

**THE HOLY QUR'ĀN'S FIVE PLANTS
RESEMBLE FIVE SENSORY RECEPTORS IN
THE MICROSCOPIC APPEARANCE: AN
ANALYSIS**

MOTAHAREH SOLTANI

Religious and Medicine Research Center, Kerman University of
Medical Sciences, Kerman, Iran
Email: motahareh.soltani@gmail.com

SOMAYYEH KARAMI-MOHAJERI

Student Research Committee, Kerman University of Medical
Sciences, Kerman, Iran.
Email: s_karami@kmu.ac.ir

EHSAN MEHRABI-KERMANI

English Language Instructor, Official Translation Office No. 442,
Kerman, Iran.
Email: e.mehrabikermani@yahoo.com

REZA ALLAHDADI

Department of Islamic Studies, School of Medicine Kerman
University of Medical Sciences, Kerman, Iran.

MOHAMMAD SOHRABIYAN PARIZI

Department of Islamic Studies, School of Medicine Kerman
University of Medical Sciences, Kerman, Iran.

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Abstract

In the Holy Qur'ān, the religious text of Islam, the name of leeks, cucumbers, garlic, lentils and onions are mentioned together in the verse 61 of Sūrah Al-Baqarah (The Cow). This descriptive study was designed to determine the probable cause of mentioning these five plants in the Holy Qur'ān. Results present interesting similarities between the microscopic view of these plants and the five sensory

receptors in the peripheral nervous system. These findings are in line with the ideas of the “Doctrine of Signatures” theory. The doctrine of signatures theory believes that plants that resemble body parts have beneficial effects on those parts. Thus, the main purpose of this study was to propose another look to Qurānic scientific research in order to open new windows for more research in the field of interdisciplinary topics. Undoubtedly, the continuation of these studies and scientific attention to the meaningful verses of the Holy Qur'ān can be the first steps of a new path in line with the discovery of miracles and scientific statements of the Holy Qur'ān.

Keywords: *Sūrah Al-Baqarah, the Doctrine of Signatures Theory, Peripheral Nervous System, The Holy Qur'ān, Sensory Receptors, Sūrah*

1. Introduction

The *Holy Qur'ān* revealed to Prophet (*Ḥaḍrat Muhammad Rasūlullah Khātam un Nabīyyīn Ṣallallahu 'alaihi wa 'alā Ālihi wa Aṣḥābihi wa Ṣallam*) about 1400 years ago is a book of guidance of human beings to the Almighty God. The purpose of all the commandments and stories of *the Holy Qur'ān* is to explain the aim of human life, invite them to think about their bodies and the world, and teach moral, social, and scientific topics. *The Holy Qur'ān* contains many scientific lessons for body health, types of nutrition, body parts, fruits, and herbs. ⁽¹⁾

The scientific issues and medical advice express the greatness of the Almighty God. ⁽¹⁾ *The Holy Qur'ān* uses various methods, including stories, allegories, and instructional speeches, to convey social and scientific concepts. ^(2,3) One of these allegories is similarities between the leech mentioned in verse 14 of *Sūrah Al-Mu'min (The Believer)* and the human embryo from days 7-24 when it clings to the endometrium of the uterus, as mentioned in Figure 1. ^(4, 5)



Figure 1. The leech-like appearance (lower image) of the 24-day-old human fetus (upper image).⁽⁵⁾

Fruits and plants are mentioned in many *Sūrahs* of *the Holy Qur'ān*. ^(2,3) Several articles have investigated the plants mentioned in *the Holy Qur'ān* and their medicinal properties. ^(2,3) The doctrine of signatures is widely mentioned in the literature on medicinal

plants. According to this theory, some of the physical properties of plants act as signs to show their therapeutic value. ⁽⁶⁾ For instance, in the doctrine of signatures theory, walnuts are similar to the human brain (Figure 2) and it is helpful for brain health. ⁽⁶⁾

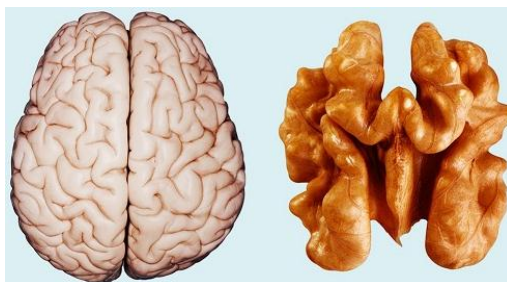


Figure 2. The appearance of the human brain (left image) is similar to a walnut (right image).

