Genetic Recessiveness and Genetic Counseling

and their Application in Islam

الوراثة المنتحية والإرشاد الوراثي وتطبيقاتهما في الإسلام

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Abstract:

The Sayings of Prophet Mohammad (PBUH) were surveyed for relevant links with genetic recessiveness and genetic counseling. Important and interesting understandings of these concepts are found in the Prophet's Sayings depicting the recessive genes that disappear in one generation and appear in another (Skipping of generations):

Islam predates, therefore, the new discoveries of genetics by some 1400 years! The traditions of the Prophet enabled at that time to practice genetic counseling and resolve a social problem based on an insightful understanding of the recessiveness mode of inheritance. In fact, a man was furious about a black child born to him even though his wife and himself were non-black! The total story is detailed in this paper but to resume, the Prophet said: Possibly it is "عَرَقٌ (عُسِيُّ أنَّ يَكُنْ نَزُوهُ عَرَق) "عرق". The word "عرق" was employed here undoubtedly to designate "recessive gene" which might have segregated from the far grandparents and assorted in that black child. Genetically, this is a fully accepted possibility. This is an example of the scientific miracles (Ijaz) that strengthens faith in God who revealed the religious texts to his Prophet and therefore, demonstrates the ideological and scientific strength and authenticity of Islam. Marvelous social consequences on traits as skin color are evoked like fighting against color racism since black children can be born to non-black parents. Furthermore, compatibility of science and religious texts (The Glorious Qur'an and Honorable Hadith), directly opens the possibility of further investigations based on the religious citations which prove more and more to be full of merit and
worthy of studying! Scientific inquiry is a religious manner to attain high degrees in the estimation of God:

O you who believe! when it is said to you, Make room in (your) assemblies, then make ample room, Allah will give you ample, and when it is said: Rise up, then rise up. Allah will exalt those of you who believe, and those who are given knowledge, in high degrees; and Allah is Aware of what you do. Al-Mujadila (She That Disputeth, The Pleading Woman, Qur'an Chapter 58, Verse 11)

At the end of this paper will be cited conclusions and recommendations…

Key words:

Honorable Hadith (Prophet Mohammad's Sayings), Ijaz (scientific miracles in Hadith), genetics, recessiveness and genetic counseling.

ملخص باللغة العربية:

استطاعت هذه الورقة أحاديث الرسول محمد في قرآن تنطلق بالتنحي والإرشاد الوراثيين. وقد وجدت قرآن مهمة تشير إلى القيم النبوية التطبيقية لهذه المجامع، كما روى: تخبروا لللمان إن الطرق تنسى (سناب ماجه جزء 1 من 633 حيد 1970)، في إشارة إلى الجنيات المنتمية، التي قد تختفي في جبل وتظهر في آخر (ظاهرة الفقوض). إن هذا يشير أن الإسلام كان له قيم السباق في هذه المجامع بنحو أربعة عشر قرناً من الزمان. وقد وقف الرسول هذا الفهم في سابقة تاريخية، هي الإرشاد الوراثي الذي حل به مشكلة اجتماعي للبرج أنته امرأته بغلام أسود، ليس لهم عدي بشبه في أنفسهم ولا أبائهم فكان جوابه في حديث مفصل، يُستخلص منه هذا (عسي أن يكون نزهة عرق). وفي هذا إشارة إلى الجنيات المنتمية لصفة السواد من الأجداد (بعيدي الأمد) التي انزلت ثم تجمعت في ذلك الغلام الآسود. في علم الوراثة، هذا احتفال ممكن، وهذا يقد لنا مثالاً واضحاً للعجائز العلمي في النصوص الإسلامية، ويقوي الإيمان بالله الذي أوجه إلى عبده ما يوحى، ويذكر نبتين منغة الإسلام التشريعية والعلمية. إن من رواج الدين الإسلامي المبني على هذا الفهم مكافحة التمييز العنصري المبني على اللون مثالاً فقد يولد أشكلين غير أسودين!
إِن مَطَابِقَةِ الإِلَامِ للمَكْتَبَاتِ العَلْمِيَةِ الحَدِيثةِ بَاسِبَةٌ تَقْرِيبٌ مِنْ أَلْفٍ وَأَرِبعُ مَائَةٍ عَامٍ، تَفْنِيَ الْبَابُ عَلَى مَصَارِعِهِ.
وَهَذَا مَمَّا يَرْفعُ اللَّهُ بِهِ دِرَجَاتٍ.
بَا أَيْبَا الَّذِينَ آمَنُوا إِذَا قَالُوا إِنِّي أُنْفِقُ مِنْ كَلَبِي ۛ فَفَاتِحُ اللَّهُ كَلَبَهُ إِذَا قَالُوا فَأَنْفِقُوا ۛ يَرْفعُ اللَّهُ الَّذِينَ أَنْفَقُوا مَنْكُونَ وَالذِّينَ.
وَخَاتِمَةُ هَذِهِ الْوِرَقَةِ اسْتِنَابَاتٌ وَتَوْصِيَاتٌ.

