

Ezekiel's Vision and ATP Synthesis System

Dongsheng Zhang

Abstract

A 2500-year-old, an enigma, Ezekiel's Vision recorded a mysterious energy supply system in a "mirage": "fire" was taken from running "wheels" and transported "over the city". Exegetes tried to explain what it was in that vision, but all was so difficult. We compared the Ezekiel's Vision (Ezekiel 10, consecutive 600-word description) with the biological discoveries (adenosine triphosphate, ATP, synthesis and ATPase) and gained the surprising results: both of "Ezekiel's Vision" and biological scientists described the same event, even though they had different "civilization" and used different "terminological words". This study verified the concordance of the Ezekiel's Vision to ATP synthesis and ATPase from its major figure, characters to details. Our thesis suggested that the source of Ezekiel's Vision was a dream or hallucination that provides important clues for further researching what dreams may come. It also is an important clue to explore the truth of life and its origin but disputation. **Keywords** Bible; Ezekiel; ATP; ATPase; ring-shaped protein

Introduction

In 571 B.C., a man, Ezekiel, recorded a mysterious energy system he saw in a marvelous scene (Ezekiel 10:2, 10:6)^{1,2}. The oldest lection embodied in the Old Testament. The author Ezekiel³ used the very common words, "burning coals", "take fire", "wheels", "man in linen", "cherubim", "hands", "over the city" to describe and define the complex characteristics of a mysterious energy system which he saw in a vision. Beyond all doubts, the special system in the image was not real constructors. That was one scene of "Ezekiel's Vision".

2500-year passed, exegetes tried to explain the means of the old apocalypse, Ezekiel Vision, but all seems so difficult. In 1897, Matthew George Easton commented the Book of Ezekiel in his famous *Easton's Bible Dictionary*: Ezekiel's prophecies are characterized by symbolical and allegorical representations, "unfolding a rich series of majestic visions and of colossal symbols." ... A cloudy mystery overhangs them which it is almost impossible to penetrate. Jerome calls the book 'a labyrinth of the mysteries of God.' It was because of this obscurity that the Jews forbade any one to read it till he

had attained the age of thirty."⁴

Until now, it still is a challenge to human wisdom to decode the true meaning of the Ezekiel Vision and how he got the vision and why it has been presented as "a cloudy mystery" in Bible for 2500 years.

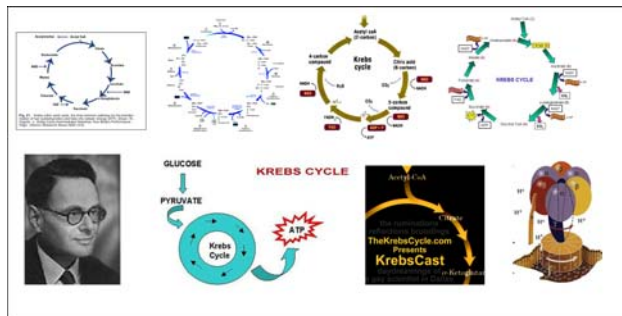
Analysis and Results

This study first hypothesized that it is a process of energy supply in living cell. We compare the Ezekiel's Vision (Ezekiel 10, consecutive 600-word description) with the biological definitions of ATP synthesis system and gained following results.

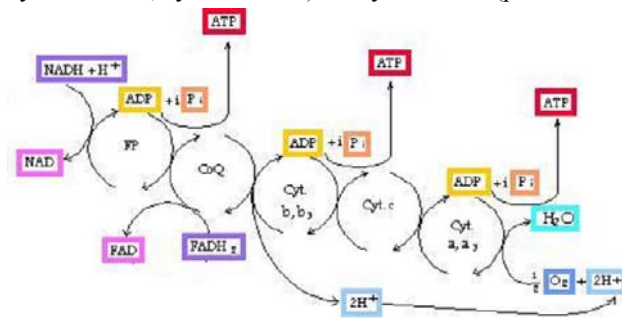
The "take fire from wheels" corresponding to "ATP synthesis from Krebs cycle"

The tricarboxylic acid cycle (TCA cycle, Krebs cycle) and ATP synthase are always described as the running "wheels" showed in the illustration in the biology textbook^{5,6}. The TCA cycle is that it takes the left-over carbon from glycolysis and breaks it down in such a way as to yield a large amount of useable energy. The energy is first transferred to NAD and FAD through a highly

charged hydrogen atom, and the result is shown as NADH and FADH₂. The molecules carry the energy to the respiratory chain system in mitochondria. During the processes of electron transferring, ADP comes in from outside of mitochondria. A spinning ATP synthase, a small rotary motor^{7, 8, 9, 10}(Figure 1), pick up ADP and Pi and bring them together to reconstruct ATP. H₂O is produced as well. Then ATP is transferred out of the membrane of mitochondria to entire cell. ATP as the principal high-energy-carrying molecule supplies a large amount of usable energy for keeping cell alive.