In verse 61 of Sūrah Al-Baqarah (The Cow), five plants were mentioned together: ⁽⁷⁾

”وَإِذْ قُلْتُمْ يَا مُوسَى لَنْ نَصْبِرَ عَلَىٰ طَعَامٍ وَاحِدٍ فَادْعُ لَنَا رَبَّكَ يُخْرِجْ لَنَا مِمَّا تُنْبِتُ الْأَرْضُ مِنْ بَقْلِهَا وَقِثَّائِهَا وَفُومِهَا وَعَدَسِيهَا وَبَصِلِهَا قَالَ آتَسْتَبْدِلُونَ الَّذِي هُوَ أَدْنَىٰ بِالَّذِي هُوَ خَيْرٌ اهْبِطُوا مِصْرًا فَإِنَّ لَكُمْ مِمَّا سَأَلْتُمْ“

And when you said, .Musa , we will no longer confine ourselves to a single food: So, pray for us to your Lord that He may bring forth for us of what the earth grows — of its vegetable, its cucumbers, its wheat, its lentils and its onions.. He said, .Do you want to take what is inferior in exchange for what is better? Go down to a town, and you will have what you ask for..

At the beginning of this verse, the Israelites ask Prophet Moses (‘*Alaih As-Salām*) for other foods in addition to Mann-o-Salwa: “We cannot endure one food”. *The Holy Qur’ān* is the word of the Allah Almighty and behind each word is a hikmat. The current study aims to study the reasons for the following objections; 1) why are these five plants mentioned together in this verse, 2) Since there is no similarity between the appearance of these plants and body parts, would the evaluation of their microscopic appearances provides more information about the relationship between these plants?

To answer these questions, the structure and growth stage of the plants were evaluated in scientific resources. Finally, we revealed the shape similarities between these plants and the microscopic view of sensory receptors in the peripheral nervous system.

2. Background, History, and Review of Literature:

The Holy Qur'an is not a book of experimental and biological sciences; however, it directly mentioned many scientific facts to Muslims 1400 years ago through stories and allegories. ⁽⁸⁾ In many verses of *the Holy Qur'an*, Allah Almighty mentions hidden signs in the allegories that could be extracted by concrete thinking. However, as it is stated in verse 29 of Sūrah Ṣa'd, there is no end to researching *the Holy Qur'an* verses:

”كِتَابٌ أَنْزَلْنَاهُ إِلَيْكَ مُبَارَكٌ لِيَدَّبَّرُوا آيَاتِهِ وَلِيَتَذَكَّرَ أُولُو الْأَلْبَابِ”

This is a blessed Book We have revealed to you, so that they deliberate in its verses, and so that the men of understanding may heed to advice.

The Holy Qur'an is suitable for all levels of understanding and consciousness, and scientists are still far from reaching the miraculous nature of *the Holy Qur'an*. ⁽⁸⁾ Muhammad Rasūlullah Khātām un Nabīyyīn Ṣallallahu 'alaihi wa 'alā Ālihi wa Aṣḥābihi wa Ṣallam says ⁽⁹⁾ about *the Holy Qur'an*:

”لَهُ ظَهْرٌ وَ بَطْنٌ فَظَاهِرُهُ حُكْمٌ وَ بَاطِنُهُ عِلْمٌ ظَاهِرُهُ أَمِينٌ وَ بَاطِنُهُ عَمِيقٌ لَهُ جُجُومٌ وَ عَلَى جُجُومِهِ جُجُومٌ لَا تُحْصَى - مَجَائِبُهُ وَ لَا تُبْلَى عَرَائِيهِ فِيهِ مَصَابِيحُ الْهُدَى وَ مَنَارُ الْحِكْمَةِ وَ دَلِيلٌ عَلَى الْمَعْرِفَةِ لِمَنْ عَرَفَ الصِّفَةَ“

It has an appearance and It has an inwardness, its appearance is command and order, and its inwardness is science and knowledge, its outward appearance is noble and beautiful, and its inwardness is deep and insufficient, it has stars and its stars also have stars (it has parts and each part has parts), its wonders cannot be numbered and its innovations do not become old. In it are the lights of guidance and the source of wisdom and evidence for knowledge, for those who know its way

The phrase “ظَاهِرُهُ أَمِينٌ” refers to the beauty of the verses and “بَاطِنُهُ عَمِيقٌ” refers to the scientific and intellectual aspects of *the Holy Qur'an*, which is very deep like the sea in which you swim, you move a bit further, but you realize there are still somethings to learn. Here, “لَهُ جُجُومٌ وَ عَلَى جُجُومِهِ جُجُومٌ” emphasizes the existence the endless acceptable concepts for different levels of understanding in *the Holy Qur'an*. “لَا تُبْلَى عَرَائِيهِ وَ لَا تَنْقُضِي عَرَائِيَهُ”, the wonders of *the Holy Qur'an* do not end. After the advent of Islam and the revelation of *the Holy Qur'an*, the Arab people had superstitious beliefs about scientific issues ⁽¹⁰⁾, including medicine, chemistry, physics, geology, biology, and botany were at their peaks in Islamic societies. ⁽¹¹⁾ While the Western world

