Bachelor of Religious Education (B.R.E/S.Ag) from the study program Qur'an and exegesis Science faculty of Ushuluddin.

We hope this student can be participating officially in the examination session as fast as possible.

Thank you for your attention.

Wassalamu'alaikum Warahmatullah Wabarakatuh

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MOTTO

Because time is too precious to waste worrying about what is out of your control,
prioritize what is essential and walk the earth relying only on Him



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FOREWORD

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Alhamdulillah, praise and thanks be to the presence of Allah SWT for His mercy and grace, which are always bestowed upon us all. Then, *sholawat* and greetings to the Prophet Muhammad SAW, who has transmitted the treatise and *Syari'ah* of Islam to all mankind. By the grace of Allah SWT, the writer is finally able to complete the thesis entitled " **Myrmecodia in Qur'anic Interpretation and Science.**"

This research is a requirement for obtaining a Bachelor of Religion from the Faculty of Ushuluddin, State Islamic University of Sultan Syarif Kasim Riau. Thanks to the trust and support of some people, both moral and material, the author was able to face and overcome the difficulties and obstacles, so that the research could be completed. On this occasion, the author would like to express his gratitude to some parties, for the help, guidance and encouragement, so that the author can finish, namely to:

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- Dean of the Faculty of Ushuluddin Dr. H. Jamaluddin, M. Us, Vice Dean I Dr. Rina Rehayati, M. Ag., Vice Dean II Dr. Afrizal Nur, MIS, and Vice Dean III Dr. H. M. Ridwan Hasbi, Lc. M.Ag,

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Head of the Qur'an Science Study Program Agus Firdaus Chandra, Lc., MA and all its staffs.

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The author hopes that all of them can become successful people for the nation and religion in the future.

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The author is fully aware that this thesis is far from perfect. Therefore, constructive criticism and suggestions from various parties are highly expected and hopefully this thesis will become useful knowledge, *Aamiin*.

Regards,

Rahmayani
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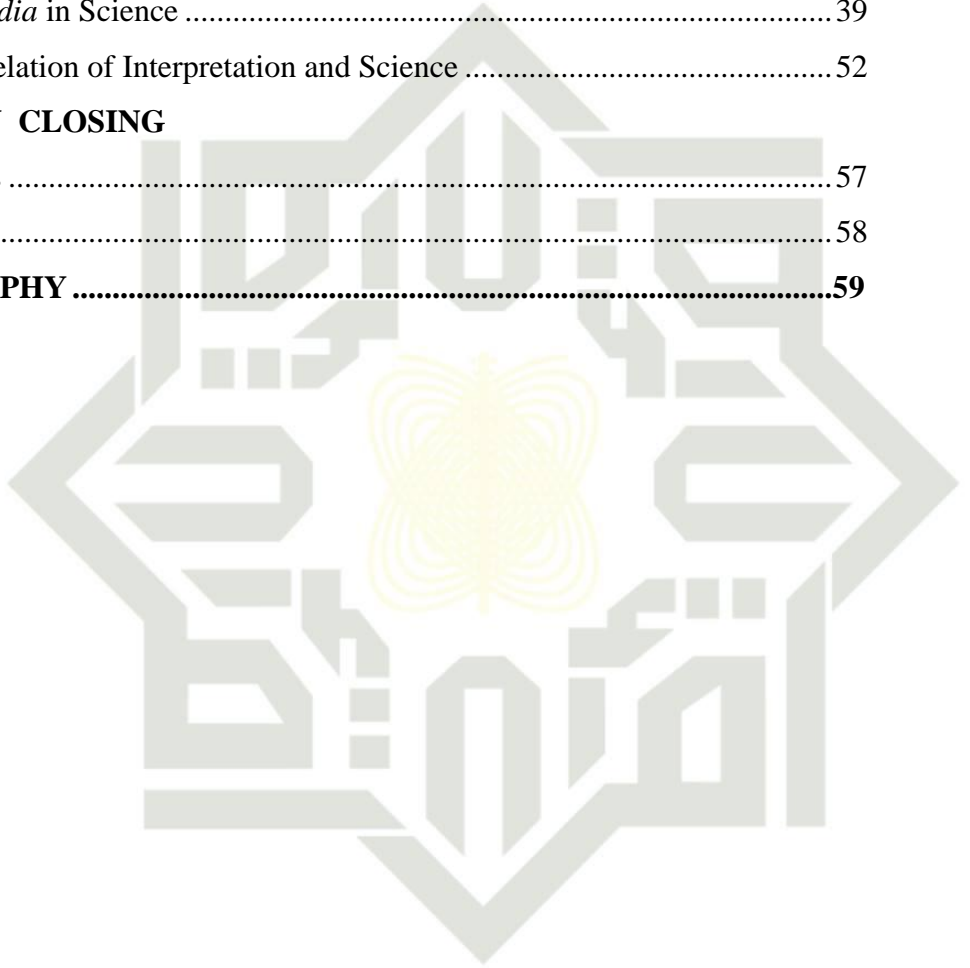
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A GUIDE TO ARABIC transliteration

The transliteration of Arabic-Indonesian letters in this text is based on the Joint Decree of the Minister of Religious Affairs and the Minister of Education and Culture of the Republic of Indonesia, dated January 22, 1988, No. 158/1987 and 0543.b/U/1987, as stated in the Arabic Transliteration Manual (*A Guide to Arabic Literation*), INIS Fellow 1992.

Consonant

Arabic	Latin	Arabic	Latin
ا	A	ط	Th
ب	B	ظ	Zh
ت	T	ع	'
ث	Ts	غ	Gh
ج	J	ف	F
ح	H	ق	Q
خ	Kh	ك	K
د	D	ل	L
ذ	Dz	م	M
ر	R	ن	N
ز	Z	و	W
س	S	هـ	H
ص	Sy	ء	'
ش	Sh	ي	Y
ض	Dl		

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<u>Vocal</u>			<u>Long Vocal</u>			<u>Example</u>
اَ	=	a	آ	=	Ā	تَكَاثُرٌ = <i>takâtsur</i>
اِ	=	i	إِ	=	Ī	يَهَيِّجُ = <i>yahîj</i>
اُ	=	u	أُ	=	Ū	تَعْلَمُونَ = <i>ta'lamûn</i>
			أَو	=	Aw	سَوْفَ = <i>sawf</i>
			أَي	=	Ay	عَيْنَ = <i>'ayn</i>

Long Vocals and Diphthong

Each Arabic writing in the form of *fathah* vocal Latin writing is written with “a”, *kasrah* with “i”, *dlommah* with “u” while the long readings are each written in the following way:

Vocals (a) long = Ā for example قَالَ become qâla

Vocals (i) long = Ī for example قِيلَ become qîla

Vocals (u) long = Ū for example دُونَ become dûna

Especially for the reading of ya[‘] nisbat, it should not be replaced with “i” but still written with “iy”: in order to describe ya[‘] nisbat at the end.

Likewise, for the sound of the diphthong, wawu, and ya[‘] after *fathah* is written with “aw” and “ay”. Consider the following example:

Diphthong (aw) = أَو for example قَوْلٌ become qawlun

Diphthong (ay) = أَي for example خَيْرٌ become khayrun

Ta' Marbûthah (ة)

Ta' *marbûthah* is transliteration with "t" if it is in the middle of a sentence, and if ta' *marbûthah* is at the end of the sentence, it is transliterated by using "h". Such as الرسالة للمدرسة to *al-risalat li al-mudarrisah*, or when in the middle of a sentence consisting of *mudlaf* and *mudlaf ilayh* arrangement, then

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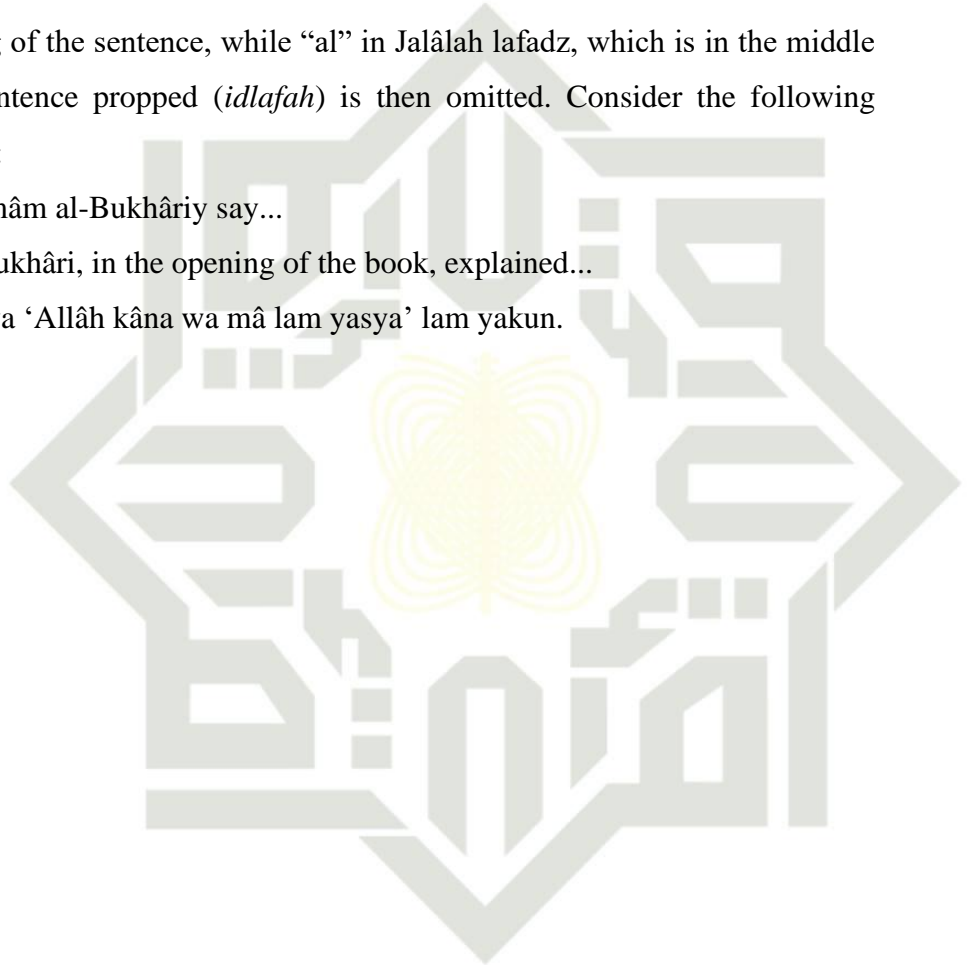
transliterated by using t connected with the following sentence, for example,