Compare the Ezekiel’s Vision with above biological definitions, we interpret Ezekiel’s words into the modern biological items in the squer: “The LORD (no definition in biological science book) said to the man clothed in linen (ADP), ‘Go in among the wheels (ATP synthase, a rotary motor) beneath the cherubim (NADH, FADH₂, electron transport chain including flavoprotein, iron-sulfur protein, ubiquinone, cytochrome b, cytochrome c, cytochrome a). Fill your hands (pentose



sugar on adenine) with burning coals (two high-energy phosphate bonds) from among the cherubim and scatter (transport) them (energy) over the city (entire cell).’ And as I watched, he went in (ADP enter mitochondria).” “When the LORD commanded (signals) the man in linen (ADP), ‘Take fire (energy) from among the wheels (ATP

synthase), from among the cherubim (coenzymes and electron transport chain)’, the man went in and stood beside (combine with) a wheel (ATP synthase). Then one of the cherubim (NAD, FAD) reached out his hand to the fire (energy, protons, H⁺) that was among them (coenzyme or electron transport chain). He took up some of it (energy) and put it into the hands (pentose sugar) of the man in linen (ADP), who (ADP) took it (high-energy phosphate bond) and went out (as an ATP separates from ATP synthase and go out of membrane of mitochondria).” And scatter (transport) them (energy) over the city (entire cell). The details of the description is most likely ATPsynthesis by ATP synthase in mitochondria.

The “wheels” corresponds to the NTP-driven ring-shaped proteins

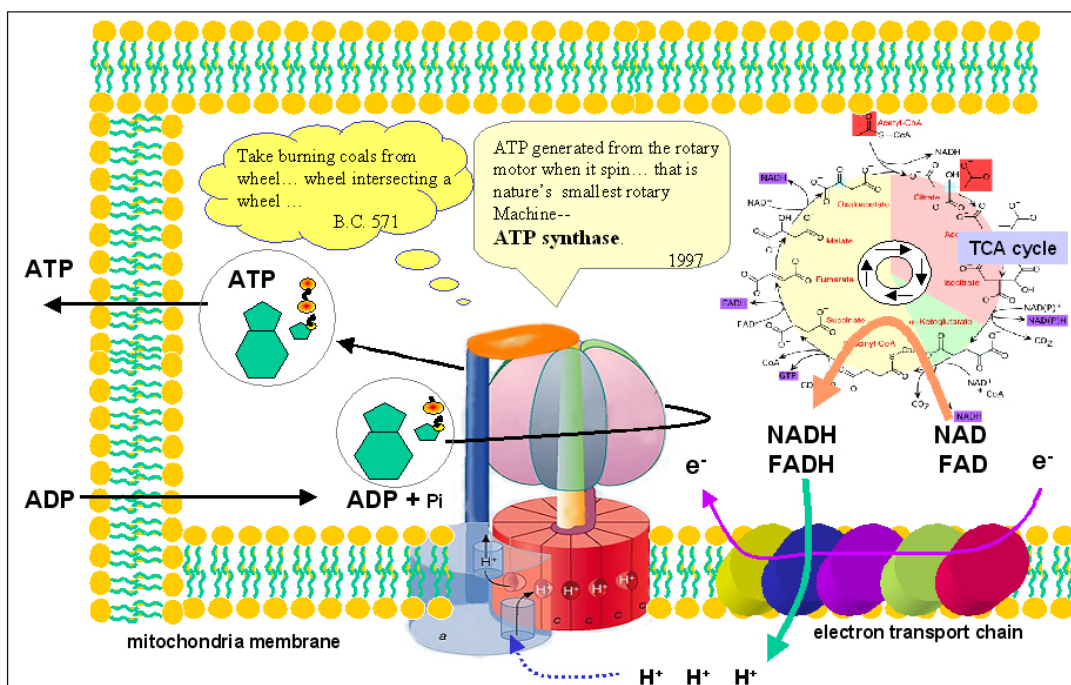
Nucleoside triphosphate (NTP) cannot function without preexisting proteins. Ezekiel described a close concomitant of cherubim, wheels: “When the cherubim moved, the wheels beside them moved; and when the cherubim spread their wings to rise from the ground, the wheels did not leave their side, because the spirit of the living creatures was in them.” (Ezekiel 10:16 to17).