was trapped in medieval ideas, the greatest scientists emerged from Islamic societies. ⁽¹²⁾ Islamic scholars took various sciences from Greece and upgraded them, and they reached the peak of their knowledge within a few centuries. Scientists such as Ibn Sina, Kharazmi, Farabi, Muhammad ibn Zakaria Razi, Abu Rihan al-Biruni, Hakim Omar Khayyam, and Ibn Khaldun were engaged in teaching, writing, and researching in these sciences. Muslims wrote the best books, such as the Canon of Medicine and the Al-Shifa of Ibn Sina. From the twelfth century onwards, the translation movement took shape in Europe, and the ideas of Ibn Sina and Ibn Rushd became prevalent in European universities for many years. ^{(13,} ¹⁴⁾ Despite the passage of several centuries, the books of many Islamic scientists, including the Canon of Medicine, are still taught in the best universities. Islamic scholars such as Abu Hamid al-Ghazali in *Tahaft al-Falasfeh* and Fakhr al-Razi in *Mafatih al-Ghayb* used the scientific interpretation of the Quranic chapters to refute the philosophical and scientific foundations of the Greek objections. The Holy Qur'an provided legitimacy to the experimental sciences of Greece by matching them with its verses, thus authenticating the scientific concepts.

During these thousand years, many scientific interpretations, books, and articles have been written in this field. One of the characteristics of the science of miracles in *the Holy Qur'an* is that several scientific discoveries that human beings have been able to make only with new technology were mentioned in *the Holy Qur'an*. Many of the scientific facts that are mentioned in a very brief, deep, and wonderful way in the verses of *the Holy Qur'an* have been discovered only with the technology of the twentieth century. These scientific facts could not have been known at the time of the revelation of *the Holy Qur'an* 1400 years ago and are in accordance with the latest scientific findings. The compatibility of *the Holy Qur'an* with the new sciences is considered a sign of its revelation in the book "Comparison between the Torah, Bible, *The Holy Qur'an* and Science". ^(15,16) Today, many studies have shown that the Allah Almighty refers to various fields of science in the text of *the Holy Qur'an* using allegories. ⁽¹⁷⁾

In this regard, Maurice Bucalille states that the examinations revealed traces of sea salt in Merenpetah's mummy that indicates the pharaoh's drowning, which is well explained in verse 90 of Sūrah Yūnus (Jonah). ⁽¹⁸⁾ The floating of the mountains on the top of the Earth is mentioned in the Sūrah An-Naml (An Ant); "Thou seest the mountains and thinkest them firmly fixed, but they shall pass away as the clouds pass away: (such is) the artistry of Allah, who disposes of all things in perfect order, for he is well acquainted with all that ye do." Keith L. Moore first mentioned in 1986 in an article entitled "A

scientist's interpretation of references to embryology in *the Holy Qur'an* proves that *the Holy Qur'an* mentioned scientific facts that were recently discovered by scientists. ⁽⁵⁾ In this article, he proves the developmental stages of the fetus from fertilization to birth during the nine months in the mother's womb according to modern embryology in the verses of *the Holy Qur'an*. It is stated in verse 14 of Sūrah Al-Mu'minūn (*The Believers*) regarding the stages of embryo creation:

”مَّمَّ حَلَلْنَا الطُّلْقَةَ عَلَقَةً فَحَلَقْنَا الْعَلَقَةَ مُضْغَةً فَحَلَقْنَا الْمُضْغَةَ عِظَامًا فَكَسَوْنَا الْعِظَامَ لَحْمًا ثُمَّ
أَنْشَأْنَاهُ خَلْقًا آخَرَ.“

Then We turned the sperm-drop into a clot, then We turned the clot into a fetus-lump, then We turned the fetus-lump into bones, then We clothed the bones with flesh; thereafter We developed it into another creature.

One of the meanings of the word "*alaraqah*" is leech or bloodsucker that clings to the skin. Just as a leech sucks blood from the host, the human embryo derives blood from the decidua or pregnant endometrium. It is Amazing how much the fetus of 23-24 days resembles a leech (Figure 1).

As there were no advanced microscope devices to examine the stages of human embryo formation 1400 years ago, doctors or midwives of that time would not have known that the human embryo had this leech-like appearance. In the early part of the fourth week, the fetus is smaller than a grain of wheat, so it is not possible to see it with the naked eye. ⁽⁵⁾ This verse is consistent with the stages of human embryo development as researchers such as Keith L. Moore, Marshall Johnson, and Gerald Goringer first put forward this claim. ⁽⁵⁾ Soltani *et al* also mentioned Quranic similarities are likened to the structure of the human eye in Sūrah An-Nūr (*The Light*). ⁽¹⁹⁾