في رحمة الله become *fī rahmatillah*.

Articles and Lafadz al-jalâlah

The word “al” (ال) is written in lowercase unless it is located at the beginning of the sentence, while “al” in Jalâlah lafadz, which is in the middle of the sentence propped (*idlafah*) is then omitted. Consider the following examples:

1. Al-Imâm al-Bukhâriy say...
2. Al-Bukhâri, in the opening of the book, explained...
3. Masya ‘Allâh kâna wa mâ lam yasya’ lam yakun.



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ABSTRACT

This thesis is entitled “*Myrmecodia* in the Quranic Interpretation and Science”. This research is based on the rapid development of the interpretation of the Qur’an using science. This confirms that the Qur’an has miracles that are still relevant today. One of them is *Myrmecodia*. This research aims to find out how the mufassirs interpret the verses about *Myrmecodia* and its relevance to current scientific theories. The form of this research is qualitative and library research by using the perspective of ‘*ilmi* interpretation to reveal the relevance of the interpretation of the Qur’an with scientific theory. The results of this study indicate that *Myrmecodia* in the Quranic interpretation is one of the *wad an-Naml* which is ant nests in the form of a plant refers to the word *masakin* in surah an-Naml verse 18, this nest has a hollow space and functions for shelter, breeding, and storing food. This is relevant to the study of modern science, where this plant is an ant nest that has a hollow structure, contains 85% glucose in its tubers, and is the residence of ants from the genus *Iridomyrmex* and *Ochetellus*. The plant produces *flavonoids*, *tannins*, and *polyphenols* that are used medicinally. There are 27 species in the world, 26 of which are found in Indonesia.

Keywords: *Myrmecodia*, Qur’anic Interpretation, Science.

ABSTRAK

Kripsi ini berjudul “*Myrmecodia* dalam Penafsiran al-Qur’an dan Sains”. Penelitian ini dilatarbelakangi oleh berkembang pesatnya penafsiran al-Qur’an menggunakan ilmu pengetahuan. Hal ini menunjukkan bahwa al-Qur’an memiliki keajaiban yang masih relevan sampai sekarang. Salah satunya adalah *Myrmecodia*. Penelitian ini bertujuan mengetahui bagaimana para mufassir menafsirkan ayat-ayat tentang *Myrmecodia* serta relevansinya dengan teori sains masa kini. Bentuk penelitian ini adalah kualitatif dan bersifat library research dengan menggunakan perspektif Tafsir ‘ilmi untuk mengungkapkan relevansi penafsiran al-Qur’an dengan teori sains. Hasil dari penelitian ini menunjukkan bahwa *Myrmecodia* dalam penafsiran al-Qur’an adalah salah satu *wad an-Naml* yang merupakan sarang semut berupa tumbuhan merujuk pada kata *masakin* pada surat an-Naml ayat 18, sarang ini memiliki ruang yang berongga dan berfungsi untuk tempat tinggal, berkembang biak, dan menyimpan makanan. Hal ini relevan dengan kajian ilmu pengetahuan modern, yang mana tumbuhan ini merupakan sarang semut yang memiliki struktur berongga, mengandung 85% glukosa pada umbinya, dan menjadi tempat tinggal semut dari genus *Iridomyrmex* dan *Ochetellus*. Tumbuhan ini menghasilkan zat *flavonoid*, *tanin*, dan *polifenol* yang digunakan untuk pengobatan. Terdapat 27 jenis di dunia, 26 diantaranya ditemukan di Indonesia.

Kata Kunci: *Myrmecodia*, Penafsiran al-Qur’an, Sains.

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الملخص

الرسالة بعنوان "*Myrmecodia* في تفسير القرآن والعلم". يعود سبب هذا البحث إلى الانتشار السريع لتفسير القرآن استخدام المعرفة العلمية. وهذا يظهر أن القرآن يحتوي على عجائب لا تزال ذات صلة حتى الآن. واحدة من هذه العجائب هي *Myrmecodia*. تهدف هذه الدراسة إلى معرفة كيف يفسر المفسرون الآيات المتعلقة بـ *Myrmecodia* وصلتها لنظريات العلمية الحديثة. خذ هذه الدراسة شكلاً كيميائياً وهي من نوع البحث المكتبي استخدام منظور التفسير العلمي لكشف صلة تفسير القرآن لنظريات العلمية. نتيجة هذا البحث تشير إلى أن *Myrmecodia* في تفسير القرآن هو أحد وادي النمل وهو عش النمل على شكل نبات يشير إلى كلمة "مساكن" في آية 18 من سورة النمل، وهذا العش يحتوي على مساحة فارغة ويستخدم كمأوى ومكان للتكاثر وتخزين الطعام. وهذا يتماشى مع دراسات العلوم الحديثة، حيث أن هذه النبتة تعتبر عش النمل الذي يحتوي على هيكل فارغ، ويحتوي على 85% *glukosa* في النقطة، ويعتبر مأوى للنمل من جنس *Iridomyrmex* و *Ochetellus*. تنتج هذه النبتة مركبات الفلافونويد، التانين والبوليفينول التي تستخدم في العلاج. هناك 27 نوعاً في العالم، 26 منها تم العثور عليها في إندونيسيا.

الكلمات المفتاحية: *Myrmecodia*، تفسير القرآن، العلم.

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CHAPTER I INTRODUCTION

A. Research Background

Recently, study of science and technology has been growing. Along with the times, interpretation of the Qur'an has also experienced developments that can be studied in terms of the codification of the science of interpretation. This development and progress requires humans to think smart and be sensitive to the environment when interpreting the Qur'an. Therefore, studying Tafseer in accordance with the science that has developed from a scientific perspective is interesting.

Science shows that the miracle of the Qur'an remains relevant today. Because the Qur'an is flexible that can adapt to changing times. According to Quraish Shihab, miracle of the Qur'an lies in three aspects, namely the beauty and accuracy of its editorials, news about unseen things, and scientific cues.¹

Scientific cues in the Qur'an are one of the miracles of the Qur'an that gives a signal about the existence of science while motivating its development.² These scientific cues are hidden because the verses of the Qur'an only contain religious messages when we read them at a glance.

However, if research is done in depth, we will find that scientific cues exist in the Qur'an and with the help of science to make it stronger, so we can say it as a cue from scientific research. As mentioned in the Qur'an:

إِنَّ فِي خَلْقِ السَّمٰوٰتِ وَالْاَرْضِ وَاخْتِلَافِ الْبَيْلِ وَاللَّيْلِ وَالنَّهَارِ وَالْفُلْكِ الَّتِي تَجْرِي فِي الْبَحْرِ بِمَلِيْنَعِ النَّاسِ وَمَا نَزَّلْنَا مِنَ السَّمٰءِ مِنْ مَّاءٍ فَاَحْيٰ بِهٖ الْاَرْضَ بَعْدَ مَوْتِهَا وَبَثَّ فِيْهَا مِنْ كُلِّ دَآبَّةٍ ۗ وَتَصْرِيفِ الْبِحْرِ وَالسَّحَابِ الْمُسَخَّرِ بَيْنَ السَّمٰءِ وَالْاَرْضِ لآيٰتٍ لِّقَوْمٍ يَعْقِلُوْنَ

“Indeed, in the creation of the heavens and earth, and the alternation of the night and the day, and the [great] ships which sail through the sea with that which benefits people, and what Allah has sent down from the heavens of rain, giving life thereby to the earth after its lifelessness and dispersing therein every [kind of]

¹ M. Quraish Shihab, *Mukjizat Al-Qur'am*, (Bandung: Mizan, 2007), p. 114.

² Abdul Syukur al-Azizi, *Islam itu Ilmiah*, (Yogyakarta: Laksana, 2018), p. 28.