Here the “cherubim” was the nucleoside. The “wheels” must be the NTP-driven ring-shaped proteins. Following is an example to describe the relationship of a ring-shaped protein and nucleotide. Biological scientists discovered that ring-shaped enzymes involved in DNA metabolism vary greatly in sequence, structure and function, they bind DNA and catalytically active on DNA. Helicases is one of ring-shaped proteins that play a role in DNA replication and transcription. Studies have revealed that helicases are NTP-driven motor proteins that couple the hydrolysis of nucleoside triphosphate (NTP) to directionally movement on DNA strand and to unwind nucleic acid. The structural of helicases has been identified to assemble into multisubunit ring-shaped hexamers. In most, hexamer formation requires nucleotide binding (NTP). NTP binding stimulates hexamer formation, and hexamer formation and NTP binding are necessary for DNA binding. Details of the NTP-linked hexamerization process are unclear¹¹. This discovery emphases that hexmer-ring (wheel) cannot be formed and not move on DNA (either 5’ to 3’ or 3’ to 5’direction) without binding

NTP (living creatures) because the helicases are NTP-driven motor proteins. Ezekiel emphasised their relationship: the wheels did not turn about as the creatures went. When the living creatures moved, the wheels beside them moved.

These words indicated that there were powered

“circling wheels” closely accompanying and controlling the carrier of “fire” and “burning coals”. Biological scientists found that ATPase, such as ATP synthase F_0 and F_1 , are energy generator that spins in certain direction when generating ATP. And “the ATP synthase lays claim to being nature’s smallest rotary motor”^{7,9} (Figure 1).



The concordance of Ezekiel’s Vision to ATP synthesis and ATPase: Krebs cycle is always described as a running “wheel” as showed on the illustration in the biology textbook. Krebs cycle is a series of chemical reactions in which a large amount of potential chemical energy released step by step. The coenzymes, NAD and FAD pick up hydrogen atoms that are released in the steps of Krebs cycle. After NAD and FAD pick up hydrogen atoms, they become NADH and FADH₂ carrying electrons and energy to the electron transport chain. During the processes of electron transferring, ADP come in from outside of mitochondria and bond to ATP synthase, rotary motor, and receives energy (high-energy phosphate bond) on pentose sugar and change into ATP. H₂O is produced as well. Then ATP transferring out of the membrane of mitochondria as the principal high-energy-carrying molecule goes to the entire cell.

The “wheel intersecting a wheel” corresponds to the multisubunit ring-shaped proteins

Based on the basic biological principle, proteins should control all above biochemical reactions. When ATP synthesised, the ATP synthase are necessary.

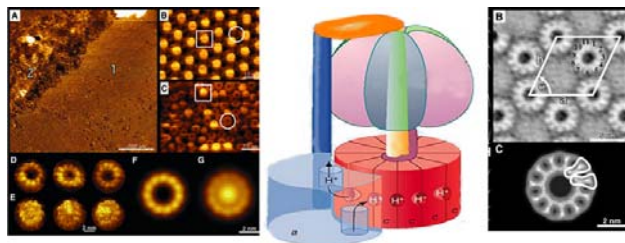
We have known that proteins are the particular

compound that with very complex structures. Following was Ezekiel’s description about the structures of the “wheels” as: “...the wheels sparkled like chrysolite. As for their appearance, the four of them looked alike; each was like a wheel intersecting a wheel. ... I heard the wheels being called ‘the whirling wheels.’” (Ezekiel 10:9-13).

“This was the appearance and structure of the wheels: They sparkled like chrysolite, and all four looked alike. Each appeared to be made like a wheel intersecting a wheel. Their rims were high and awesome, and all four rims were full of eyes all around.” (Ezekiel 1:16).