The doctrine of signatures was first mentioned by Paracelsus and his followers and is a widely cited theory, according to which the therapeutic value of plants is revealed based on their physical appearance shape along with color, texture, and smell. For thousands of years, people have also recognized the medical properties of a plant according to its appearance. ⁽⁶⁾ Oswaldus Crollius believed that everything has signs communicated to us by the immense mercy of the Allah Almighty to reveal the purpose of its creation. ^(20, 21) According to this theory William Cole also wrote: “Wall-nuts have the perfect Signature of the Head: The outer husk or green covering, represent the pericranium, or outward skin of the skull, whereon the hair growth, and therefore salt made of those husks or barks, is exceeding good for wounds in the head. The inner woody shell hath the Signature of the skull, and the little yellow skin, or peel, that covereth the kernel, of the hard Meninga and Pia-mater, which are the

thin scarfs that envelope the brain. The kernel hath the very figure of the brain, and therefore it is very profitable for the brain and resists poysons; for if the Kernel is bruised, and moistened with the quintessence of Wine, and laid upon the Crown of the Head, it comforts the brain and head mightily".^(20, 21)

So far, no study has been done on the doctrine of signatures and plants mentioned in *the Holy Qur'an*. Reviewing the research on the scientific aspects of *the Holy Qur'an* inspired us to find novel scientific implications of *the Holy Qur'an*. The current study aimed to scientifically study the allegories in verse 61 of Sūrah Al-Baqarah (The Cow) based on the biological point of view of all the five sensory receptors of the human peripheral nervous system.

The sensory system consists of a group of sensory receptors in the peripheral nervous system that receive environmental stimuli and send them to the brain to direct the effector tissue for a response. According to the traditional definition, rooted in Aristotle's words, man is equipped with five senses, including eyesight, hearing, smell, taste, and touch. Human five senses are not perfect at birth and gradually develop, the first one is the sense of touch, and then the senses of taste, hearing, smell, and sight.⁽²²⁾ Kant wrote about the importance of sensory perception: "Experience is undoubtedly the first product of our understanding, that understanding is the basis of sensory findings."^(23, 24) Aristotle proposes two divisions for the five senses: 1) the senses that apply to all animals, such as touch and taste and those that do not apply to all animals, such as smell, hearing, and sight. 2) Senses that work through external mediators such as smell, hearing, and sight, and those that do not work through external mediators such as touch and taste. These divisions can be combined to say that the senses of taste and taste belong to all animals and do not work through external intermediaries. While hearing, sight, and smell do not belong to all animals and work through external intermediaries.

Ibn Sina and Mulla Sadra pay special attention to the sense of touch and define the sense of touch as follows: "The sense of touch is spread throughout the nerves of the skin and understands what a person touches and what changes the composition and temperament of the body."^(23, 24) The sense of taste connects this sense with moisture, which is another kind of senses; although it believes that this feeling does not reach us through the water. Ibn Sina and Mulla Sadra knew the place of this feeling on the tongue and believed that according to the moisture in the mouth, the sense of taste perceives what it encounters. Ibn Sina: "The sense of taste can understand nine things including sweetness, bitterness, sourness, bitterness, bitterness, spiciness, fat, ugliness, insatiability"^(23, 24).

According to Aristotle, the sense of smell in us is more difficult than other senses. The cause of this difficulty can be found in two factors: 1) the nature of the smell is not very clear, 2) the sense of smell is not very precise and human beings perceive smells with moderate accuracy. Ibn Sina and Mulla Sadra determined that the sense of smell is located in the two appendages of the front part of the brain. ^(23, 24)

3. Methodology:

The present study is a qualitative study on the five plants mentioned in verse 61 of Sūrah Al-Baqarah (The Cow). The meaning of this verse text of *the Holy Qur'an* is evaluated in the interpretation books. The Arabic, Persian, and English texts of *the Holy Qur'an* ⁽⁷⁾ were reviewed to understand the relationship between allegories used in *the Holy Qur'an*. To find the complete meaning of words, Dekhoda Dictionary ⁽²⁵⁾, Amid Dictionary ⁽²⁶⁾, Al-Mufradat Fi Gharib Al- *the Holy Qur'an* written by Ragheb Isfahani ⁽²⁷⁾, and *Qamus al-Qur'an* written by Seyyed Ali Akbar Qurashi ⁽²⁸⁾ were used. Then, to find out the microscopic similarity of the five sensory receptors with the five plants, scientific literature in Pub Med and Science Direct search engines, and *Gray's anatomy* book, ⁽²⁹⁾ *Ganong's review of medical physiology* are used to explain the structure of the five sensory receptors. ⁽³⁰⁾ The obtained results are presented in a descriptive-analytical method.