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moving creature, and [His] directing of the winds and the clouds controlled between the heaven and the earth are signs for a people who use reason.”³

The attempt to explain the meaning of the words of Allah SWT containing scientific cues is also called "Tafseer 'Ilmi". Tafseer 'Ilmi is a interpretation in which the theories of science are involved. Such as Chemistry, Physics, Biology, Geology, and Astronomy.⁴ Interpretation will always evolve through time, so no one type of interpretation can be considered as the completely correct interpretation.⁵

One of the discussions in the study of science in the Qur'an is the discussion of animals. Science about animal life gets no less attention in the Qur'an than other aspects of life. Animal life reveals the majesty and greatness of the creator in new realms and encourages humans to pay attention to it. There are many verses in the Qur'an that describe animal life in various contexts.⁶

The word that means animal in the Qur'an is found in the word *dabbah* which means creeping animals. It is mentioned 18 times and the word *an'am* which means cattle is mentioned 32 times.⁷ There are also words that directly mention the name of the animal, such as snake, dog, camel, horse, ant, bee, spider, etc.

Ants are one of the animals mentioned in the Quranic verses. In an article published in the late 1970s by Reader's Digest magazine, it was mentioned that ants have unique characteristics compared to other living species.⁸ Ants are social insects from the family Formicidae and belong to the order Hymenoptera, as well as bees, wasps, and cosmopolites. There are roughly 3,500 species of ants in the world today. Ant species living in tropical and temperate environments have great

³ LPPMQ, *Al-Qur'an dan Terjemahannya: Edisi Penyempurnaan*, (Jakarta: Pustaka Lajnah, 2019), p. 25.

⁴ Jani Arni, "Tafsir al-Tahwir wa Tanwir Karya Muhammad Thahir Ibnu 'Asyur", *Ushuluddin* Vol. 17, No. 1, (Januari 2011), p. 80.

⁵ U. Syafaruddin, *Paradigma Tafsir Tekstual dan Kontekstual Usaha Memaknai Kembali Pesan al-Qur'an*, (Yogyakarta: Pustaka Pelajar, 2009), p. 3.

⁶ Afzalu Rahman, *Ensiklopedia Ilmu dalam al-Qur'an: Rujukan Terlengkap Isyarat-isyarat Ilmiah dalam al-Qur'an*, (Bandung: Mizan, 2007), p. 191-193.

⁷ Mardiana, "Kajian Tafsir Tematik tentang Pelestarian Lingkungan Hidup", *Al-Fikr*, (Makassar: 2013), p. 141.

⁸ Agus Purwanto, *Ayat-ayat Semesta Sisi-sisi al-Qur'an yang Terlupakan*, (Bandung, Mizan, 2008), p. 214.

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benefits to ecosystems due to ants' ability to maintain soil aeration and combination to increase water infiltration, which keeps the soil healthy as ants are major predators of some small invertebrates and possibly plants.⁹

One of the verses that is considered to contain elements of scientific miracles about ant in the Qur'an is Q.S. An-Naml verse 18:

حَتَّىٰ إِذْ لَتَوُا عَلَىٰ وَادِ النَّمْلِ ۖ قَالَتْ نَمْلَةٌ لِّئِيَّهَا النَّمْلُ ادْخُلُوا مَسَكِنِكُمْ ۖ لَا يَحْطِمَنَّكُمْ سُلَيْمٰنُ وَجُنُودُهُ
وَهُمْ لَا يَشْعُرُونَ

*“Until, when they came upon the valley of the ants, an ant said, "O ants, enter your dwellings that you not be crushed by Sulaiman and his soldiers while they perceive not.”*¹⁰

This verse is a story that tells the relationship between humans and ants. It is told that Sulaiman AS and his troops arrived in a valley, where there was a colony of ants. So, the queen of ants at that time instructed all the ants to enter her cave so as not to be stepped on by Sulaiman AS and his soldiers. According to the Qur'an, long before science was discovered, animals had their own system of society, such as ants and bees research to topics that are still disputable in the field of scientific research, until Sulaiman AS was given by Allah SWT the ability to understand and interact with animals and jinn.

The scientific literature that emerges from this verse is very diverse. This is proof that the Qur'an is very rich in science. The development of scientific interpretation, making the interpretation of this verse more varied. This verse is found in many contemporary interpretations that refer to science. So that the discussion of ants becomes broader. Finding scientific cues in the Qur'an requires a deeper study based on the rules of Tafseer and the development of science. From many scientific studies stemming from this one verse, an interesting part is the ant's

⁹ Mohammad Ruslan, Kemukjizatan Keberadaan Semut, *Mozaic: Islamic Studies Journal* Vol. 02, No. 01, 2022, p. 60

¹⁰ LPPMQ, *Al-Qur'an dan Terjemahannya: Edisi Penyempurnaan*, (Jakarta: Pustaka Lajnah, 2019), p. 378.



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nest, where the ant's habitat includes all terrestrial, and coastal mountain habitats.¹¹ In general, it's easy to find ants if you look around. Planting trees, creating organic waste, and piling up items can usually invite ants as they can find food supplies, nests, and shelter.

Natural and environmental factors can influence ant establishment patterns. Habitat conditions like temperature are related to the presence of ants.¹² The extreme low temperatures disrupt the ants' metabolism and can also kill them. Because of this, ants are not found at the poles.¹³ Ants are also known for their regular nests and colonies. Except for water, ants can be found living anywhere on earth.

Ants are environmentally important, and their species are scattered around the world because their adaptations enable to live in a variety of places and create effective social structures in terrestrial environments. Ants have a special role in interacting with other living things, such as plants and insects. One of the unique interactions of ants is with plants, which ants use as nests, for defense, shelter and food storage. This unique symbiosis occurs in *Myrmecodia* plants, which are epiphyte plants used as traditional medicine and have potential as natural antioxidants. The temperature stable of this plant makes ant colonies comfortable in it.

Based on background above, author want to know how the interpretation of QS. an-Naml: 18 according to the mufassir, then the results of the interpretation analysis are explained scientifically through the relevant Science approach, which is oriented towards *Myrmecodia*. So it is hopeful that this analysis proves that the Qur'an still exists as the times develop, and with the scientific cues found in it, making science increasingly developed and beneficial to human life. Therefore, the author conducted research with the title: "**Myrmecodia in Qur'anic Interpretation and Science**".

¹¹ Falahudin, "Peranan Semut Rangrang (Oecophylla smaragdina)", *Pengendalian Biologis pada Perkebunan Kelapa Sawit*, p. 2604.

¹² Andersen, "Global Ecology of Rainforest Ants: Functional Groups in Relation to Environmental Stress and Disturbance", *Smithsonian Institution*, (Washington, 2000).

¹³ N. A. Campbell, et al, *Biology*, 8th edition, (USA: Pearson Education, 2008), p. 1205.

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B. Term of Affirmation

To make this study easier understandable and avoid misunderstanding the keywords contained in the title, the author feels the need to explain this term as follow:

1. *Myrmecodia*

Myrmecodia is derived from the Greek *Myrmikodes* which means it resembles ants or is surrounded by ants. *Myrmecodia* species, are found in Kalimantan, Sumatera, Papua New Guinea, Philippines, Cambodia, Malaysia, and Cape York, Papua, and the Sulaiman Islands.¹⁴ *Myrmecodia* is an empiphytic plant, which is symbiotic with other plants as a place to grow (host). *Myrmecodia* is commonly attached to Beech (*Fagus* spp.), Cemara Gunung (*Casuarina junghuniana*), Kaha, and Eucalyptus (*Melaleuca leucadendra*).¹⁵ The uniqueness of *Myrmecodia* is that it can be symbiotic with ants and fungi as Mutualism. The types of ants that nest in it are the genus *Iridomyrmex* and *Ochtellus* sp.¹⁶

2. Science

Science comes from the Latin *scientia*, meaning which means knowledge. The term science is specifically interpreted as the nature of science. knowledge of nature. Science is a scientific discipline that which consists of the physical sciences (physics) and the life sciences (biology). The physical sciences include astronomy, chemistry, geology, mineralogy, meteorology and physics. While the life sciences/biology include anatomy, physiology, zoology, cytology, embryology, and microbiology. According to Carin & Sund (1989)

¹⁴ Arief Soeksmanto, et al, "Uji Tosisitas Akut Ekstrak Air Tanaman Sarang Semut (*Myrmecodia* Pendans) terhadap Histologi Organ Hati Mencit", *Journal of Nature Indonesia*, Vol. 12, No. 2, (2010), p. 152-153.

¹⁵ Alamendah, "Tumbuhan Sarang Semut dengan Simbiosis yang Unik", quoted from, <https://alamendah.org/2011/11/15/tumbuhan-sarang-semut-dengan-simbiosis-yang-unik/>, accessed on Thursday, December 8, 2023 at 11.55 PM.

¹⁶ Rudy Agung Nugroho, et al, *Myrmecodia: Efek Fisiologi dan Potensi Manfaat*, (ogyakarta: Deepublish, 2019), p. 9.