Only based on above words of Ezekiel it is impossible to imagine the exactly structures of the “wheel intersect wheel” and “rims were full of eyes all around” and its power supply.

As difficult as it, after Ezekiel’s Vision two thousand five hundred years, the nature’s smallest rotary motor, ATP synthase, found by Paul Boyer and John Walker, the Nobel laureates of 1997⁸. They described it: ATPase is a large protein complex (-500kDa) with a complicated structure. It is composed of two linked multi-subunit (22-27 subunits) complexes, called F₀ and F₁. In binding-change model, F₀ and F₁ function as a pair of rotary motors linked by a central rotor and a peripheral stator. Rotation of the ring of c-subunit in F₀ is proposed to allow protons to be carried... A prominent part of the F₀ motor consists of an oligomeric c-subunit assembly in the shape of a ring, which consists of 10 to 15 monomers⁹.



The structure of the main part of the ATP synthase shows the tiny motor made from 3,500 amino acids is remarkably reminiscent of man-made motor⁸. The ATP synthase lays claim to being nature’s smallest rotary motor^{7, 8, 9, 10}. It indeed is a complex rotary machine that made from many wheel-like parts (22-27 subunits) with complex connecting.

Face the facts of Ezekiel’s Vision and biological science books, we first confirmed the concordance of the Ezekiel’s Vision to ATP synthase system. The major figure, characters and details of the event accurately match the structures and functions of ATP synthase system in living cell. It is impertinency if adjudicate it as a coincidence by accident.

The trustworthy of Ezekiel’s description

Ezekiel’s story is intact. First, the original book written 2500-years ago and the English translation version published at least hundreds year ago, both are not adapted by modern authors for any purpose. The initial author declared that was his description to record what he saw and heard, but not his thinking or opinion. He did not add any figure or scenery into the paragraph because he indeed did not know what would be the real intention of the strange scenes. So, he just said: “The heavens were opened and I saw visions of God.” In fact, the real intention of the system is not uncover until today.

The author’s description merely accorded on author’s recollection what he saw and heard. If produce a cartoon movie according to these words and paragraph that might be a nice cell biological teaching-film. We consider his description is conceivability and believable.

ATP synthesis system is necessary in all life on the earth. The discoveries of [TCA](#) in 1937 by Krebs, and ATP synthase by Paul Boyer and John Walker in 1977, are the brilliant and wonderful evidence to inadvertently verify that the mysterious energy system in the Ezekiel’s Vision were ATP synthase system, that also are side notes to verified Ezekiel’s words were intact. In the human history, Ezekiel’s words were the first description of ATP synthase system in metaphor but scientific terms.

The source of Ezekiel’s Vision

Is it a miracle? It seems to be extremely unbelievable that the most important systems in a living cell, ATP synthase system, was seen and described in a 2500-year old book. It is difficult to repeat the author how got the vision. We hypothesized that there were some possible ways to form Ezekiel’s Vision: a real living things he saw; a concoction of the author; a plagiarism from other literatures; a dream or a hallucination in the author’s brain; or a living image that shown through an unknown way by someone, like a 3-D movie.

Our study do not support that was real living things Ezekiel saw. There was not the similar system found since then to now. That just was the image or a simulation of certain system, the molecules of ATP and ATP synthase,

because those belong to microcosmic world that could not be directly seen by nude-eye of human. It is impossible that Ezekiel's story was fabricated depend on his imagination and intellectual talent, because no any historical record indicated he was a scientific fiction composer. Our study conformed again that he was the greatest prophet. If Ezekiel's story was plagiarized from other's literature, the initial authors and books should be more valuable. When it is found in future which maybe include more predicts on biological science details.

It was the most possible that the vision was Ezekiel's dream or hallucination. One's feeling from his dream or hallucination merely is personal experiences that only through his describing let other people to understand what he saw, heard and felt. If he did not express it, any other one could not know the content of the dream or hallucination. Because did not find any historical data that indicated someone including his family and colleagues seen the vision with Ezekiel together, we believed that the vision of Ezekiel was his dream or hallucination.