4. Results and Discussion

4.1 Visual sense (Sense of sight)

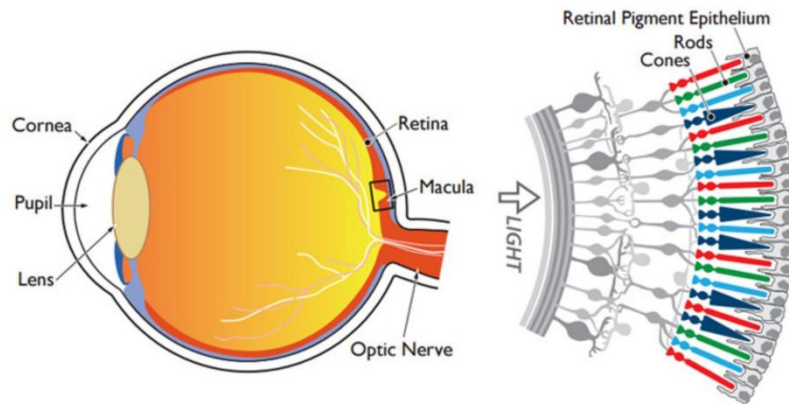
The eye consists of the cornea, pupil, iris, and lens in the front. Light enters the eye through the pupil orifice in the iris and focuses on the retina after refraction in the lens. The retina is the light-sensitive area behind the eye where the optical receptors are located. Optical receptors are specialized retinal cells that respond to light. The most accumulation of light cells is in the middle part of the retina, macula lutea, and the clearest images are created in this region. Finally, Retinal cells transmit information through the optic nerve to the occipital lobe in the back of the head. ⁽³¹⁾ Macula lutea contains a hole (Fovea) with a diameter of about 5 mm without blood vessels in which the light from the lens is concentrated. The cone and rod photoreceptor cells in the retina of the eye convert the light energy to electrochemical signals which are transferred along the optic nerve and then to the brain.

In verse 61 of Sūrah Al-Baqarah (The Cow), the word “بَقِيلًا”; Herbs” means leek which is similar to the visual sensory system in the back of the eyeball including photoreceptors and optic nerve. As

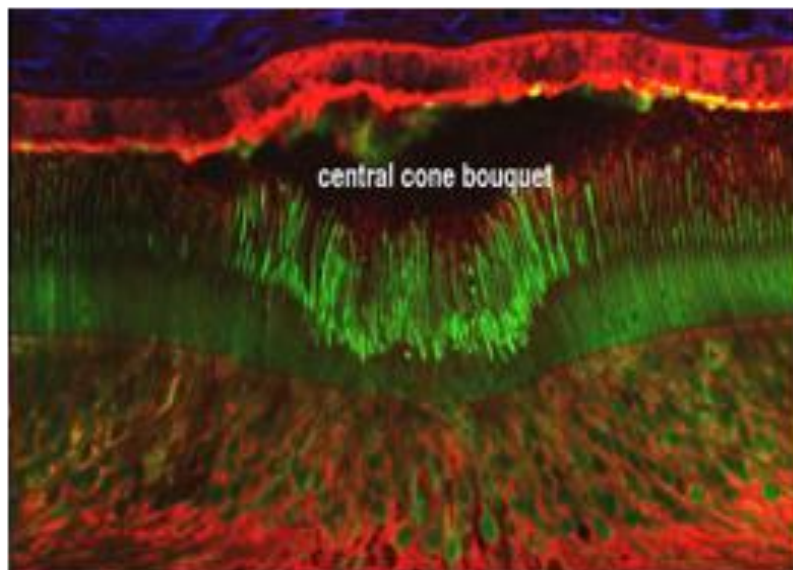
shown in Figure 3, photoreceptors in the macula lutea resemble the branches and leaves of the leek which join together and make optic nerves like the leek pod.

Numerous studies have shown that lutein and zeaxanthin are necessary and main components for eye health and it was reported that leeks are rich in these two substances. ⁽³²⁾ lutein and zeaxanthin are carotenoid pigments that constitute the major pigments that start in the yellow spot of the human retina and also, defend the macula from hazards by blue light, improve visual power and remove adverse reactive oxygen species. So, according to studies, it is very useful for eye health. ⁽³²⁾

(a)



(b)



(c)



Figure 3. Visual sense. a) Structure of the eye, b) the image of photoreceptors in the fovea captured by a fluorescence microscope, and c) leek.

4.2 Auditory sense (Sense of hearing)

The human ear consists of three parts; the outer ear (tulip, ear canal, and eardrum), the middle ear (the air-filled space behind the eardrum including the smallest bones in the body, and the inner ear (cochlea). The cochlea is filled with a fluid in which the cilia of auditory receptor cells (hair cells) float. The energy of sound waves is transmitted through the bones of the middle ear to the cochlea, where the hair cells are located.

