

# Genetic Interpretation of Some Medico-Philosophical Theories of Ibn Sina: 3- Ibn Sina's Theory of the Temperament

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## ABSTRACT

This study is the third in a series of studies aimed at explaining and interpreting some of Ibn Sina's medico-philosophical implications from a genetic perspective. In the first study, we explained the genetic interpretation of the theory of "the soul creation"; while in the second study we discussed the theory of "mixtures and essence".

In the current study, we emphasize the proper linguistic and scientific meaning of the term "temperament", which is the "genotype" of an organ or some organs. This new definition that we propose was derived from two sources, the first is a linguistic source originating from the interpretation of the word "temperament" in all its derivatives in Arabic (Dictionary of Lisan al- Arab, Ibn Manzoor). The second source is the analysis of the scientific context of Ibn Sina and comparing it to the linguistic analogy term. In his manuscript "Treatise on Cardiac Drugs" Ibn Sina stated, "each organ has a special structure/qualitative mixture, (temperament in English translation) which is the result of specific mixtures (genes) in the essence (zygote), but this special structure/qualitative mixture (genotype) develops because of the number of mixtures and the form of their structure". In our belief, the terms "specific mixtures/genes" and "special structure/genotype" can be adopted as sibling terms, as the difference between them is not in the meaning, but it can be explained within the concept of causation (the cause "specific mixtures/genes" and effect "special structure/genotype"). Thanks to the Arabic language in which Ibn Sina formulated most of his encyclopedic works, we were able to realize some of the hidden meanings in Ibn Sina's theories, the most important of which is the meaning of the temperament, as well as the meaning and the origin of the word DNA, which first appeared in the cultural and scientific heritage of the Arabic language and is called the "two powers" or "al-merrataine" in Arabic pronunciation, which means "A long, fine, well coiled strands" and other synonyms, as will be evident in the folds of the current study.

Keywords: Ibn Sina; Temperament; DNA; Genetic Diversity; Genome; Al-Merrataine شترملا

## Introduction

Temperament in Arabic is called (mizaj) or (mazaj), which literally means a state of mind or body. However, in tibb, it is used to describe the quality or qualities of the elemental mixture that constitutes the human body as a whole or a single organ as well. An individual's temperament phenotype changes during the various stages of life and is largely affected by the interactions of genotype, environmental effects, and lifestyle choices. [1] There is always a problem with the influence of ancient Greek philosophical and medical theories on Ibn

Sina's thoughts. Galen (AD130-200) used the theory of humors to explain individual differences in character. The four primary humors, yellow bile, black bile, blood and phlegm, are related to cosmology theory which, states that "fire, earth, air and water are the four basic elements of all things [2]. Ibn Sina, also influenced by Galen, used this theory in his formulation of the types of temperaments stating, "The four basic temperaments are hot, cold, wet, and dry. "However, these four always appear in distinct combinations that raise the total number of temperaments to nine". [1]. Over the life span, temperament

remains fairly stable, but its expression can be impacted by a variety of factors, such as biological changes, psychological well-being, socialization, parenting practices, and cultural values. [3].

*Ibn Sina's* 3rd Lesson of the first book of the Canon on temperament is elaborate and complex. He defined healthy temperament "as having the optimal mixture of the initial qualities (elements) that allows the individual to have the best health under the environmental system that the individual lives within. (Lukas, et al. [4]) studied genomic diversity in fundamental biological processes. They found within- species genetic diversity across families and geographic regions to be associated with climate and sociality but not with extinction risk. Furthermore, (Iker Rivas-Gonzalez, et al. [5]) revealed the prevalence of natural selection at liked sites that shapes the landscape of both genetic diversity and incomplete lineage sorting along the primate genome. However, (Joseph K and Jonathan K [6]) revealed that the historical relationships between populations could be useful as null demographic models for the detection of natural selection.

