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Is Zygotic Genome Activation the First Secular Task of the Soul?

A Quick Closer Look at Ibn Sina's Scientific Heritage

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Abstract

In science and philosophy, everything is connected. In the current study we try to provide an intellectual and cultural survey about most of the ideas and theories of the soul and its amazing manifestation. With emphasis on Ibn Sina's theory of the soul creation specifically his profound vision about duality explaining its structure from a medico-philosophical perspective. It goes without saying that the ancient Egyptian philosophers were the first to analyze the components of the soul and its five divisions, the most important of which is Ib (heart). Then, Greek philosophers, Aristotle, Plato, Socrates and others had made a significant contribution to explaining what the soul is? Perhaps the most distinctive feature of this article is the presentation, discussion, and interpretation of Ibn Sina's theory of the soul creation from its philosophical, religious, and genetic aspects. In our humble belief, the word zygote could not have been borne, coined, or even understood in any philosophical or scientific context without the soul. Simply put, without the soul there is no zygote, and therefor there is no life. Hence, we assume that, at the moment of the first division of the zygote cell into cleavage, the soul immediately joins it to begin its sacred tasks of activating the functional genes that lie deep within the germ cells (latent power) to create the newborn organism; this is why the zygotic genome activation (ZGA) is the first task of the soul. Therefore, this article proposes a new definition of the soul as follows: Is the soul the divine code that regulates and activates the genetic code of an organism?

Keywords: Soul, Ibn Sina, Philosophy, Zygotic Genome Activation, Zygote, First perfection.

1. Soul, the Evolution of the Term, and its Rich, Effective Implications: a New Vision

1.1 Historical and Philosophical/Religious Rooting

In the academic field, the concept of soul has been discussed on religious or philosophical perspectives, related to theological constructs or historical-cultural interpretations [1-3].

The issue of the soul/body remains one of the most complex issues in the medico-philosophical studies of the soul. The historical development of the concept of the soul first began with the ancient Egyptian philosophers, who were the first to contribute to analyzing the components and divisions of the soul. The Egyptians believed that a human soul has five parts, Ib (heart), Sheat (shadow), Ren (name), Ba (personality), and Ka (vital spark). Ib was thought to be the metaphysical (divine) heart of a human being and was believed to be formed from one drop of blood from the child's mother's heart taken at conception. To ancient Egyptians (Ib) was the seat of emotion, will, thought and intention [4].

The pioneers Greek philosophers made a unique contribution to understanding and interpreting the soul. Plato stated that the soul is that which imparts life to its body (Plato, 105C-D), and he suggests defining the word "soul" as "the motion which can set itself moving" and be thinks of the soul as a "the universal cause of all motions and changes" (Laws, 896B). Furthermore, Socrates assumed that the soul actually pre-exists the body and if the soul pre-exists the body, it is not identical to it. Like Plato, Aristotle believes that the soul gives life to its body, because it is the first principle of living things [5].

According to traditional Christian theories of the soul, John C. Yates (1989) stated that the soul is embodied in three possibilities

or three ideas: pre-existence, traducianism, and creationism [6]. The term 'traducianism' is derived from the Latin word 'tradux' which means 'layer'. All souls are, as it were, derived ultimately from the one original soul of Adam. This view has its philosophical roots in Stoicism which considered the soul to be made up of a special sort of fine matter [7]. the most important representative of traducianism was the early African Father Tertullian (c. 160-220 A.D.). Tertullian taught that the soul is 'handed on' from parent to child through the organic process of generation. In procreation the soul as well as the body passes on part of itself to its offspring, so that the whole person, soul and body is derived from the substance of the progenitors. Creationists believe that God creates each soul ex nihilo and individually at the very moment he joins it to the developing organism.

The definition of the soul in Arabic language includes many synonyms, the most important of which are:

- The soul is “nafas” or “nafs”, and this definition has two closely related synonyms, the first coincides with the Greek term “psyche” which means to breathe, while the second is the “self”.
- The soul is what a person lives by.
- The soul is what the body is made of and through which life is created. This definition is very applied to the concepts of zygotic genome activation, and the whole body genome.
- The soul is the essence of thing and its reality. This definition may indicate or explain the eternal union of the soul with the zygote.
- The soul is the blood, and this definition is corresponds to the Egyptian ancient philosophers as well as, Ibn Sina’s thought [8].