The auditory receptors (hair cells) in the ear are exactly like a cucumber plant “قَثَائِيسًا” mentioned in the above verse, and the auditory nerves are similar to its stem (Figure 4). Hair cells such as cucumber fruit is a connection to the auditory nerve (stems) by an afferent nerve (short stalk). Sound waves cause this fluid to move (Fluid oscillation), resulting in the movement of the hair cells, which opens or closes the potassium channels. These cells ultimately lead to the excitation of the auditory nerves and transmit auditory information to the auditory part of the brain. The message received from the hair cells is transmitted as a nerve signal to the auditory nerve, which is transmitted to the temporal lobe of the brain for processing. ⁽³³⁾

It might be concluded that the hair cells image captured by an electron microscope (Figure 4b) characterized by green-yellow color, looks surprisingly similar to the cucumber plant and its fruit (Figure 4d), so we can say that the word "cucumber" in this Sūrah is probably related the sense of hearing. It has been reported that cucumber is rich in potassium. ⁽³⁴⁾ Da Jung Jung *et al.* showed that, in people with high levels of potassium intake through diet, there was a lower prevalence of Hearing loss (HL) and lower hearing thresholds. ⁽³⁵⁾

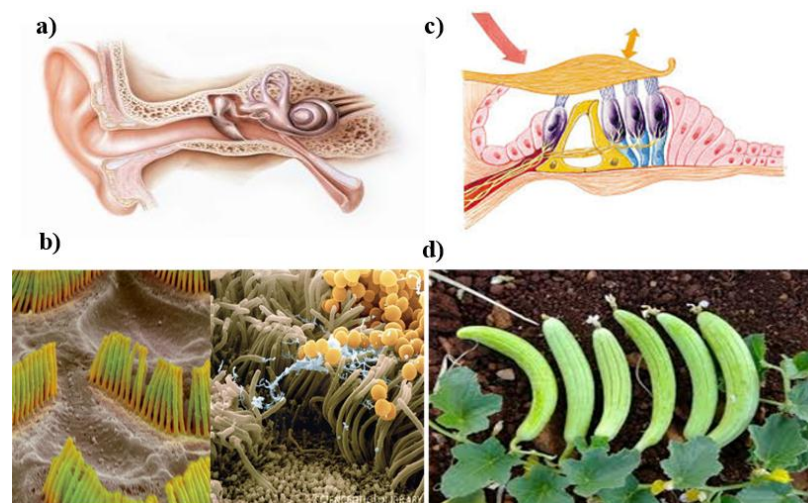


Figure 4. Auditory sense. a) Structure of the auditory system and ear, b) hair cells image captured by an electron microscope, c) Organ of Corti; auditory nerves attached to the hair cells, and d) cucumber plant and fruit.

4.3 Olfactory Sense (Sense of smell)

The nasal cavity contains olfactory receptors. Odor molecules first dissolve in the mucosa covering the nasal cavity and then attach to the receptor. This connection creates action potential in the receptor neuron. Unmyelinated axons of the olfactory receptor cells synapse in the olfactory bulb where the initial processing of olfactory signals occurs. Eventually, the signals are sent to the higher centers of the brain in the primary olfactory cortex. ⁽³⁶⁾

According to the anatomy of the olfactory receptors and garlic “فُوْمَها” botanical characteristics, it can be concluded that the hair inside the nose (cilia) is likened to the villi at the end of the garlic plant (Figure 5). This hair collides with the nerve molecules and the olfactory nerve is stimulated inside the nose and olfaction occurs. Garlic is a perennial herbaceous plant whose stem reaches a height of 40 cm. The underground part is swollen and consists of 5 to 12 cloves wrapped in thin and delicate membranes of a white-gray color. Its

leaves are narrow and striped in dark green color, and its flowers are small and pink which appear as an umbrella at the end of the stem. The olfactory nerve is the first of the twelve pairs of cranial nerves. This nerve is part of the olfactory system. It has no nucleus and is the shortest of the cranial nerves in the central nervous system. The olfactory receptors are located in the olfactory mucosa, which is a specific area 2.5 cm wide in each nasal mucosa. These receptors respond differently to different odors. Contrary to other sensory pieces of information, olfactory messages do not pass through the thalamus. The olfactory nerve is directly related to the optic nerve area and the part for memory completion. In this way, when an odor whose source is not seen is inhaled, its image is immediately made and presented in the right place in the mind. ⁽³⁷⁾

One of the five senses through which we perceive the world is the sense of smell. By one evaluation, humans can sense more than one trillion olfactory stimuli. ⁽³⁸⁾ Eric Block has done much research on sulfur compounds from garlic, onion, and related species, and in their investigations, they identified that 2-propanethiol and allyl methyl sulfide are the odorous components of human garlic breath. ⁽³⁸⁾ Also, another study has reported that humans and animals have a very sensitive sense of smell to low-volatile sulfur compounds. ⁽³⁹⁾ Mammalian survival is closely related to the hypersensitive olfactory detection of volatile sulfur compounds by mammals, as these compounds indicate the presence of decaying food, an O₂-depleted atmosphere, and predators. ⁽³⁸⁾

If we look closely at figure 5, the Human olfactory receptors image captured by an electron microscope looks very similar to a garlic plant (Figure 5b), especially in a part of Figure 5a, which looks like an upside-down garlic. So probably the word "garlic" in this Sūrah can be the sense of smell.