الكلمات الدالة:
السنة النبوية الشريفة، إعجاز، وراثة، الوراثة المنحية والإرشاد الوراثي.
Introduction:

We can define genetics as the science of studying genes and modes of inheritance or transmission of traits between generations (Glanze, 1996). This is relatively a new science founded by the "Father of Genetics", Gregor Mendel (1822-1884) who discovered the laws of inheritance following his insightful investigation on peas. The first law of segregation of alleles and second law of independent assortment of alleles represent the basis for a tremendous number of research papers and fundamental basis of understanding of life and of innumerable applications as well (Griffiths et al., 2007).

The ancient understanding of genetics was vague. However, Prophet Mohammad (PBUH) shows an understanding of genetics and its newly discovered concepts like dominance and recessiveness of paternal and maternal alleles. This can be understood from the following Saying of the Prophet (Hadith):

Based on this understanding, a child might resemble more his or her paternal or maternal uncles. Actually, the term employed by the Prophet (علي) is an accurate translation of the new Mendelian term (dominate), the dominated trait (recessive) is the one that is masked under the effect of the dominant trait.
In this paper, the Islamic religious texts in Qur'an and Hadith will be investigated conceptually vis-à-vis recessiveness versus dominance. Applied understanding of genetic recessive mode of inheritance will be extracted notably in the field of genetic counseling.

Through this paper, it will be demonstrated how the Prophet practiced genetic counseling based on extrapolating on similar cases (to the one that faced him). Genetic counseling is advising about characters, possibilities of contracting characters or diseases based on the family pedigrees and available date on the character under advising. It is a service to help individuals and families translate scientific knowledge into practical information. A genetic counselor works with a person or family that may be at risk for an inherited disease or abnormal pregnancy outcome, discussing their chances of having affected children. It was a premier to practice genetic counseling some 14 centuries ago!

**Methodology:**

The Glorious Qur'an and the authentic Sayings of the Prophet are screened for insightful and applied aspects of recessiveness mode of genetic transmission and genetic counseling. Actually, investigations took place in two directions: genetics with its newly discovered concepts are screened in holy texts and religious understandings are explored in genetics as a relatively new science. These are parallel lines supportive of each other and should aim at unique goals. Few Hadiths cited in this paper are weakly attributable to the Prophjet Mohammad (PBUH). Such Hadiths are not necessarily that they are wrong but that their credibility is not absolute! Citation of Hadiths weakly attributable to the prophet is conditioned by a convincing
support by other more credible Hadiths and or scientific facts. Such Hadiths can be considered and cited but with conditions put by many Islamic scholars and well reviewed (http://www.binatiih.com/go/forum.php?action=view&id=2081). These conditions are respected in this paper.