The relationship between the soul and the body in the philosophy of Ibn Sina is one of the fundamental theories in the soul’s studies, and it has been reviewed carefully in all philosophical, religious, and psychological fields. [9-11]. On the other hand, Chinese philosophy dealt with the issue of the creation of the soul through the concept of “Shen Si” as indicated by its two constituent Chinese characters, literally meaning “spiritually divine” (shen) and “thinking” (si). Taken together, it stands for imaginative contemplation [12].

1.2 Medico-Philosophical Rooting

Ibn Sina, a thousand years ago, had inspired us with a gigantic scientific idea about the divine creation of the soul. He had identified its place and explained its role, sovereignty, and the eternal value. Ibn Sina was the first to give us the preliminary medico-philosophical concepts about the creation of the soul of fine mixtures, while body is created from dense mixtures [13].

In the history of Western theological, philosophical, and scientific/ medical thought, there exist 2 dominant and, in many respects, incompatible concepts of the soul: one that understands the soul to be spiritual and immortal, and another that under- stands the soul to be material and mortal. In both cases, the soul has been described as being located in a specific organ or anatomic structure or as pan-corporeal, pervading the entire body, and, in some instances, trans-human and even pan-cosmological. Moreover, efforts to discern the nature and location of the soul have, throughout Western history, stimulated physiological exploration as well as theoretical understanding of human anatomy. The search for the soul has, in other words, led to a deepening of our scientific knowledge regarding the physiological and, in particular, cardiovascular and neurological nature of human beings. [14].

In the general implications of Islamic Philosophy, as well as in Ibn Sina’s philosophical thought in particular, psychological studies have focused crucially on its fateful connection with the essence of humankind as a living active being in his relationship with himself and his society, and being conscious of his fate as a human being creature. This fact leads us to the necessity of establishing a system of conceptual and scientific terminology, in which the nature, the reality, and the aspects of the human soul (*ar-Ruh* in Arabic) could be identified, and this is what was reflected in Ibn Sina’s perception, who treated in his philosophy a variety of psychological issues, studying them by uniting and connecting between the mental deductive approach and the experimental inductive method, taking into consideration the metaphysical (divine) reality of the soul and its behavioral appearance [10].

Currently, studies on the soul have developed and their scope has expanded from religious- philosophical conjecture, towards a scientific / medical issue [15]. In this respect, Bobrow, Rs. (2003) and Bonilla E. (2010) reported that, from a conventional scientific perspective, the existence of the soul might be considered improbable or paradoxical [16,17]. However, many recent studies with correct methodology have documented disconcerting events and experiences related to anomalous phenomena of consciousness. Unexplained events related to mystical experiences are regularly reported in the medical literature. On biomedical grounds, there are an increasing number of researches to explore the idea that mind does a separate entity and can exist outside the brain [18].

It is worth noting that the masters of Greek philosophical thought such as Aristotle and Galen, were pioneers not only in the broad field of philosophy, but they were also the founders of biology, especially medicine, and both Al-Farabi and Ibn Sina were influenced by them. Ibn Sina, with his unique scientific intuition, was able to deduce and explain the substantial changes in the embryonic development process as follows: “The embryonic development process is divided into three stages. The first stage is the churning of semen, which is male semen. The second stage is manifestation of a drop of blood, (which may apply to our current concept of a zygote). The third stage is the alteration of semen into a blood clot, (which may apply to our current concept of a blastocyst) and then into an embryo” (The Book of Animals, lX, 5,172.3-8). It is noteworthy and interesting that Ibn Sina – in contrast to Aristotle – believed that females do produce akin to semen, which may apply to our new concept of the ovum; however, he stated that, the female semen (ovum) does not possess a generative power as the male semen does [19]. In this case, it should be noted that Ibn Sina seems contradictory to himself,

because he initially acknowledged his confidence in the existence of female semen (ovum), but he denied its generative role in the reproductive cycle. This contradiction may, of course, be due to the great influence of Aristotle at that time. But in any case, it is enough that he left this bright mark deep in the history, and his name will remain immortalized forever.