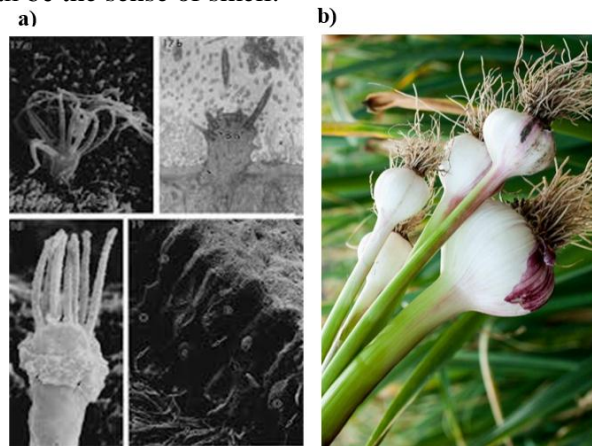


Figure 5. Sense of smell. a) Human olfactory receptors image captured by an electron microscope and b) garlic plant.

4.4 Tactile sense (Sense of touch)

Each of the different receptors in the skin (Figure 6) is anatomically similar to the vegetative and Reproductive growth stages of lentil “عَدَسِيَّهَا”. Lentil (*Lens culinaris*) is an herbaceous, annual plant with short stems, partially branched, and light green. Lentils belong to the legume family (legumes). Unlike other legumes, the vegetative growth stages of lentils are not focused on the development of the main stem. ⁽⁴⁰⁾ Six types of receptors are located on different layers of skin. Some senses, such as touch, pressure, and tickling, are detected by similar receptors, but the location of these receptors in the skin is different. The first step in any physical sensory perception is the activation of primary sensory neurons whose cell bodies are located in the dorsal root ganglia. These neurons are connected to the periphery on the one hand and the spinal cord branch on the other. ⁽⁴¹⁾ This stage is similar to the vegetation growth stages of lentils; lentil seedlings are when the newly germinated seed is in contact with the roots on one side and with the stems and leaves on the other. Areal parts of lentils including leaflets, flowers, tendrils, and capsules represent sensory receptors that get stimulation from the environment.

Receptors with free nerve endings are found all over the skin. It can cause sensations of touch and pressure, even in parts of the eye such as the cornea that has no nerve endings other than the free nerve endings. The free nerve ending is similar to the lentil tendrils.

The *tactile* receptor (*Meissner's* corpuscle) is very sensitive, forming a long, encapsulated nerve ending, and is a large, myelinated sensory nerve fiber. A large number of branched nerve filaments are seen inside the capsule. The number of these receptors is abundant in the hairless parts of the skin, especially on the fingertips and lips. *Meissner's* corpuscle is structurally similar to the lentil seed the end reproductive growth stages of the lentil.

A slight movement of each body hair stimulates the nerve fibers at the end of each hair. Hair end receptors adapt easily and, like Meissner corpuscles, mainly detect the movement of objects on the surface of the body or the initial contact of objects with the body. *Ruffini* corpuscles are found in deeper layers of the skin that are branched and encapsulated. They adapt slowly and are important for announcing the state of tissue deformation by receiving touch and heavy pressure messages. Some of them, also found in the joint capsule, help rotate the joint. *Pacini* corpuscles are located both immediately below the skin and deep in the body tissues. They are only stimulated by rapid local pressure because they adapt within a few hundredths of a second. Therefore, they are important for

detecting tissue vibration or other rapid changes in the mechanical condition of tissues. *Ruffini* and *Pacini's* corpuscles are similar to the ovary in the reproductive growth stages of lentils, which are contained ovules.

Paucean *et al* reported in a study that lentil compound flours can ensure the folic acid daily intake for an adult person. ⁽⁴²⁾ Stanhewicz *et al* showed that folic acid supplementation in the elderly increases the sensitivity of cutaneous vasodilators to sympathetic nerve activity, and also, folic acid did not affect central sympathetic outflow as measured by sympathetic nervous system activity responses to hyperthermia and the nonthermal regulatory stimulus of mental stress. ⁽⁴³⁾ Another function of folic acid in the elderly is the improvement of their skin health. ⁽⁴³⁾