## Materials

- 1) **Appendix 1:** summarizes Ibn Sina's theory in Arabic.
- 2) Translation of Ibn Sina's theory from its original language (Arabic) [7].
- 3) **Appendix 2:** translation of some terms mentioned in the current study in their original language "Arabic".
- 4) **Appendix 3:** some excerpts from the dictionary of Lesan al-Arab, which explain the different synonymous for the meaning of the word (al-merratine) in Arabic.

## Interpretation and Discussion

Ibn Sina stated that "each organ has a special structure/qualitative mixture (temperament in English translation), which is the result of specific mixtures (genes) in the essence (zygote) but this special structure/qualitative mixture (genotype) develops because of the number of mixtures (chromosomes/genes/genetic alleles) and the form (phenotype) of their structure". Discussion and interpretation of the overall implications of the current study can be done through the following entries:

### The True Meaning of the Term "Temperament" in Arabic (Appendix 2)

The term "temperament" has different synonyms in the Arabic language; the following definitions are literal translation according to the dictionary of Lesan al-Arab, pages: (4176 - 4177) and 4191 [8].

- 1) **1<sup>st</sup> - Mood:** This meaning is related to the psychological state of an individual (such as happiness, sadness, grief, joy, anger, and depression). And this definition has no consideration for the context of the current study, because it is far from what Ibn Sina intended at all. Ibn Sina used the term of "temperament" in the sense of mixture/chromosomes/genotype.

- 2) **2<sup>nd</sup> Mixture, "mazeej":** This means a mixture of two fluids, such as a mix of different fruit juices, or mixture of different colored inks.

- 3) **3<sup>rd</sup>:** Any two types of things that unite or mix to become a mixture: "Khaleet/mazeej".

- 4) **4<sup>th</sup>:** The temperament of the body is what the body is based on of the blood, "two powers" (Al-merrataine), and phlegm," [Lesan al-Arab, Ibn Manzoor: pages (4176-4177) - and 4191 [8].

### Literal Meaning of the Term "Two Powers" / (Al-merrataine) in Arabic

According to the Dictionary of "Lesan al-Arab", the literal translation of the meaning of the term "two powers" (Al-merrataine) in Arabic can be presented as follows:

- 1) The two coiled strands (braid).

This meaning refers to the nature of the dual structure of the strand

- 2) Fine long strands (braid).

(This meaning refers to a specific characteristic of the strand structure)

- 3) The power and sharpness of the mind.

(This meaning refers to the specific quality of the molar/theoretical faculties according to Ibn Sina).

- 4) Long, fine, well coiled strands (tightly braided).

(This meaning refers to a specific qualitative characteristic of the strength and structure/shape of strands)

- 5) Powerful, intensity and proper organs.

(This meaning refers to a specific quality of the strength of the physical/practical faculties according to Ibn Sina). All the previous definitions lead to the conclusion that the expression of "two powers" (Al-merrataine in Arabic) symbolizes two strands tightly coiled around each other (DNA) that result in a proper body and a proper mind.

### The Objective and Scientific Equivalent of the Meaning of the Ancient Arabic Term (Al-Merratine) with the Modern Notion of DNA

According to the genetic approach of the current era with regard to DNA, the following can be stated:

- 1) DNA was first isolated by the Swiss physician Friedrich Miescher in 1869 [9]. Approximately more than 800 years after Ibn Sina's time.

- 2) 2-DNA is a long polymer made from repeating units called nucleotides [10].

- 3) 3-The structure of DNA is dynamic along its length, being capable of coiling into tight loops and other shapes [11].
- 4) 4-DNA does not usually exist as a single strand but instead as a pair that is held tightly together [12].

Then the above-mentioned 4<sup>th</sup> definition of the meaning of temperament is the true accurate meaning of the term temperament in Arabic language for this reason, this definition is consistent with the general context of the current study, given that the body is formed basically of DNA (chromosomes/nucleic acids/genes) and some complementary biological molecules such as blood (proteins), phlegm (unassimilated and incompletely digested proteins), fat, lipids, and organic acids. All these components together make up the “special structure/qualitative mixture” that can be confidently adopted as the “genotype”. (Mones, et al. [1]) discussed the term temperament, and they stated that (literally temperament means: the state of mind or body), this interpretation is very apply to the characteristics of DNA abovementioned in current study, especially for “the power and sharpness of the mind” and “Powerful, intensity and proper organs”. In this sense, the terms “specific mixtures” and “special structure/qualitative mixture” can be adopted as sibling terms, as the difference between them is not in the meaning, but it can be explained within the concept of causation (cause and effect). Therefore, it can be emphasized that the specific mixtures (chromosomes/genes) in essence (zygote/nucleus) are the basis responsible for the formation of special structures (genotype/qualitative mixture/organ/body).