This first part of the article involves a number of general key notions that can be discussed as follows;

- (Ib) was thought to be the metaphysical (divine) heart of a human being and was believed to be formed from one drop of blood from the child's mother's heart taken at conception. To ancient Egyptians (Ib) was the seat of emotion, will, thought and intention. This concept is considered the founding root of Ibn Sina's thought which is imbued with the culture of Arabic language, in defining the soul as it is the blood. For further clarification, we must ask why the heart became of such decisive importance in its relationship with the soul from the ancient Egyptian until now. The answer to this question comes from modern embryology, which determined that, the blood cell development begins as early as the seventh day of embryonic life, this is because the utmost importance role in delivering oxygen to tissue and developing vascular channels. Through early development, the primitive vasculature expands, remodels, and specializes to achieve the critical metabolic demands of the tissue it supplies. This means that the blood creates first, and then the heart comes after. Rather, to be precise, the heart is the gift of the blood [13].
- Socrates argues that the soul actually pre-exists the body and if the soul pre-exists the body, it is not identical to it. And this concept does not agree with Ibn Sina, who stated: "the rational soul comes into existence together with the body, not before, and it maintains a certain association with it as long as a person is alive". This means that the soul is not an absolute or metaphorical expression, but rather that each soul has a specific body allocated to it, where compatibility occurs from the moment of the fusion of the soul during the first division of the zygote cell into cleavage until the moment of death. Consequently, the soul must belong to the very substance of that body. In this respect, Ibn Sina stated: "the soul is the first perfection of a natural body possessed of organs that performs the activities of life" (Psychology, 1.1, 12.6-8). [9], we believe that Ibn Sina's notion of the activity of life is the (second perfection/genome).
- Aristotle believes that the soul gives life to its body, because the soul is the first principle of living things. And this understanding is generally consistent with Ibn Sina's theory of the "first perfection". With a simple difference, Aristotle limited the meaning to the soul alone, while, Ibn Sina linked the soul to its union with zygote, according to our understanding and analysis.
- Ibn Sina was the first to give us the preliminary medico-philosophical concepts based on genetic structure (the soul is created of fine mixtures "which may apply to our currently concept of genetic of intelligence. While, the body is created of dense mixtures "which may represents the "whole body genome".
- According to Western theological, philosophical, and scientific/medical thought, the soul has been described as being located in a specific organ or anatomic structure. This assumption was a fact that Ibn Sina had previously confirmed by affirming that the heart is the chamber (repository) of the soul (blood).
- Stoicism is a philosophical doctrine that started in ancient Greek and remained popular in ancient Rome. The Stoics believed that the soul is made up of a special sort of "fine matter". This concept of Stoics may be the first primitive seed of Ibn Sina's developed notion of "fine mixtures".
- Creationists believe that God creates each soul ex nihilo and individually at the very moment he joins it to the developing organism. This belief consistent with, and enforces one of the crucial hypotheses in this article, which is the soul joining the zygote. Simply put, if we replaced the word "zygote" instead of the word "developing organism" the context would become perfectly understandable. On the other hand this notion is completely apply to Ibn Sina's thought: "the rational soul comes into existence together with the body (zygote), not before, and it maintains a certain association with it as long as a person is alive". It is the inevitable association that leads to the formation of zygotic genome activation (ZGA).

2. The Genius Theory of Divine Creation of the Soul and Body According to Ibn Sina

In his astonishing manuscript "Treatise on Cardiac Drugs" [*Risala al Adwiya al Qalbiyah*] [20]. Ibn Sina stated the following:

"God Almighty created the left cavity of the two heart cavities to be a repository "chamber" for the soul and a source of its permanent validity. He is the Almighty who created the soul as a carrier of the physic faculties that flow through the bodily organs. Additionally, He is the Almighty who made the first specialization of the psychic faculties dedicated to the soul. What is surplus to the needs of the soul then passes to the bodily organs. God Almighty created the soul of fine and delicate mixtures (fine and delicate chromosomes) ⁕, as He Almighty created the body of dense mixtures (dense chromosomes) so that the ratio of the soul to the finest mixtures is equal to the ratio of the body to the density of the mixtures.

Just as the mixtures (chromosomes), when mixed together, produce organs with special structure "*Mizag* or *Mazaj* in Arabic language" (admixture-genotype temperament), this admixture prepares to accept the conditions that have not benefited from simple material (in the sense that they consist only of compound structures/" chromosomes/genotypes"). Likewise, the soul is formed up of the finest of mixtures, due to the mixing between its four types, which results in a special structure (admixture /genotype/temperament), by means of which the soul is prepared to accept the psychic faculties that have not benefited from simple stuff (in the sense that they consist only of compound structures/"chromosomes"/ genotypes/temperament), and its origin is of divine emanation.

This divine flow alone is capable of transforming power into

action, provided that it is prepared for its perfection without apathy or miserliness.