**Results and Discussion:**

Recessiveness is a condition that appears only in individuals who have received two copies of a mutant gene, one copy from each parent. The individuals with a double dose of the mutated gene are called homozygotes. The individuals with a single dose of the mutated gene appear normal and are called heterozygotes, or gene carriers (Reece et al., 2010).

Genetic counselling or counseling is the process by which patients or relatives, at risk of an inherited disorder, are advised of the consequences and nature of the disorder, the probability of developing or transmitting it, and the options open to them in management and family planning in order to prevent, avoid or ameliorate it. This complex process can be seen from diagnostic (the actual estimation of risk) and supportive aspects (Sequeiros and Guimarães, 2008).

Phenotypic traits of offspring can reflect directly the parents' traits and genotypes. This meaning is depicted from the following Hadith in which Mohammad (PBUH) practiced genetic counseling:

> حديثنا عمران بن أبي الطاهر من السرح المصري حديثنا يوسف بن عدي حدثنا عبد الرحيم بن سلمان عن محمد بن إسحاق أخبرنا
> 
> العباس أبي سهل عن أبيه قال : لما لاقا قال رسول الله "إِذْ ضَلَرْنَا هَذَا الْحَمْرَاءَ فَلَمْ يُؤْتِنَا هُمْ بِهِ عِرْبِيَّ" فَلَمَّا أَتَيْنَا مِنْهَا حَيْثْ إِنَّهُ تَفَصَّلَ فَنَكَرَتْ فِيهِ أَحَدَمُ غَرْبُهُ وَجَزَاهُ فِيهِ لأَبِيهِ عِرْبُيَّ الذي
> 
> انقضى منه وإن تلته أسود اللون، والشعر، فهو لأبي السماء الرجل الذي رسمه به قال عيرميماً ولدته أبيته به فاستلقي مثل الفروة السوداء، ثم أخذت بلجيه فاستلقي لسباة مثل الثمرة فقلت صدق الله ورسوله (الطبراني، المعجم الكبير، حديث رقم 3724، جزء 6 - صفحة 128، وصححة الطبراني).
However, traits can change between generations and this notion was also employed by the Prophet in genetic counseling: In fact, at the time of Prophet Mohammad (PBUH), a man was confused as his wife gave a birth to a black boy and was about to accuse his wife of infidelity. When the Prophet asked this man if he had camels and asked him about their color, he answered yes, they are red, and then the Prophet asked him if there were blackish, non-pure black (أورق) camels in his herd and he answered that he did. The Prophet concluded that the two cases are similar (the case of the man with his wife and that of camels). By dialoguing with that man, Prophet Mohammed (PBUH) made him conclude by himself that some characters can reappear after one or more generation of disappearance (recessive inheritance). Actually, skipping of generations is a characteristic of recessively inherited characters (Reece et al., 2010). In addition, of the scientific importance of revealing some of the genetics' secrets some 1400 years ago, another educational importance is attributed to the the Sayings of the Prophet. That is pedagogy and convincing by dialogue and comparing similar cases to reach a conclusion! The genetic understanding of the Prophet could help in genetic counseling and consequently in resolving a social problem.

The word (عَرْقٌ) in the previous and later Hadiths is a Prophetic designation of allele, in this context a recessive allele that could have reappeared (نَزْعَه). Similarly, reappearance of the hidden (recessive) alleles is understood from the following Hadith that describes segregation and grouping of recessive alleles after having been masked for generation(s):
Segregation of recessive alleles and assortment of these segregated alleles in both parents can be understood from the expression of the Prophet:

(…) in the following Hadith:

The Law of Segregation (Mendel’s First law) states that when an individual produces gametes, the copies of a gene (alleles) separate, so that each gamete receives only one copy. A gamete will receive one allele or the other (Griffiths et al., 2007).

In this last Saying of the Prophet, the number (99) might indicate the numerous genes that participate in our phenotypes. It could have been cited in a figurative rather than an absolute context.