### Ibn Sina's Definition of The Healthy Temperament (Genotype)

Ibn Sina defined healthy temperament (special structure/genotype in our understanding and belief) *“as having the optimal mixture of the initial qualities (genetic alleles) \* that allows the individual to have the best health under the environmental system that the individual lives within”. Therefore, Ibn Sina rejected the existence of “universal optimal temperament” and advocated that “the human species has a wide-range temperament that is specific to its species (genome) \*, and that within the normal range of this temperament there are sub temperaments for races and populations. Even within a population, each individual has a unique temperament (specific unique genotype) \* that differs from that of another individual. The boundaries of a temperament are always in relation to a related group and never as an absolute; the human species has its own temperament in comparison to other species; the same is true for members within a population of the same species or for an organ. [3rd Lesson of the 1<sup>st</sup> book of the Al-Canun fi al-Tibb], [Avicenna's Medicine] [1]. \* (in italic are Ibn Sina's words, but between brackets is the author's interpretation)*

### Genetic Diversity and Genome

In the previous paragraph, it seems that Ibn Sina speaks in the language of our time, about the genome, or genetic divergence, or ge-

netic population between species and populations, and/or the compatibility between the genetic constitution of the individual and his surrounding environment. All the terms and concepts that Ibn Sina elucidated and explained in this chapter are genetic terms and concepts that belong par excellence to the field of biological diversity, specifically genetic diversity. Biological diversity has three types: genetic diversity, species diversity, and ecosystem diversity. (Inbarasan K, et al. [13]) The functional value of genetic diversity within populations has been confirmed in a series of studies. Clearly, this rich pool of diversity provides a resource for the continuous selection of adapted genotypes (Evitor N [14]).

Genetic diversity refers to both the vast numbers of different species as well as the diversity within a species, typically as Ibn Sina stated. In other words, it is the variation at the level of individual genes (polymorphism) that provides a mechanism for populations to adapt to their ever changing environment. On a molecular genetics level, genetic diversity is due to changes in a small number of genes in a species resulting in speciation, which is the evolutionary process by which populations evolve to become distinct species. (Palumbi Stephen R [15]). Furthermore, (Amit K [16]) used molecular genetic tools of ISSR and RAPD, as well as dendrogram statistics for studying the genetic divergence of *Justicia adhatoda* L, a medical plant, and they reported that the level of genetic diversity within a given species and its population depends on the breeding system, past level of gene flow among populations, the actual size of populations, and human impact. They found that molecular variances within populations were higher than those among populations, which implied the need to conserve more individuals in any population. There are many studies that explain the value and importance of genetic diversity as a pioneering theory in its scientific and economic value. (Iguerio P, Melissa E) [17-19] Furthermore, (McGinnis J [20]), in his great work “Avicenna, Great Medieval Thinkers”, studied Ibn Sina's concept of temperament and revealed the genetic core which is beyond doubt of this concept, where Ibn Sina stated: *“The individual temperament (genotype) come to be when the male and so - called female semen come together, where the various qualities associated with the individual temperament (genotype) might be affected by such factors as the initial qualities of the individual parent's semen.*

*Like the elements from which they ultimately derive, the humors (mixtures/chromosomes) too are typified by the predominance of the two set of primary active (dominant) and passive (recessive) qualities” (genes). Isn't this literally and definitively genetics. Simply if we replaced the term “qualities” by the term “genotypes” or “genes”, the text would become purely genetic. (Lucas, et al [3]) found within-species genomic diversity across families and geographic regions to be associated with climate and sociality, but not with extinction risk. Furthermore, they revealed that mutation rates differ across species, potentially influenced by effective population size.*