Each organ has a special structure (genotype/temperament), which is the result of specific mixtures (chromosomes) in essence (zygote), but this special structure (genotype/temperament), develops because of the numbers of mixtures (chromosomes) and the form (phenotype) of their structure.

(Words in brackets are the author's interpretation). ⁎
Based on this text, it is necessary to discuss, elucidate, clarify and explain some pivotal elements:

- This text represents the pinnacle of peaks in Ibn Sina's thought because it is the first genius human contribution to explain the formation of the soul and body in their primary components, specifically at the level of the mixtures (chromosomes) and the wonderful genes that they carry. His notions about fine/delicate mixtures and dense mixtures are the key that leads us to understand the meaning of the term "special structure" which is the precise definition of the term "*Mizag*"or *Mazaj* in Arabic / temperament in English translation, genotype in our interpretation. The temperament (genotype) of the body is what the body is based on of the blood, (Al-merrataine), and phlegm, according to the Dictionary of Lesan Al-Arab [8]. To clarify and confirm, the term "Al-merrataine" in Arabic is equivalent to the term DNA in English [21].
- The heart is the housing of the soul, meaning that the soul is the blood, and this fact corresponds to Dictionary of Lesan Al-Arab [8]. On the other hand, this notion supports the theory of ancient Egyptian philosophers about relationship between the soul and the heart (Ib), and both theories reinforce the truth of the divine creation of the soul. Moreover, this interpretation went beyond the theory of (Giuseppe, S.; etal, 2009) who had not been guided to the place of the soul, as they said: "the soul has been described as being located in a specific organ or anatomic structure".
- The pairing of the soul and the zygote that occurs during the first division of the zygote cell into cleavage, which we considered the theory of sacred pairing, is in fact the essence of the basic idea of existence. This pairing process in our opinion may be consists of two successive steps, the first is the pairing between the soul and zygote, and the second step is the pairing of the soul, blood and functional genes in a unified, luminous mass abundant with super activity and absolute wisdom. This pairing can be considered a reflection of, or even proof of Ibn Sina's theory of the "first perfection" of the soul, which for sure is the zygotic genome activation (ZGA).
- We can also strive to try to understand how Ibn Sina succeeded in bringing together the duality of the soul and the body and linking them together within a philosophical vision that believes in the theory of divine creation. He was also, able to combine between the religious-philosophical vision and the secular components at the level of the genetic constitution of each of them (fine delicate mixtures and dense mixtures).
- For more details and boarder knowledge about our genetic interpretation of Ibn Sina's theories of the soul creation, the mixtures and essence, and the temperament, you can refer to the following sources (13-22-23).
- The dialectical relationship between the human soul and the body is due to the dual nature of the soul, as it overlooks and connects two completely different worlds (immaterial realm world and material realm world) by means of two faculties, a theoretical faculty (immaterial realm of intelligible) that is the one that the soul possesses for connection to *the side above it*, and this faculty may apply to the "fine delicate mixtures" according our interpretation), and a practical faculty (material realm of the body) that is the one that the soul possesses for connection to with *side below it*. And this faculty may apply to the "dense mixtures" (according to our interpretation). (Psychology, 1.5, 47.8-18) (9).
- Ibn Sina's stated that: "this divine flow alone is capable of transforming power (germ cells) into action (fertilization), provided that it is prepared for its perfection without apathy or miserliness". This theory of the "latent power and creative transformation" represents an integrated unit with his medico-philosophical vision. If we try to guess or make a conjecture about the first impulses of the soul's union with the zygotic cell during cleavage stage, it could be as follows: When Ibn Sina describes germ cells as latent power, he means that they are latent, but in fact, they are under demand and will emerge from their latency by force of human instinct and by inspiration from God in order to procreate. These germ cells embarks on its effervescent and active journey from darkness to light and the height of activity and enthusiasm, and it doesn't rest until it delivers its sacred gift (genetic material) and fertilization occurs. Exactly at the moment of the sperm is released towards its precious goal, the soul is prepared and is at the peak of alertness to carry out its sacred mission until the moment of fertilization. Then, under strict divine guidance, at the moment of the first division of the zygote cell into cleavage, the soul immediately joins it to begin its sacred tasks in activating the functional genes to create the newborn organism (process of ZGA). So, if we can describe the journey of the sperm as a mechanical journey, then the journey of the soul is purely luminous divine journey". In this case, the soul can gain a new, unprecedented definition that can be formulated in the following question: Is the soul the divine code that regulates and activates the genetic code of an organism? We may ask another question that may answer the first one. Isn't the soul in its nature immaterial and the genes also so, meaning that they are both of the same kind, and perhaps of the same origin, and this may mean that each of them possesses the keys to the other as if they were identical or sister cods?