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science is a system for understanding the universe through controlled observation and experimentation.¹⁷

C. Identification of the Problems

The main issues related to this research topic are as follows:

1. The evolving times, the Qur'an should be studied with a more comprehensive study by following certain methods to achieve a perfect understanding.
 2. The collection of verses of the Qur'an regarding scientific cues needs to be done to expand the scientific treasure and its benefits to people's lives.
 3. Q.S. an-Naml: 18 contains many I'jaz 'Ilmi, which includes scientific studies about ants, their lives that are used as examples of social life in society, nest structures that are very systematic and can be found anywhere even though ants are only small animals, but have a very broad scope of study.
 4. Myrmekology is one of the urgencies in studying ants, which are eusocial animals with more than 15,000 species spread around the world.
 5. The number of scholars of Tafseer who are interested in discussing the life of this unique animal, and expose his knowledge contained in the book of Tafseer.
 6. The interpretation regarding Q.S. an-Naml: 18 covers a wide scope, one of the most interesting is the ant shelter from all threatening situations, breeding places, and storing food.
- In science, *Myrmecodia* as an ant nest has its own uniqueness as an animal nest in a plant.

D. Research Limitation

To make this research focused, perfect, and insightful, the author considers that the research issues raised are limited to the variables. From the identification of the problem above, the problem discussed only focuses on the mufassir's interpretation of *Myrmecodia* in Q.S. an-Naml: 18 and its relevance to science. This is because the study of ant nests is as important as the ants themselves. As we know, that the home of a living creature is as urgent as the existence of the creature.

¹⁷ Asri Widowati, *Diktat Pendidikan Sains*, (Yogyakarta: Fakultas Matematika & Ilmu Pengetahuan Alam Universitas Yogyakarta, 2008), p. 2

E. Formulation of Problem

To reveal the problems that have been set out above, the following research questions were formulated:

1. How is *Myrmecodia* according to Qur'anic interpretation?
2. How is the relevance of Qur'anic interpretation with science about *Myrmecodia*?

F. Research Objectives and Research Significant

1. Research Objectives

Based on the problems formulated above, this research aims to:

- a. Knowing how the mufassir's interpretation of *Myrmecodia* in the Qur'an.
- b. Knowing the relevance of interpretation with science regarding the existence of ant nests in plants (*Myrmecodia*).

2. Research Significant

- a. Theoretically, this research is hoped to be able to provide Islamic insight into the mufassir's interpretation of the ant nest especially *Myrmecodia*, and the scientific explanations associated with them through a science perspective.
- b. Practically, this research is hoped to be used as material for consideration and attention for students and the public in developing scientific treasures about interpretation reviewed through a scientific approach, then for scientists it can be used as further research material.

G. Systematics Writing

The systematics of writing this research refers to the Thesis Writing Guidelines (Revised Edition) Sultan Syarif Kasim Riau State Islamic University 2019. The systematics of writing this research are as follows:

CHAPTER I: Contains an introduction that begins with the background of the problem in accordance with the title where there are reasons for the author to conduct this research. Then continued with the affirmation of terms, problem identification, problem limitation, and problem formulation that focuses the discussion on this

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research. Next are the objectives and benefits of the research both theoretically and practically. And lastly the systematics of writing.

CHAPTER II: Contains a theoretical framework in which there is a theoretical foundation regarding the theory of Scientific Interpretation, and Ant nest. In accordance with the theoretical basis, there is also a relevant review of previous studies to examine research that is relevant to the topic discussed.

CHAPTER III: Contains research methods. Describes research methods or systematic procedures to make this research directed and get scientific, accurate and defensible results. Here the author explains four points containing the type of research, primary and secondary data sources, data collection techniques and data analysis.

CHAPTER IV: This is an chapter of data presentation and analysis, which is an explanation of the questions in the problem formulation. This chapter consists of two major sub-chapters, namely the interpretation of *Myrmecodia* in Q.S. an-Naml verse 18 and the relevance to science.

CHAPTER V: This is the last chapter and also the final chapter of this research. This chapter contains a closing in which it discusses the conclusions or results obtained from what the author has described in the previous chapters, also suggestions for this research and further research.

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CHAPTER II THEORETICAL FRAMEWORK

A. Theoretical Basis

1. Scientific Interpretation

Scientific interpretation in Arabic is called Tafseer 'ilmi.¹⁸ Tafseer 'ilmi consists of two words, namely Tafseer with the noun *tafil*, which means explaining, revealing and explaining rational meanings¹⁹, and the word 'ilmi is derived from the word *'alama, ya'lamu*, which means "to know". The word 'ilmi here is understood as *al-Mukhtashshu bil 'ilmi*, which means about or based on science.²⁰ It can be concluded that *Tafseer 'ilmi* is the interpretation of the verses of the Qur'an based on a scientific approach.²¹

Scientific interpretation or 'ilmi is an interpretation of the mufassirs who are characterized by 'ilmi or use a scientific approach in explaining the verses of the Qur'an by releasing various sciences.²² Scientific interpretation discussing kauniyyah verses or verses of natural science and exploring the concept of natural law contained in the Qur'an.²³

Tafseer 'ilmi is an interpretation of the verses of the Qur'an through a scientific approach, such as science, language and literature, political science, social science, economics, geography, technology and other sciences. Husein al-Dzahabi said that:

لِلتَّفْسِيرِ الَّذِي يَحْكُمُ الْإِصْطِلَاحَاتِ الْعُلْمِيَّةِ فِي عِبَارَاتِ الْقُرْآنِ وَيَجْتَهِدُ فِي إِسْتِخْرَاجِ مُخْتَلِفِ الْعُلُومِ
وَالْأَرَءِ الْفَلْسَفِيَّةِ مِنْهَا

“Tafseer 'ilmi is a Tafseer that sets the terms of science in the narration of the Qur'an. Tafseer 'ilmi attempts to explore the dimensions of knowledge that the

¹⁸ Tesa Fitria Mawarti, “Tafsir Saintifik”, *Tafsere*, Vol. 10, No. 1, (2022), p. 10

¹⁹ Manna al-Qathan, *Mabâhith fi Ulûm al-Qur'ân*, translate by *Rafiq el-Mazni*, (Jakarta: Pustaka al-Kautsar, 2004), p. 407-408.

²⁰ A. W. Munawwir, *Kamus al-Munawwir Arab-Indonesia Terlengkap*, Cet. 14, (Surabaya: Pustaka Progresif, 1997), p. 966.

²¹ Muhammad Gufron and Rahmawati, *Ulumul Qur'an: Praktis dan Mudah*, (Yogyakarta: Tas, 2013), p. 195.

²² Tesa Fitria Mawarti, “Tafsir...”, p. 10.

²³ Andi Rosadisastira, *Metode Tafsir Ayat-ayat Sains dan Sosial*, (Jakarta: Amzah, 2007), p.

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Qur'an contains and tries to reveal various scientific opinions that are philosophical in nature."²⁴

This opinion is almost the same as the opinion of 'Abdul Majid 'Abdus Salam al-Mahrasi, who believes that "Tafseer 'ilmi is a Tafseer whose mufasssir tries to uncover signals in the Qur'an, namely regarding some scientific views and terms and exert all abilities in exploring various scientific problems and views of a philosophical nature."²⁵

According to Prof. Amin al-Khuli, 'ilmi Tafseer is a Tafseer that includes contemporary scientific terms to the editorial of the Qur'an, and tries to deduce various sciences and philosophical views from the editorial of the Qur'an.²⁶

From the explanation above, it can be concluded that Tafseer 'ilmi is an interpretation that strives to see the Qur'an through scientific studies with the aim of knowing the scientific signals shown by the Qur'an as a mercy and guidance from Allah SWT for humans.

a. Urgency of Scientific Interpretation

In the interpretation of the 'ilmi style, it is important to realize that science and its theories are tentative, which can change with the times. But to understand the Qur'an through new theories or discoveries, as a scientific interpretation is a good ijihad, as long as it does not conflict with the principles of the Qur'anic truth.²⁷ Scientific interpretation has developed more quickly than previously, providing sufficient space to encourage scientists to study and develop scientific theories that are helpful for the survival of life.

b. History and Development of Scientific Interpretation

1) Medieval Era

²⁴ Badri Khaeruman, *Sejarah Perkembangan Tafsir al-Qur'an*. (Bandung: Pustaka Setia, 2004), p. 109.

²⁵ Abdul Majid Abdussalam al-Muhtasib, *Visi dan Paradigma Tafsir al-Qur'an Kontemporer*, (Jatim: Al-Izzah, 1997), p. 258.

²⁶ Husain Muhammad al-Dzahaby, *al-Tafsîr wal Mufasssîrîn*, 3th Edition, Cet. 2, (Baghdad: al-Mustasna, 1976), p. 140.