Even though dreams always happen in every one's brain at every sleeping night, the essence of dream is still unknown. Recent advances in brain imaging, cellular and molecular neurobiology data, have given us a remarkably clear picture of the differences in brain activity between waking and activated states of sleep, such as rapid eye movement (REM), when intense dreaming most commonly occurs. One of the important causes of dream hallucinations is the general and widespread activation of the brain that occurs in conjunction with a blockade of external sensory inputs and motor outputs in REM sleep. When the mind is dominated by internally generated images, as it is in dreaming, the capacity to generate thoughts is greatly weakened^{12,13}. This implied that a person could not control the content of dream by subjective desire or any other ways. Dream seems spontaneously and inevitably happening in brain during sleeping.

The idea that sleep can trigger the gain of insight is associated with the names of famous scientific discoverers, August Kekule, Otto Loewi and Dmitry Mendeleev^{14,15,16}. If the Ezekiel's Vision is conformed that was a dream or a hallucination of his, our study provided another evidence that the dream of human are a kind of source for gaining

correct information only if someone is able to identify its meaning. Once we know the memory, dream and hallucination how befallen in human brain, correctly decode human's dream and hallucination may become a novel way to acquire valuable knowledge.

It was a real miracle that a lifelike 3-D image was producing and showing in the sky just for single audience, Ezekiel. It is easy be understanding that "operator" must be the Creator of life, because no person in human could know the microcosmic detail inside the living cell in 2500-year ago.

Our finding implied that both of science and theology might found the same event by their distinct methods. Scientific discoveries are an important key to find the true means of God's apocalypses in Bible, a priceless treasure.

The conclusion and future research direction

Our results implied that the Ezekiel's Vision, the oldest apocalypse, has is been interpreted by biological discoveries, ATP synthesis system. In scientific category, the Ezekiel's Vision was a dream or hallucination 2500-year ago. In theology, the Ezekiel's Vision was an apocalypse from God, the Creator. However, to find the truth of the way, and the mechanism of "internally generated images", would be a very useful for finding the essence of gene, protein, memory and dream that are the most difficult biological projects of human being. Our finding may become the evidence for studying the origin of life. Searching the "spirit of wheels", protein's dominators will be a new challenge to the future biological scientists.

References

1. Ezekiel. *Holy Bible, Ezekiel* (New International Version, Chinese/ English, Union). International Bible Society, Hong Kong, China (2002).
2. Ezekiel. *Holy Bible, Ezekiel* (King James Version). www.biblegateway.com
3. Malick, D. An Introduction to the Book of Ezekiel. www.bible.org (2004).
4. Easton, M. G. *Illustrated Bible Dictionary* (Third Edition), published by Thomas Nelson (1897).

5. Campbell, N. A. & Reece, J. B. *Biology*. The Benjamin/Cummings Publishing Company, Inc., San Francisco, USA (2002).
6. Marieb, E. N. *Human Anatomy and Physiology* (Second edition). The Benjamin/Cummings Publishing Company, Inc., Menlo Park, USA (1991).
7. Block, S. M. Real engines of creation. *Nature*. **386**, 217-219 (1997).
8. Yoshida, M., Muneyuki, E., & Hisabori, T. ATP synthase—a marvellous rotary engine of the cell. *Nature Rev. Mol. Cell Biol.* **2**, 669–677 (2001).
9. Cross, R. L. Molecular Motors: Turning the ATP motor. *Nature*. **427**, 407-408 (2004).
10. Dimroth, P., Ballmoos, C., & Meire, T. Catalytic and mechanical cycles in F-ATP synthases. *EMBO Reports*. **7**, 276-282 (2006).
11. Patel, S. W. S., & Picha, K. M. Structure and function of hexameric helicases. *Annual Review of Biochemistry*. **69**, 651-97 (2000).
12. Hobson, A. A model for madness? *Nature*. **430**, 21 (2004).
13. Nielsen, T. A. & Stenstrom, P. What are the memory sources of dreaming? *Nature*. **437**, 1286-1289 (2005).
14. Mazzeo, P. What dreams may come? *Nature*. **408**, 523 (2000).
15. Maquet, P., & Ruby, P. Insight and the sleep committee. *Nature*. **427**, 304-305 (2004).
16. Wagner, U., Gais, S., Haider, H., Verleger, R., & Born, J. Sleep inspires insight. *Nature*. **427**, 352-5427 (2004).

Dongsheng Zhang, free-lancer, dongshengzhang_1@yahoo.com