In this respect of human phenotypic traits like the skin color, Islam fights against racial discrimination notably discrimination based on color. Discrimination is a sociological term referring to the treatment taken toward or against a person of a certain group under consideration based on class or category. Racial discrimination differentiates between individuals based on real and perceived racial differences.

Islam puts an honorable basis of distinguishing rather than discriminating people but based on their good conduct and righteous relations with God and people.
O you men! surely We have created you of a male and a female, and made you tribes and families that you may know each other; surely the most honorable of you with Allah is the one among you most careful of his duty (or most righteous or the best in conduct) surely Allah is Knowing, Aware. (Al-Hujraat, The Private Apartments, Qur'an Chapter 49, verse 13)

To confirm the mentioned honorable principle, Prophet of Islam, Mohammad (PBUH) orders Muslims to follow and obey the leader even if he was of color. At that time, this was a revolutionary attitude when slaves were representing an integral part of the social, economic and political life of people. Recall that the modern democracies in the world could put this honorable principle in practice only very recently.

The offspring might display hidden characters from the pedigree (ancestors) of the mate, the Prophet of Islam, Mohammad (PBUH) recommends selecting well the mate:
However, it is believed that this Hadith (Choose well your mates because characters are maskable) is an assemblage from two Hadiths:

Choose well for your semen (your mates) and marry with rivals" and "Choose well where you will put your children (your semen) because characters are maskable"

And in another Hadith, we can understand the same message:

The companions of the Prophet understood the meaning of transmission of traits, which might be paternal or maternal. In the following story, Ali, companion and cousin of Mohammad (PBUH) accused one of his sons to hesitate during a battle time under the effect of a maternal gene (عرق), that he should have inherited from his mother (Al-Hanafiyya).
Finally, another lesson that can be learned from the previously mentioned Saying of the Prophet:

The lesson is that he thought about the question intensively before answering although he receives revelation from God! He explained this attitude in another Saying of the Prophet when he thought about a Jew question deeply then answered. A Jew asked him, why did it take you long time to answer although you know it? The Prophet (PBUH) answered: by respect of the wisdom. Undoubtedly, the Prophet wanted to give us a lesson in pedagogy: thinking before answering!

Conclusions and Perspectives:

Muslims believe that the sources of knowledge are experimental but also can be inspired from the authentic revealed texts (The Glorious Qur'an and authentic Sayings of the Prophet, Hadith). These texts are originally guidance texts for life but include, evidently, scientific indications for applied reasons as well as source of lasting convincing power!
And say: Praise be to Allah, He will show you His signs so that you shall recognize them; nor is your Lord heedless of what you do (An-Naml, The Ant, The Ants, Qur'an Chapter 27, Verse 93).

Looking for relevant links between genetics and religious texts has given fruitful results for the precise topic of genetic recessiveness with applied aspects in the society (e.g. genetic counseling, fraternity and equality). More investigations are important to demonstrate furthermore the authenticity and strength of this religion and consequently its supra terrestrial source, the Creator and Ultimate Knower of everything, Allah! Some of the secrets of this universe are revealed to the messengers of God. The authentic texts are therefore a rich source of spiritual as well as research inspiration!

The Know of the unseen: so He does not reveal His secrets to any * Except to him whom He chooses as a messenger; for surely He makes a guard to march before him and after him * So that He may know that they have truly delivered the messages of their Lord, and He encompasses what is with them and He records the number of all things (Al-Jinn, Jinn, Qur'an Chapter 72, Verses 26-28)

Acknowledgments:

Ultimate thanks to God, Allah for everything in this life. Many thanks are addressed to all the following colleagues and friends for amiable critical reading and useful remarks: Dr. Sa'eed Rahbania, Prof. Hilmi Abdel-Hadi, Dr. Mohammad Dawabsheh and Sheikh Ziyad Ayaseh.

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