²⁷ M. Quraish Shihab, *Membumikan al-Qur'an*, (Bandung: Mizan Pustaka, 1992), p. 60

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Tafseer 'ilmi began in the Abbasid dynasty, specifically during the time of Khalifah al-Makmun with the institution of scientific book translation and the starting of bookkeeping of religious and scientific knowledge, along with its classification and system.²⁸ Then this idea was continued by al-Ghazali in 505 H in his Tafseer Jawahir al-Qur'an which used several disciplines such as astrology, astronomy, and medicine. Furthermore, in 606 H, Fakhrudin ar-Razi appeared with his book Mafatih al-Ghaib which contains scientific interpretation. This influenced many other ulama with his theory of interpretation such as *Ghara'ib Al-Qur'an wa Ragha'ib al-Furqan* by An-Nasyaburi, *Anwar at-Tanzil wa Asrar at-Ta'wil*, by Al-Baidhawi, and *Ruh al-Ma'ani fi Tafseer Al-Qur'an al-Adzim wa Sab'al-Matsani*, by Al-Alusi.²⁹

2) Modern Era

This era began since the French revolution that occurred in the approximate 18th century M. Because the latest scientific research data is very supportive, the development of Tafseer in this era is more realized. This method of interpretation developed considerably beginning with Ahmad Khan, Muhammad Abduh, and Thantawi Jawhari who interpreted the Qur'an scientifically.³⁰

Ulama's Opinion about Scientific Interpretation

- 1) Ulama which permit interpretation with scientific approach. This group is of the view that interpreting verses of the Qur'an with scientific approach and technology and philosophy is one of the realizations of the command of Allah SWT to understand the creation of Allah SWT in this

²⁸ *Ibid.*, p. 154.

²⁹ Asep Sulhadi, "Tafsir 'Ilmi: Sejarah dan Konsepnya", *Samawat*, Vol. 6, No. 1, (2022), p. 3-4.

³⁰ Rubini, "Tafsir 'Ilmi", *Jurnal Komunikasi dan Pendidikan Islam*, Vol. 5, No. 2, (Desember, 2016), p. 96.

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universe. The person who allows it, among others, al-Ghazali,³¹ al-Zarkasyi,³² Thantawi Jawhari,³³ Jalaluddin as-Suyuthi,³⁴ and al-Marsi.³⁵

- 2) Ulama which resist interpretation with scientific approach. This group was spearheaded by Imam Abu Ishak al-Syatibi al-Andalusi. According to him, all the companions of the Prophet knew more about the Qur'an and its contents, but none of them stated that the Qur'an included all branches of science.³⁶ Among modern scholars who reject the availability of scientific interpretation include Shaykh Mahmud Syaltut.³⁷ He argues that Tafseer must be pure from two aspects, namely using verses to strengthen the group or opposition to the mazdhab, and the use of scientific theory.³⁸

d. Basic Concept of Scientific Interpretation.³⁹

The basic concepts of scientific interpretation are as follows:

- 1) Paying careful attention to meaning and linguistic rules.
- 2) Paying careful attention to the context of the verse interpreted.
- 3) Not using verses that contain scientific cues to judge the right or wrong of a scientific discovery.
- 4) Paying careful attention to the possibility of one word or idiom containing multiple meanings.
- 5) Understanding everything that concerns the object of discussion of a verse.
- 6) Not using scientific discoveries that are still theoretical and hypothetical.⁴⁰

³¹ Abdul Mustaqim, "Kontroversi tentang Corak Tafsir 'Ilmi", *Jurnal Studi Ilmu al-Qur'an dan Hadits*, Vol. 7, no. 1, (Januari, 2006), p. 29-30.

³² Al-Zarkasyi, *al-Burhân fi Ulûm al-Qur'ân*, Kairo: Dâr al-Ihya, 1977), p. 153-155.

³³ Al-Muhtasib, *Ittijahat at-Tafsîr fi al-Ashr al-Hadîth*, (Beirut: Dâr al-Fikr, 1987), p. 273.

³⁴ As-Syuyuti, *al-Itqân fil Ulûm al-Qur'ân*, (Mesir: Musthafa al-babi al-Halabi, 1950), p. 115-126.

³⁵ *Ibid.*, p. 126-128.

³⁶ Mahdi Ghulsyani, *Filsafat Sains Menurut al-Qur'an*, (Bandung: Mizan, 1990), p. 141.

³⁷ As-Syuyuti, *Al-Itqan...*, p. 34.

³⁸ Mutma'innah, and Junaid, "Plus Minus Tafsir 'Ilmi", *Indonesian Journal of Education Research and Technology*, Vol. 2, No. 1, (January, 2022), p. 7.

³⁹ Asep Sulhadi, "Tafsir...", p. 4-5.

⁴⁰ Abdul Hayy al-Farmawi, *al-Bidayah fi Tafsîr al-Maudhû'i: Dirâsah Manhajiah Maudhû'iyah*, translate by Suryan A. Jamrah, (Jakarta: Raja Grafindo, 1996), p. 35.

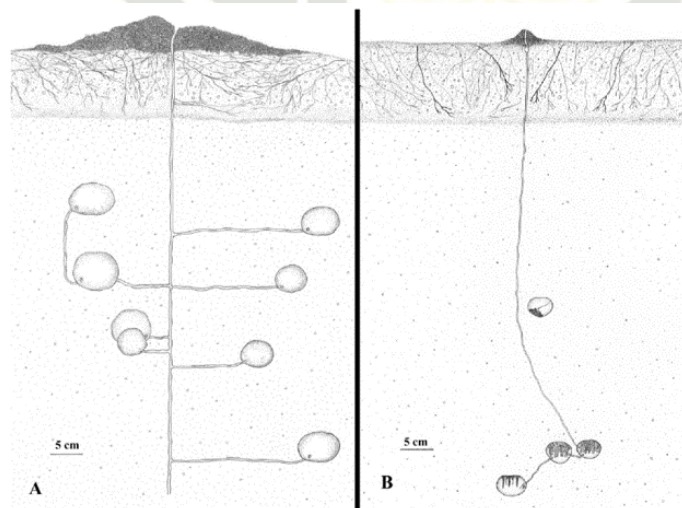
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Ant Nest

Ant nest is homes of ants⁴¹, a place where ant colonies live and work together. Ant nests usually consist of complex structures built by ant colonies to provide shelter and food storage. Ants can build nests anywhere, even in the neighborhood, such as on soil mounds, trash, flower pots, trees, the sides of homes, and so many other places.⁴² According to Riyanto, some of the rooms built by ants function as food storage or progeny rearing rooms.⁴³ The structure of the ant nest can influence the behavior at the colony level, as the spatial connectivity of the harvester ant nest increases, and the redundancy of the connections between spaces also improves the recruitment speed of the colony to find food.⁴⁴

Each nest consists of thousands of ants each colony. Ant nests are mostly found in grasslands and rarely in lowland tropical forests. They are found on trees such as beech, eucalyptus, mountain spruce, kaha and others. The presence of suitable nesting sites influences the presence of ants. Most ant nests consist of two basic components, the vertical axis and the horizontal space.



⁴¹ Ant Keepers, "Ant Nests", quoted from <https://antkeepers.com/pages/ant-nests>, accessed on Sunday, December 3, 2023, at 10.30 AM.

⁴² Donald J. Borror, et al, *Introduction to the Study of Insect*, 7th edition, (Amerika: Cole, 2005).

⁴³ Riyanto, "Kapadatan Pola Distribusi dan Peranan Semut pada Tanaman disekitar Lingkungan Tempat Tinggal," *Jurnal Penelitian Sains*, Vol. 10, No. 2, (2007), p. 241.

⁴⁴ Pinter Wollman, "Nest Architecture Shapes the Collective Behavior of harvester Ants", *Biol Lett*, Vol. 11, (2005).

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Picture 2. 1 Vertical Horizontal structure ant nest⁴⁵

This variety of sizes, shapes and sequences of building components results in a distinctive architecture in the nests of this species.⁴⁶ Overall, as colonies increase in measure or as an environmental factor such as light, of temperature, and changes in humidity, ant colonies have the ability to redesign their nests through group interaction.



Picture 2. 2 Structure ant nest

Savolainen and Vespalainen (1988) state that ant communities consist of three parts: the lower part where ants defend their nests and guard eggs, the middle part represents the consuming ant community, and the upper part represents the nest-defending and foraging ant community, where large colonies have absolute defense areas.⁴⁷

Ants can build nests anywhere. Some types of ants build nests underground, or in rocks, leaves, grains and wood.⁴⁸ Most ants like to nest in

⁴⁵ Guong Yang, Wei Zhou, and Wenjun Qu, "A Review of Ant Nest and their Implications for Architecture", *Buildings*, Vol. 12, No. 2225, (2022), p. 8.

⁴⁶ Walter Tschinkel, "The Nest Architecture of the Ant *Camponotus Socius*", *Journal SCI*, Vol. 5, No. (, (2005), p. 8.

⁴⁷ Terrence P. McGlynn, and S. Eben Kirksey, "The Effects of Food Presentation and Microhabitat upon Resource Monopoly in a Ground Foraging Ant (Hymenoptera: Formicidae) Community", *Revista de Biologia Tropical*, Vol. 48, No. 23, (June, 2000), p. 2.

⁴⁸ Pusat Berita, "Semut Berjalan Satu Semboyan di dalam Satu Tujuan", quoted from <https://pei-pusat.org/berita/146/semut-berjalan-satu-semboyan-di-dalam-tujuan.html>, accessed on Monday, December 5, 2023, at 11.30 AM.