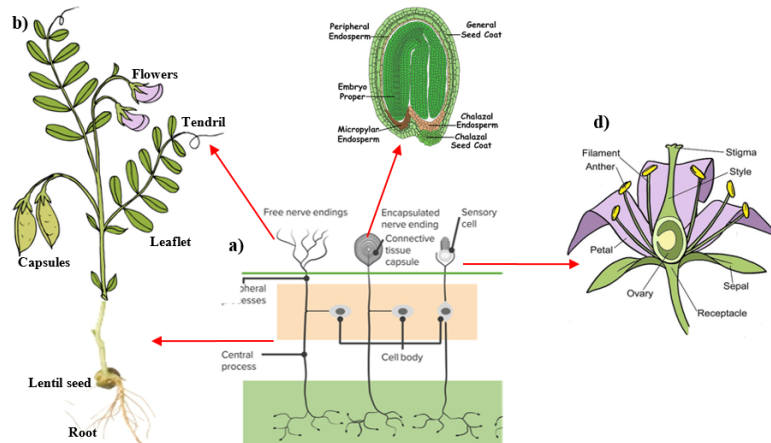


Figure 6. Senses of touch. a) Skin receptors, b) vegetative and reproductive growth stages of lentils, c) Green lentil seed, and d) Lentil flowers.

4.5 Gustatory sense (Sense of taste)

A sense of taste is created when chemical compounds stimulate specialized chemical receptors in the oral cavity. Taste buds are a collection of hundreds of polarized epithelial nerve cells that are stimulated by chemicals in food. In humans, there are about 5,000 taste buds in the oral cavity, located on the upper surface of the tongue, on the palate, and the epiglottis. Taste bud cells and olfactory neurons are regenerative, unlike visual and auditory sensory receptors. ⁽⁴⁴⁾

According to the taste receptors anatomy, the microvilli are the same as the terminal villi of the onion "بصلها" at the end, and the taste buds are similar to the onion (Figure 7). Onions have small stems with fleshy leaves in the underground part of plants. Onion is an underground specialized plant, often covered with thick fleshy scales

that include the axis of short, fleshy stems, usually vertical. At the end of the flowering period, the onion begins to grow. After a while, the flowers wither and only the onion remains and becomes the food source of fresh sprouts.

The tongue is covered with thousands of small protrusions called papillae, visible to the naked eye. There are hundreds of taste buds within each papilla. Except for crystalline papillae that do not have taste buds, there are between 2,000 and 5,000 taste buds on the back and front parts of the tongue. The rest are on the roof, on the sides, behind the mouth, and in the throat. Each bud taste contains 50 to 100 taste receptor cells. Looking at Figure 7, the sense of taste is very similar (Figure 7a) to onions (Figure 7b). So we can say that probably the word onion in this Sūrah is the sense of taste.

Onion is a member of Alliaceae and has been categorized as a food plant and a medicinal plant in traditional medicine as anti-oxidative, anti-hypertensive, and antiobesity properties. Plants of the Alliaceae family are widely operated to taste foods and improve the taste of foods. ⁽⁴⁵⁾ Onion is known worldwide as a flavor enhancer, not only bettering the taste of the food but also adding nutritional value via antibacterial and antioxidant effects. ⁽⁴⁶⁻⁴⁸⁾

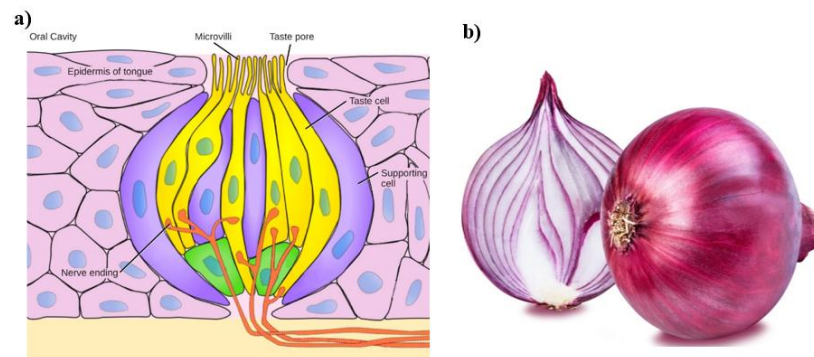


Figure 7. Sense of taste. a) Schematic figure of taste buds and b) onion fruit.

5. Conclusion

The Holy Qur'ān has been revealed in such a way that it can be used and understood by people in all periods of history. Having knowledge, awareness, and thinking, man can study *the Holy Qur'ān* and, from within his heart, s/he can extract scientific facts concerning all different scientific, medical, social, economic, and mystical fields. In *the Holy Qur'ān*, Allah Almighty uses allegories to explain various sciences. The findings of this study showed that five plants mentioned in verse 61 of Sūrah Al-Baqarah (The Cow), leek, cucumber, garlic, Lentils, and onions are similar to the microscopic view of five sensory receptors related to the sense of sight, sense of hearing, sense of smell,

sense of touch and sense of taste, respectively. These findings open a new field of Quranic interdisciplinary studies and might encourage scientists to gradually discover other concepts of *the Holy Qur'an* in various sciences.

6. Declarations

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6.3. Conflict of interest:

The authors declare no conflict of interest.

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