It is worth noting that the major importance of the body in relation to the soul is embodied in two reasons according to Ibn Sina:

1st- The human intellect is an immaterial substance; therefore, it cannot be achieved by itself, but through a body that acts as a custodian for it, and prepares it to intellectually perceive the full range of intelligible objects.

2nd- The body acts as an occasioning cause for the origination of the human soul, while the production of a new substance is ultimately due to the Giver of forms. Such production requires the initial preparation of the material to provide a suitable subject for the new species form.

3. Zygotic Genome Activation

Following fertilization, the tow specified gametes must unite to create an entirely new organism. The genome is initially transcriptionally quiescent, allowing the zygote to be reprogrammed into a totipotent state. Gradually, the genome is activated through the process of maternal-to-zygote transition, which enables zygotic gene products to replace the maternal supply that initiated development [24].

Accordingly, zygotic genome activation is of utmost importance in that it represents a crucial developmental milestone in early embryogenesis, marking the transition from maternal to embryonic control of development. This process, which varies in timing across species, involves the activation of the embryonic genome, paving the way for subsequent cell differentiation and organismal development [25].

The process of Pre implantation is controlled by three distinct cell lineages: epiblast, trophectoderm and primitive endoderm. The epiblast gives rise to the organism, while the trophectoderm and the primitive endoderm contribute to extra embryonic tissues that support embryo development after implantation. Cell cleavage that follows fertilization results in polarization of these factors between the individual blastomeres, which become restricted in their developmental fate [26].

The zygote genome does not become transcriptionally active until ZGA occurs, enabling the embryo to grow according to its genetic profile. This stage development is critical because it determines the genetic blueprint of the particular organism [27].

Zhuoning, Zou, etal (2024) revealed that, there are two major classes of key regulators of ZGA, which are: licensors and specifiers [28]. Licensors would control the permission of transcription and its timing during ZGA. Specifires would instruct the activation of specific genes during ZGA.

These data, which explain the pivotal role of ZGA, actually represent the ultimate expression of the meaning and content of Ibn Sina's theory of the "first perfection", which literally embodies the inevitable fusion "eternal unity" between the soul and the zygote .This theory states that: "The first perfection is that by which the species actually becomes a species under the rule of the rational soul". And this notion, in language of our time, has a distinctly genetic connation, while, the whole genome of the body is the second perfection (body activities) [29]. Alex Mauron, (2001) asked a similar hypothetical question: is the genome the secular equivalent of the soul? This is very wise question because he bases this question within the scope of his inspiring theory of "genetic metaphysics" [30]. The current study partially adopts this assumption of Alex Mauron, with the simple addition, since the soul is the first perfection according to Ibn Sina, then the genome is exactly the "second perfection" that complements the first perfection, and both the soul and body are created united by the Creator, although they are distinct from each other in their physical nature. The process of creation takes place through two successive steps: first is the zygotic genome activation and the second step is the whole genome as if the first was completely the prototype for the second.

4. Conclusion

Finally, the following can be concluded:

- The soul is one of the most complex and controversial problematic issues that has faced humanity since the realization of this humanity's existence and awareness.
- The soul is likely to have been born immediately before or completely associated with the first division of the zygote cell into cleavage. In this sense, can the soul be considered the divine code (order) that activates the genetic code inherent in the germ cells?
- Ibn Sina's term "fine mixtures" may be applied to our current term "genetics of intelligence.
- Ibn Sina was the first to believe that there was a female gamete (egg) equivalent to the male gamete (spermatozoa).
- Ibn Sina's Theory of the "latent power and creative transformation" represents an integrated unit with his medico-philosophical vision.
- Ibn Sina stated: "This divine flow that alone is capable of transforming power (germ cells) into action (zygote/ cell division), provided that it is prepared for its perfection without apathy or miserliness ". This sober scientific notion, formulated by Ibn Sina in a beautiful Arabic language a thousand years ago, is what was literally confirmed by modern embryology, which has proven that: "In humans, the embryo stage is the first eight weeks post- fertilization. At week one post fertilization, the cells undergo extensive and rapid growth".
- The Zygotic Genome Activation represents the first perfection according to Ibn Sina.
- The soul may gain a new definition: the soul may be the divine code that activates and regulates the genetic code of the newborn organism.

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