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the soil.⁴⁹ Ants build their nests from small nests that can be up to 150 square meters in size. Each of the 200 small nests can contain anywhere from 5,000 to 500,000 ants.⁵⁰

Natural ant nests can be found in several places, namely:

- a. Ant Nest in Soil

Soil ant nests are the most common type of nest. Ants are able to build soil networks that create beneficial ecosystems that have a positive impact on other plants and animals that live near the ant nest.⁵¹ There are an estimated 3 quadrillion ants inhabiting the tropics and subtropics.⁵² Most ants like to nest in the ground for easy access to food, water and shelter. Ants tend to build their nests faster in rougher and wetter soil.⁵³ Subterranean nests consist of a system of tunnels and passageways. Research conducted by Tschinkel⁵⁴ and Moreira⁵⁵ reinforces the claim that ants dig their nests underground.

The holes that lead to ants' underground nests come in a variety of styles. The tunnels that ants build in the ground do not collapse easily and can last for centuries.⁵⁶

⁴⁹ Myrms Ant Nest, "Ant Nest", quoted from <http://www.antnest.co.uk/keep.html>, accessed on Tuesday, December 6, 2023 at 11.20 AM.

⁵⁰ Muhammad Kamil Abdul Shamad, *Mukjizat Ilmiah dalam al-Qur'an*, (Jakarta: Akbar Media, 2002), p. 170.

⁵¹ Fantastic Pest Control, "Ant Nest", quoted from <https://www.fantasticpestcontrol.co.uk/ant-control/ants-nests/>, accessed on Tuesday, December 6, 2023, at 11.20 PM.

⁵² Mongabay, "Berapakah Jumlah Semut di Dunia", quoted from <https://www.mongabay.co.id/2022/10/09/berapakah-jumlah-seluruh-semut-di-planet-bumi/>, accessed on Tuesday, December 6, 2023, at 03.20 PM.

⁵³ BBC Indonesia, "Semut Api", quoted from <https://www.bbc.com/indonesia/majalah/2015/05/150507semutapi>, accessed on Tuesday, December 6, 2023, at 05.20 PM.

⁵⁴ Walter Tschinkel, "The Nest", p. 21.

⁵⁵ A. A. Moreira, et al, "External and Internal Structure of *Atta Bisphaerica* Forel (Hymenoptera: Formicidae) Nest", Vol. 128, (2004), p. 205.

⁵⁶ IPB Berita, "Peran Semut dalam Lingkungan dan Pertanian", quoted from <https://ipb.ac.id/cms/id/berita/detail/305/peransemutdalamlingkungandanpertanianternyata-luar-biasa->, accessed on Tuesday, December 6, 2023 at 05.40 PM

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Picture 2. 3 Ant nest in soil

Ant nests have many positive impacts that can change the physical and chemical properties of the soil.⁵⁷ Changes the density of most types of soil⁵⁸, increases soil porosity, and improves conductivity and permeability. Ant nests can also improve soil nutrient retention.⁵⁹ In addition, ant activity can increase the release of N from plant residues and increase the breakdown of organic matter and recycling of minerals and nutrients by decomposing plant residues.⁶⁰

Ant nests in the soil also increase the concentration of organic matter, P, N, and K⁶¹, the levels of Na⁺, K⁺, Ca²⁺ and Mg²⁺ in the hive⁶², and change the pH⁶³. In wellness, it can also improve soil conductivity, soil nutrient content, which makes the potential for higher crop yields.⁶⁴

b. Ant Nest in Wood

⁵⁷ M. V. Brian, *Production Ecology of Ants and Termites*, (UK: Cambridge University Press, 1987).

⁵⁸ F. P. Baxter, and F. D. Hole, "Ants (*Formica cinerea*) Pedoturbation in a Prairie Soil", *Soil Sci Soc Am*, Vol. 31, (1967), p. 425-428.

⁵⁹ J. Majer, T. Walker, and F. Berlandier, "The Role of Ants in Degraded Soils Within Dyandra State Forest", *Mulga Res*, Vol. 9, (1987), p. 15-16.

⁶⁰ S. Geiger, et al, "Change in a Sandy Sahelian Soil Following Crop Residue and Fertilizer Additions", *Soil Sci Soc Am*, Vol. 56, (1992), p. 173.

⁶¹ R. D. Mandel, and C. J. Sorenson, "The Role of the Western Harvester Ant (*Pogonomyrmex occidentalis*) in Soil Formation", *Soil Sci Soc Am*, Vol. 46, (1982), p.787.

⁶² J. Dauber, A. Rommeler, and V. Wolters, "The Ants *Lasius flavus* Alters the Viable Sees Bank in Pastures", *Soil Biol*, Vol. 42, (2006), p. 160.

⁶³ V. Jilkova, O. Sebek, and J. Frouz, "Mechanism Ph Change in Wood Ant (*Formica polyctena*) Nest", *Pedobiologia*, Vol. 55, (2012), p. 247.

⁶⁴ D. Mc. Garry, et al, "Contrasting Soil Physical Properties after Zero and Traditional Tillage on an Alluvial Soil in the Semu Arid Subtropics", *Soil Tillages Res*, Vol. 53, (2000), p. 106.

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While some ants prefer comfortable soil, others prefer wood. The wood nests are built in the wooden structure, on tree stumps, trunks, and branches. The ants favor moist, hollow, decaying wood such as old tree trunks. During tunnel construction, the ants dispose of pieces of wood but do not eat them. Piles of discarded wood, which often resemble sawdust, are left outside the nest.⁶⁵



Picture 2. 4 Carpenter nest in wood

One species that nests in wood without eating the wood is the Carpenter Ant (*Camponotus pennsylvanicus*).⁶⁶

c. Opportunistic Ant Nest

Opportunistic nesting ants are some of the most difficult ants to control. Opportunistic nests can be found almost anywhere, such as underneath objects such as rocks, under concrete slabs where air conditioning units rest, in cavities in walls and insulation inside the house, and in any holes or cracks on the outside of the house. These nests are usually temporary and the ants will only stay for a few months at most. The ants will move on if they find a better place or leave if they sense danger.⁶⁷

⁶⁵ Maggies Farm, "Ant Nest", quoted from <https://maggiesfarmproducts.com/blogs/bug-hep/ant-nests>, accessed on Wednesday, December 7, 2023, at 08.20 AM.

⁶⁶ Fantastic Pest Control, "Ant Nest", quoted from <https://www.fantasticpestcontrol.co.uk/ant-control/ants-nests/>, accessed on Wednesday, December 7, 2023, at 09.20 PM

⁶⁷ Wikihow, "Mengusir Semut Kayu", quoted from <https://id.wikihow.com/Mengusir-Semut-Kayu>, accessed on Thursday, December 8, 2023, at 08.50 PM.

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Opportunistic nesting ants are able to adapt to a variety of environments. They need a moist, sheltered place and easy access to food.⁶⁸



Picture 2. 5 Ant nest in home

Ants that nest opportunistically include *Monomorium* ants, whose nests are made in the interior of building cavities making them quite difficult to reach, Pavement ants (*Tetramorium caespitum*), whose nests are found around wood, boards, stones, and close to water sources.⁶⁹ Cornfield ants, make crater-like nests that appear near or under bricks, stones, sidewalks, sidewalk cracks, and rotting logs.⁷⁰

Some ant colonies can also adapt well to human settlements. According to McGlynn, this group of ants is called tramp ants.⁷¹ Tramp ants are commonly found in disturbed habitats, such as agriculture and housing. In fact, most of these ants native territories are from outside their home range.⁷² For example, the nest of black ants, which is usually located on the fronds of coconut leaves and cocoa.⁷³

⁶⁸ Fantastic Pest Control, accessed on Wednesday, December 7, 2023, at 09.40 PM

⁶⁹ Gramedia, "Jenis Semut", quoted from https://www.gramedia.com/best-seller/jenis-semut/#1_Semut_Firaun_Monomorium_pharaonis, accessed on Thursday, December 8, 2023, at 08.55 PM.

⁷⁰ Pestgnome, "Types of Ants", quoted from <https://pestgnome.com/blog/ant-control/types-of-ants/#cornfield>, accessed on Thursday, December 8, 2023, at 09.55 PM.

⁷¹ Mc. Gallynn, "The Worldwide Transfer of Ants: Geographical Distribution and Ecological Invasions", *Journal of Biogeography*, Vol. 26, (1999), p. 535.

⁷² Hasriyanti, and Buchori, "Keanekaragaman Semut dan Pola Keberadaannya pada Daerah Urban di Palu, Sulawesi Tengah", *Entomologi Indonesia*, (2015).

⁷³ Biodiversitywarrior, "Semut Hitam", quoted from <https://biodiversitywarriors.kehati.or.id/artikel/semut-hitam-ireng/>, accessed on Thursday, December 8, 2023, at 10.55 PM.

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Library Review

A library review is conducted to prove that the research is original and different from previous studies. As far as literature studies have been conducted, scientific research that focuses on *Myrmecodia* in Qur'anic interpretation and science has never existed. Therefore, this research is very important to do in order to reveal the scientific miracle of Q.S. an-Naml verse 18 through interpretation and see the relevance of it to a science perspective oriented to one of the ant nests that has its own uniqueness compared to other ant nests. Author found several other studies related to this research, but not the same. Among the literature found are:

Winno Pradana Utomo's thesis entitled *Pengaruh Pemberian Ekstrak Tanaman Sarang Semut (Myrmecodia Pendens) Terhadap Ketebalan Tumor Kulit, Studi Eksperimental Pada Mencit BALB/c Yang Diinduksi 7,12 Dimethylbenza Anthracene (D<BA) dan 12-O-Tetradecanoylphorbol-13-Acette (TPA)*, Sultan Agung Islamic University of Semarang, 2016. This thesis describes the experimental results regarding the effect of *Myrmecodia Pendans* as one of the species of the genus *Myrmecodia* (ant nest plant) on the thickness of skin tumors. The similarity with this thesis is that both study *Myrmecodia*, but this thesis does not use experimental tests and does not focus on one type only, but rather a description of *Myrmecodia* and its benefits in general, and oriented to the verse of the Qur'an interpreted by scholars.