## Ibn Sina's Perception about Genetic Individuality

Ibn Sina stated, *"Even within a population, each individual has a unique temperament that differs from that of another individual"*. This creative idea, in which Ibn Sina expressed the genetic differentiation between individuals, has confirmed its validity and merit in the folds of modern genetic approaches. (Haoliang F, et al. [21]) revealed that combining Y-SNP/STR and MH genetic markers for mixed traces with male contributors is beneficial for familial searching, paternal/kinship determination and mixture de-convolution. In addition they proposed a GPR method for two-person DNA mixtures based on the MY system. In conclusion, based on the MY system, two-person DNA mixtures (1:10-1:2) could be de-convoluted using the GPR strategy for individual identification.

Moreover, (Robert C, et al. [22]) revealed that recent genome-wide association studies (GWAS) have shown that temperament is strongly influenced by more than 700 genes that modulate associative conditioning by molecular processes for synaptic plasticity and long-term learning and memory. On the other hand, Ibn Sina's expression of "unique temperament" has a shade of genetics because it clearly refers to personality. In this respect, (Sanchoz-Roige S, et al. [23]) reported that personality traits include thoughts, feelings and behaviors that reflect the tendency to respond in certain ways under certain circumstances. They also confirmed that the genetic variants that influence personality are still in their beginning to be identified. In addition, (Maria PC, et al. [24]) revealed that "human personality" is a complex trait resulting from the innate predisposition to respond to external stimulated interaction with environmental factors, and this definition applies to Ibn Sina's theory. On the temperament of organs, Ibn Sina in the language of scientific indoctrination stated, *"Know that God has given every animal and every organ the temperament that is most suitable and beneficial to its function and states as permissible. Additionally, God has given the human being the most balanced temperament in this world that is suitable to his active and reactive functions. Additionally, given for each of organs is its suitable temperament"* [1].

This context expresses the complementarity between the theories of divine creation and evolution. It talks about the causal relationship between the genetic makeups (genotype/temperament) and the suitability of this genotype for life and adaptation in different spatial conditions and advanced temporal conditions. From this perspective, (Erik F Sornsen, et al. [25]) revealed that the evolutionary dynamics and current structure of baboon population diversity indicate that other mammals displaying differentiated and geographically separate species may also have more complex histories than anticipated. This may also be true for the morphologically defined hominine taxa from the past four million years. Furthermore, (Xiao-Guang, et al. [26]) studied the effect of a cold climate on Asian colobine primates. This study demonstrates a direct link between a genomically regulated adaptation and social evolution in primates and offers new insights into the mechanisms that underpin behavior evolution across animal taxa.

## Conclusion

Finally, the following can be concluded

- 1) The true meaning of the term "temperament" is (genotype) which mainly consists of two coiled strands of DNA, typically as Ibn Sina envisioned it.
- 2) The origin of the meaning of the word DNA first appeared in the cultural and scientific heritage of the Arabic language and is called the "two powers" or "Al-merrataine" in Arabic, which means "A long, fine, well coiled strands" and other synonyms.
- 3) Each individual has a unique genetic constitution, which is determined by DNA, which is the blueprint that makes us who we are. Moreover, the genetic approach that we have presented in this study corresponds to some extent with what Ibn Sina stated nearly a thousand years ago. The proof is that if we replace the word "temperament" with "genome" or genetic diversity, the text becomes understandable and self-explanatory.

## Recommendation

The time has come to reconsider and scrutinize some of the translations of Ibn Sina's scholarly writing, as some of these translations did not accurately deduce the meaning of Ibn Sina's formulation in the Arabic language. The reason for this linguistic and, consequently, meaningful deviation is due to:

1<sup>st</sup> – The Arabic language is a derivational language that is characterized by the abundance of synonyms in the meaning of one word, and thus, the translator may be confused about the appropriate true meaning.