Khotib Munawar's thesis entitled *Konsep Ruang Sarang Semut dalam Pengembangan Arsitektur Alami (Kajian Q.S. An-Naml)*, Sains al-Qur'an University of Central Java, 2017. In this thesis, the story of ants in Surah an-Naml is explained, which there are lessons that can be taken from the concept of ant nest space in the development of Islamic architecture, namely a house with the concept of ant nest space centered on the meaning of the word *masaakin* which means a dwelling house, where there are spaces that have each function. The similarity with this research is that the theme at the center of the research is about the ant nest found in Q.S. an-Naml verse 18, but the difference lies in the focus of the study. The previous research explained the function of ant nests in the land towards Islamic architectural style in a building built by

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humans, while this research focuses on the interpretation of scholars regarding the ant nest and its relevance to science oriented to one of the unique forms of ant nests, namely in plants.

Abdul Falah's thesis entitled *Wawasan al-Qur'an tentang Lebah dan Semut (Studi Perbandingan Tafsir)*, PTIQ of Jakarta, 2017. This thesis describes the bees and ants in the view of the mufassirs. He presented insights about bees and ants in the Qur'an in terms of Tafseer bil Ma'tsur, Tafseer bil Ra'yi and Tafseer bil 'Ilmi. Tafseer bil Ma'tsur such as Ibn Katsir, Abdurrahman bin Muhammad al-Tsa'labi, Abu Bakr Jabir al-Jazairi ash-Syanqithi, and Abu Hatim, and al-Razi. While Tafseer bil-Ra'yi he took the opinion of Quraish Shihab, Abdullah Yusuf Ali, Sayyid Quthub, Wahbah Zuhaili, Nawawi al-Jawiy, Muhammad al-Syaukani, Ani Zamani Hasbie as-Shiddiqie, Hamka, Musthofa al-Maraghi, and 'Aidh al-Qorni. While Tafseer bil 'Ilmi includes Thantawi Jawhari, Harun Yahya, and Tafseer Kemenag RI. The similarity with this research is the object of study that both discusses ants and uses Thantawi Jawhari's interpretation, but in contrast to this paper, this research is more focused on analyzing the discussion of ant nests in Q.S. an-Naml verse 18, while research by Abdul Falah in 2017 includes discussion of bees and ants by using comparative analysis of various styles of interpretation.

Siti Fatihatul Ulfa's thesis entitled *Semut dalam al-Qur'an (Studi Penafsiran Thantawi Jawhari dalam Tafsir al-Jawahir)*, Walisongo Islamic University of Semarang, 2018. This thesis explains Thantawi Jawhari's interpretation of ants with a scientific perspective in the book *Tafseer Al-Jawahir fi Tafsîr al-Qur'an al-Karim* using tahlili analysis of Q.S. an-Naml verses 18-19. The similarity with this research is that both examine the verses about ants in Q.S. an-Naml and use Thantawi Jawhari's point of view as a source. The difference is that this study uses thematic analysis, namely on ant nests only in verse 18 of Surah an-Naml, and not only uses Thantawi Jawhari's interpretation, but also uses other interpretation books as primary data sources.

Lailatun Ni'mah's thesis *Serangga dalam Perspektif al-Qur'an (Studi Tafsir Tematik)*, IAIN of Ponorogo 2019. This thesis explains about insects in the

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Qur'an and the perspective of science, and the form of the Qur'anic narrative in describing it through a thematic interpretation approach. Similar to this research, which examines insects and scientific approaches through the maudhu'i approach, but the difference is that this research only focuses on examining one of the insects contained in the Qur'an, namely ants in Q.S. an-Naml verse 18 with the theme of ant nests.

Aswatun Nor Hasanah's thesis entitled *Kisah An-Naml dalam al-Qur'an (Studi Komperatif)*, Antasari Islamic University of Banjarmasin, 2019. This thesis explains the similarities and differences in interpretation related to verses 16-19 of surah al-Naml by using the muqarran method, which is to put forward the opinion of Tafseer scholars in interpreting verses of the Qur'an, then compare the interpretations of Ibn Katsir and al-Qurthubi with Hamka and Quraish Shihab. Similar to this research which also discusses surah an-Naml, but this research only focuses on verse 18 and the interpretation method used is thematic analysis.

7. Hilmi Muhammad's thesis entitled *Toleransi dalam Kisah Nabi Sulaiman dan Semut (Studi Komperatif Tafsir Thantawi Jawhari Dan Tafsir Al-Misbah)*, Sunan Gunung Djati Islamic University of Bandung, 2020. This thesis explains the tolerance that exists in the story of Sulaiman AS and the ant horde, both of which have a good attitude of tolerance. The similarity with this research is the object of research, namely ants and the use of Thantawi Jawhari's interpretation as a source. However, in this thesis what is studied is the attitude of tolerance between Sulaiman AS and ants using a muqarran (comparative) approach, while this study uses a thematic approach that focuses on one of the ant nests found in plants.

Ellya Rachma Yunita's thesis entitled *Semut dalam Tafsir Saintifik (Studi atas Tafsir al-Ayat al-Kauniah fi al-Qur'an al-Karim Karya Zaghlul Najjar)*, Sunan Ampel Islamic University of Surabaya, 2021. This thesis explains santfik Zaghlul al-Najjar's interpretation of ants in al-Qur'an surat an-Naml verses 18-19 and the relevance of his interpretation to scientific discoveries supported by recent research related to ants. The similarity with this study is

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that both interpret Surah an-Naml verse 18 and see its relevance to science. But the difference is that this research focuses on the theme of ant nests in the discussion of verses and does not use Zaghul al-Najjar's interpretation as a research source.

Nurjannah's thesis entitled *Kemukjizatan Ilmiah al-Qur'an tentang Perilaku Sosial Semut (Suatu Kajian Tafsir Tahlili terhadap Q.S. An-Naml: 17-19, STAIN Majene, 2021*. This thesis describes the miracle of ants in their social life scientifically evident in line with modern science studied through the tahlili approach to verses 17-19 of Surah an-Naml by describing the munasabah of the verses, the meaning of mufradat, and the interpretation of the verses using Tafseer al-Qurthubi, Jalalain, Ibnu Katsir, al-Azhar, al-Misbah, and the Ministry of Religion. The similarity with this research is that it discusses ants contained in Surah an-Naml scientifically, but the difference lies in the approach used. This study uses a thematic approach to analyze the verse and only focuses on verse 18 and the source of interpretation used to explain the verse is not the same.

10. Ahmad Salim's thesis entitled *Sediaan Nanopartikel Ekstrak Sarang Semut untuk Pengobatan Kanker, Indonesia Islamic University of Yogyakarta, 2021*. This thesis describes the nano particles in the ant nest extract have beneficial activities for anticancer of various types of cancer cells. The similarity with this thesis is that both examine the ant nest plant, the difference is that the author examines ant nest plants in general, while this thesis conducts laboratory tests on ant nest plants to prove their benefits as anticancer. Not only that, the author's thesis is oriented to interpretation, while the thesis written by Ahmad Salim is oriented to science.

Rajid Dioldi Darma's thesis entitled *Semut dalam Kajian Penafsiran al-Quran (Studi Komperatif Tafsir al-Ayat al-Kauniah fi al-Qur'an al-Karim Dan Tafsir 'Ilmi Kemenag RI)*, Raden Intan Islamic University of Lampung, 2022. This thesis describes the similarities and differences in the interpretation of Zaghul An-Nazzar in Tafseer Al-Ayat al-Kauniah fi Al-Qur'an al-Karim with Tafseer 'Ilmi of the Ministry of Religion of the Republic of Indonesia in

interpreting verses 18 and 19 of Surah an-Naml. The similarity with this research is the use of interpreted verses, namely verses in Surah an-Naml, but this research only focuses on verse 18 only, and uses thematic analysis methods instead of muqarran.

Mukhamad Sidiq Abdullah's thesis entitled *Relasi Manusia dan Hewan dalam Q.S. An-Naml Ayat 18-19 (Studi Komperasi atas Tafsir al-Baidhawi dan al-Misbah)*, K.H. Abdurrahman Wahid Islamic University of Pekalongan, 2023. This thesis explains about the relationship between humans and animals through a muqarran approach, namely comparing the interpretations of al-Baidhawi and al-Misbah in interpreting verses 18-19 of Surah an-Naml. The similarity with this research lies in the object of the verse in Q.S. an-Naml, but author use a thematic approach that is about ant nests with different sources of interpretation.

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CHAPTER III RESEARCH METHODS

A. Type Research

The type of research used in this study is *Library Research* namely collecting data that is literature which is carried out to solve a problem by relying on a critical and in-depth study of relevant library materials, like magazines, documents, books, commentaries or historical records.⁷⁴ This literature research is qualitative research, which is a method of analyzing the results of research that produces descriptive data analysis, namely data stated in writing or orally which is researched and studied as a whole.

In this library research, the author collects references from the books of Tafseer that are characterized by 'ilmi, and books, journals, articles, and other scientific works related to *Myrmecodia*, which the result of this research is an analysis of the relevance of the interpretation of al-Qur'an with science in verse 18 of Surah an-Naml in the form of written descriptive. The approach that the author uses is a scientific approach, by describing the findings or science related to the interpretation of the verse about *Myrmecodia*.

B. Data Source

The data sources in this study are divided into two, namely primary data sources and secondary data sources.⁷⁵

1) Primary Data Source

Primary data sources used in this research are data obtained from original sources that contain information related to the research.⁷⁶ The primary sources of this research are *al-Qur'ân al-Karîm*, Book Interpretation *Such as al-Jawâhir fi Tafsîr al-Qur'ân al-Karîm* by Thantawi Jawhari, *al-Marâghy* by Ahmad Musthofa al-Marâghy, and *Al-Sya'rawi* by Muhammad Mutawalli al-Sya'rawi.

⁷⁴ Abdul Rahman Sholeh, *Pendidikan Agama dan Pengembangan untuk Bangsa*, (Jakarta: Raja Grafindo Persada, 2005), p. 63.

⁷⁵ Lexy j. Moleong, *Metodologi Penelitian Kualitatif*, (Bandung: Remaja Rosda Karya, 2014), p. 256.

⁷⁶ Tatang Muhammad Amrin, *Menyusun Rencana Penelitian*, (Jakarta: Raja Grafindo Persada, 1995), p. 133.

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Then the science books used are *Ant Plant Interactions Impact of Human on Terrestrial in Australia* by Ralf C. Buckley, et al, *Ant Plant Interactions Impacts of Human on Terrestrial Ecosystem* by Paulo S. Oliveira and Suzanne Koptur, et al, *Myrmecodia: Efek Fisiologi dan Potensi Manfaat* by Rudy Agung Nugroho, et al.

2 Secondary Data Source

The secondary data source use in this study are in the form of literature related to Tafseer and science around ant nests, such as books, journals, and other scientific works that contain supporting material for research.

C. Techniques of Data Collection

The techniques of data collection is a way of collecting various sources that provide information about the problems discussed.⁷⁷ Data collection is done by examining literature and materials relevant to the interpretation and science related to ant nests, whether from books, journals, or other literature.

The author collected data using the thematic method, which collects interpretations related to a particular theme⁷⁸ that is *Myrmecodia*. The steps used:

1. Make observations about the discussion to be researched, namely how the interpretation, especially those that discuss ant nests explicitly and its review in terms of science related to *Myrmecodia* as one of the existing ant nests, either from books, or other literature.
2. Collecting sources of Tafseer, books, journals, theses, or literature related to the research discussed.
3. Reading, understanding and sorting out sources related to the discussion of this research in the form of interpretation and science.
4. Create a theoretical framework from the results of reading about interpretation and science review as a discussion of research.

⁷⁷ Eko Sugiarto, *Menyusun Proposal Penelitian Kualitatif: Skripsi dan Tesis*, (Yogyakarta: Suaka Media, 2015), p. 8.

⁷⁸ Hujair Sanaky, "Metode Tafsir (Perkembangan Metode Tafsir Mengikuti Warna atau Crak Mufassirin)," *al-Mawarid*, (2008), p. 279.

Techniques of Data Analysis

Data analysis is the process of systematically searching and compiling data. This is done by organizing data, describing it into subsets, synthesizing it, arranging it into patterns, choosing what is important and what needs to be considered, and making conclusions.⁷⁹

The data analysis method that the author uses in this research is the descriptive-analysis method. Descriptive-analysis is a type of analysis that includes exposure given in clear and detailed words. Where the author describes the data that has been collected related to the interpretation and science of *Myrmecodia* with clear and detailed sentences. The data that has been collected is organized systematically through the content analysis method. Content analysis is a type of research that thoroughly discusses the content written, aiming to make correct conclusions from the data by considering the context.⁸⁰

To present this research in a descriptive-analytical manner, author used the content analysis method to analyze information from primary and secondary data sources through three stages, namely:

1. Data Reducation

Data reduction means focusing research on important things to look for themes and patterns or summarizing and selecting important things.⁸¹ In this process, author select and focus their research and collect the data needed from the research subject, namely *al-Qur'an al-Karim*, Book Interpretation *Such as al-Jawâhir fi Tafsîr al-Qur'ân al-Karîm* by Thantawi Jawhari, *al-Marâghy* by Ahmad Musthofa al-Marâghy, and *al-Sya'rawi* by Muhammad Mutawalli al-Sya'rawi. Then the science books used are *Ant Plant Interactions Impact of Human on Terrestrial in Australia* by Ralf C. Buckley, et al, *Ant Plant Interactions Impacts of Human on Terrestrial Ecosystem* by Paulo S. Oliveira and Suzanne Koptur, et al, *Myrmecodia: Efek Fisiologi dan Potensi Manfaat* by

⁷⁹ Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*, (Bandung: Alfabeta, 2007), p. 334.

⁸⁰ Mahmud, "Proposal Penelitian Kajian", quoted from <https://www.kumpulanmakalahmahmud.com/2012/06/contoh-proposal-penelitian-kajian.html?m=1>, accessed on Saturday, March 11, 2023, at 02.00 Pm

⁸¹ Sugiyono, *Memahami Penelitian Kualitatif*, (Bandung: Alfabet, 2014), p. 92.

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Rudy Agung Nugroho, et al, and secondary sources related to this theme to be analyzed.

2) Data Display

Data presentation is the process of displaying data that has been analyzed in the form of words, sentences, or paragraphs before making conclusions. This stage in qualitative research can be displayed in the form of brief descriptions, charts, flowcharts, relationships between categories, etc.⁸² In this process, the author presents the data in narrative form by describing the interpretation content related to *Myrmecodia* and the results of the analysis using a scientific approach by presenting scientific theories and modern science discoveries.

3) Drawing Conclusion or Verification

After reducing and presenting the data, the final stage is drawing conclusions or verification. Drawing conclusions aims to find out the clear final result of the research in the form of analysis that has been done, in the form of the relevance of interpretation to science.

⁸² *Ibid.*, p. 95.

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CHAPTER V CLOSING

A. Conclusions

From the explanation above, the following conclusions can be drawn:

1. *Myrmecodia* in the interpretation of the Qur'an is that the one of *wad an-Naml* which ant nest has a space with a perfect hollow and layered structure that has a certain function for each space and is used as a shelter, breeding, and food storage according to the word *masakin* in the Qur'an. The verse that contains a hint about animal nests has several words that generally have the same meaning, namely *bayt* and *maskan*. *Bayt* found in Q.S. an-Nahl verse 68 about beehives in plural form *buyut* and Q.S. al-Ankabut verse 41 in form of *bayt* about the spider's nest. While in ants Allah SWT uses diction *masakin* which is the derivation of the word *sakana* means a house or resting place that has comfort in it, and can be a village because ants live in groups (dwelling). The difference between these two words in the scope of the nest lies in the composition of the nest, its food species and the total number of nest inhabitants.
2. The verses in the Qur'an that are explained in more detail through interpretation is always relevant to modern scientific studies, including about *Myrmecodia*. This plant is one of the ant nests that has a hollow structure, has 85% glucose in the tuber, serves as a shelter, stores food and reproduces ants of the genus *Iridomyrmex sp.* and *Ochtellus sp.* This symbiosis produces various substances such as *flavonoid*, *tanin*, *polifenol* which is very beneficial in medicine, like preventing cancer, diabetes, and other diseases. *Myrmecodia* has 27 species distributed all over the world. Among them, 26 *Myrmecodia* species occur in Indonesia, with 80% of the population living in swamps and wilderness. Out of the 26 species, 15 are found in Papua, and the most commonly used as medicine is the type of *Myrmecodia Pendans*, *Myrmecodia Tuberosa*, and *Hydnophytum Formicarum*.

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Suggestion

There is nothing perfect in the world except Allah SWT, the creator of all creatures. Including this research, of course, it is certainly far from perfect. Less precise in terms of word or sentence selection, systematic presentation, analysis carried out and others. Therefore, further studies are needed for good results related to the discussion of interpretation and modern science. Hopefully, this research can benefit readers to learn lessons from the signs of Allah's power in nature through the Qur'an. It is also hoped that this research can be a contribution to the scientific treasury, especially in the field of interpretation of the Qur'an, trying to understand interpretation from various perspectives then actualizing the findings and learning in life in order to benefit and obtain incomparable rewards for the sustainability of life in the world, being wise in utilizing every opportunity, and training sensitivity to the environment of biodiversity. We as humans must be able to utilize the existence of animals in the world to get closer to Allah SWT. Understanding of religious teachings will affect human attitudes and behavior in treating God's creatures. The author realizes that there are still many shortcomings in this research, so it is hoped that further research will examine further the development of interpretation and modern science from various aspects.

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