2<sup>nd</sup> – The Arabic language of Ibn Sina is not his mother tongue, and therefore, some terms need more contemplation, editing and scrutiny. Exactly as it happened in the folds of the current study, for example:

- 1) Our interpretation of the term "Akhlat" as they are the mixtures/chromosomes, as well as the differentiation between Arabic term "akhalat/mixtures" and Greek term "humors" as stated in the folds of our second study entitled "Genetic Interpretation of Some Medico-Philosophical Theories of Ibn Sina: 2-Ibn Sina's theory of mixtures and essence".[27]
- 2) Our interpretation of the term "temperament" in that it is definitely genotype and never a mood or state.
- 3) In his great work "The Book of Animals", Ibn Sina stated that, the change from semen to animal takes place through a series of discrete substantial changes, not a continuously gradual process. Unfortunately, Ibn Sina's language in this passage can be misleading. He speaks of "alteration", which is the standard Arabic term for "change" with respect to quality, and thus implies gradual changes. Ibn Sina does believe that during each state of embryonic development, there are a number of gradual (natural) qualitative changes; nevertheless, the transformation from state to state is not gradual but punctuated. [20].

## The statement of the Interest's Conflict

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- 1) The author has no relevant financial or non-financial interests to disclose.
- 2) The author has no competing interests to declare that are related to the content of this article.
- 3) The author certifies that he has no affiliations with or involvement in any organization or entity with any financial interests in the subject matter or materials discussed in this manuscript.
- 4) The author has no financial or proprietary interests in any material discussed in this article.

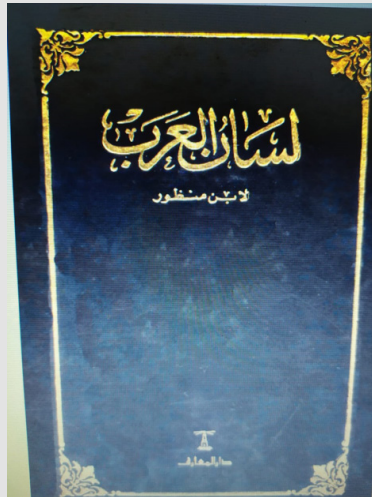


Figure 1.

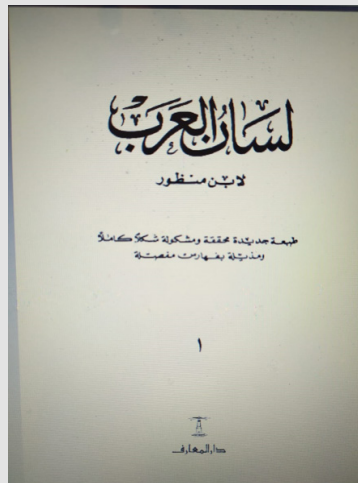


Figure 2.

## References

1. Mones, Abu-Asab, Hakima A, Marc S M (2013) A New Translation of the 11-Century Canon with Practical Applications for Integrative Health. Mealing Arts Press In: (1<sup>st</sup> Edn.),.
2. Stelmack R, Stalikas A (1991) Galen and the humor theory of temperament. *Personality and Individual Differences* 12(3): 255-263.
3. Maria A G, Kara L B (2023) Temperament Encyclopedia of Child and Adolescent Health. 2: 195-207.
4. Lukas F K K, Hong G, Mareike C J, Martin K, Joseph D, et al. (2023) A global catalog of whole-genome diversity from 233 primate species. *Science* 380(6648): 906-913.
5. Iker RG, Mariolaine R, Fang L, Long Z, Juline YD M, et al. (2023) Pervasive incomplete lineage sorting illuminates speciation and selection in primates. *Science* 380(6648).
6. Joseph K P, Jonathan KP (2012) Inference of Population Splits and Mixtures from Genome-Wide Allele Frequency Data. *POLOS Genetics* 8(11): e1004967.
7. Zaabal M M (2023) Genetic Interpretation of Some Medico-Philosophical Theories of Ibn Sina: 1- Ibn Sina's theory of the soul creation. *World Journal of Medical Sciences* 20(2): 18-27.
8. Ibn Manzoor, H Dar El-Maaref Cairo, Dictionary of "Lesan El-Arab " 1229: 4176-4177 and 4191.
9. Gruner O C (1930) A Treatise on the Canon of Medicine. AMS Press.
10. Dahm R (2008) Discovering DNA, Friedrich Miescher and the early years of nucleic research. *Human Genetics* 122(6): 565-581.
11. Alberts B, Johnson A, Lewis J, Raff M, Roberts K, et al. (2002) *Molecular Biology of the Cell* (4<sup>th</sup> Edn.),.
12. Irobalieva RN, Fogg JM, Catanese DJ, Sutthibutpong T, Chen M, et al. (2015) Structural diversity of supercoiled DNA. *Natural Communications* 6: 8440.
13. Watson JD, Crick FH (1953) Molecular structure of nucleic acids; a structure for deoxyribose nucleic acid. *Nature* 171(4356): 737-738
14. Inbarasan KG, Prasanth J, Mukesh GK (2023) Status of Biodiversity Management Committees in Tamil Nadu. *Economic and Political Weekly* 58(1).
15. Evtor Nevo (2013) *Encyclopedia of Biodiversity* (2<sup>nd</sup> Edn.),.
16. Palumbi SR (1994) genetic divergence, Reproduction, Isolation, and Marine Speciation. *Annual Review of Ecology and Systematic* (25): 547-572.
17. Amit K, Priyanka M, Subhash S, Velusamy S (2014) Efficiency of ISSR and RAPD markers in genetic divergence analysis and conservation management of *Justicia Adhatoda* L L. A medical plant. *Plant Systematics and Evolution* 300: 1409-1420.
18. Jian-huo Z, Xue-ruì L X, Sheng-Yi Han, Ti-ning W, Yonghao H, et al. (2019) The genetic divergences of codon usage shed new lights on transmission of hepatitis E virus from swine to human. *Infection Genetics and Evolution* 68: 23-29.
19. Salgueiro P, Rueedi M, Coelho MM, Palmeirin JM (2007) Genetic divergence and phylogeography in the genus *Nyctalus* (*Mammalia, Chiroptera*): implications for population history of the Insular bat *Nyctalus Zoreum*. *Genetica* 130(2): 169-181.
20. Jon McGinnis (2010) *Avicenna, Great Medieval Thinkers*. OXFORD University press, pp. 238-243.
21. Haoliang F, Qiqian X, Lingxiang, W, Kai R, Xiaohai T, et al. (2019) Micro haplotype and Y-SNP/STR (MY): A novel MPS-based system for genotype pattern recognition in two- person DNA mixtures. *Forensic Science International Genetics* 59: 102705.
22. Robert C, Kevin M C, Igor Z, Liisa KJ (2019) The complex genetics and biology of human temperament: a review of traditional concepts in relation to new molecular findings. *Translational Psychiatry* 9(1): 290.
23. Sanchez-Roige S, Gray JC, Mackillop J, Chen C CH, Palmer AR (2017) The genetic of human personality. *Genes Brain and Behavior* 17(3): e12439.
24. Maria PC, Alessandra M, Susanna A, Anna M, Paola T (2022) Genetic Dissection of Temperament Personality Traits in Italian Isolates. *Genes* 13(1): 4
25. Erik F S R, Alan H, Liye Z, Muthuswamy R, Lukas FK, et al. (2023) Genomic - wide ancestry reveals details of ancient and recent male-driven reticulation in baboons. *Science* 380(6648).
26. Xiao-Guang Q, Jinwei W, Lan z, Lu W, Xuanmin G, et al. (2023) Adaptations to a cold climate promoted social evolution in Asian colobine primates. *Science* 380(6648).
27. Magdy Mohamed Morsi Zaabal (2023) Genetic Interpretation of Some Medico-Philosophical Theories of Ibn Sina: 2- Ibn Sina's Theory of Mixtures and Essence. *J Genetic Engineering and Biotechnology Research* 5(3): 146-152.

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