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Meeting of the Executive Board of directors of ISHIM
Tuesday 26/10/10 Istanbul /TURKEY

Scientific Events

Extra-Nuclear Genetics, Sex Chromosomes, Sex Determination and their Applications in the Holy Qur'an and the Honorable Hadith (Sayings of Prophet Mohammad (PBUH))

ة السيتوبلازمية والكروموسومات الجنسية وتحديد الجنس وتطبيقاتها
في القرآن الكريم والسنة النبوية المشرفة

. بلال أحمد أحمد غريب

الجامعة العربية الأمريكية

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Summary

The Islamic scientific miracles (Ijaz) in Holy text of Qur'an and the Traditions of the Prophet (Hadith) are screened for relevant links with genetics. Interesting findings are explored in the genetics domains of extra-nuclear genetics, sex chromosomes and determination of the offspring's sex. In addition to the pregnancy, labor, birth, breastfeeding, weaning and extra care received from the mother, genetically, we owe more to our mothers than to fathers as our cytoplasmic DNA comes exclusively from the mother. For sex determination, it is demonstrated that the father is genetically responsible for determining sex while environmental factors (e.g. pH level and even the nutrition of the mother...) play also a role. Evidently, both parents notably mothers are fully worthy of beneficence through life:

And We have enjoined man in respect of his parents his mother bears him with faintings upon faintings and his weaning takes two years saying: Be grateful to Me and to both your parents; to Me is the eventual coming (Luqman, Qur'an Chapter 31, verse 14).

ووصينا الإنسان بوالديه حملته أمه وهنا على وهن وفصاله في عامين أن أشكر لي ولوالديك إلي المصير (14 :31)

At the time of revelation, it was not known whether the fetus comes from the father or the mother or both! The Islamic knowledge that predates the recent discoveries with some 1400 years was put in service of establishing a strong social status with a considerable impact (e.g. beneficence to parents...). Such reconciliation of religious text with scientific discoveries strengthens the religion of Islam as it demonstrates its power inspired from its authenticity and divine source. It opens also new horizons for the religious texts to be investigated by scientific methods and techniques. This paper will be ended by conclusions and recommendations.

Key Words: Holy Qur'an, Honorable Hadith (the Sayings of Prophet Mohammad), Ijaz (scientific miracles in religious texts), genetics, extra-nuclear genetics, sex chromosomes, sex determination.

ملخص باللغة العربية: تُستكشف في هذا البحث نواحي من الإعجاز العلمي الوراثي مُستلهمة من القرآن الكريم والسنة النبوية المطهرة، مثال ذلك ال DNA السيتوبلازمي الجنسية وتحديد الأمهات يتحملن والراعية. مدينون وراثيا للأمهاتنا منه DNA السيتوبلازمي حصري . وبالنسبة لتحديد جنس المولود، يتبين في هذا البحث دور الأب الوراثي، إضافة لدور الأم البيئي مثلا من خلال تأثير بيئتها الداخلية كدرجة الحموضة وحتى تغذيتها ترجيح الأبوين يستحقان : ووصينا بوالديه حملته أمه وهنا وهن وفصاله في عامين أن أشكر لي ولوالديك إلي المصير (14 :31)

تسبق النصوص الإسلامية البحوث العلمية بنحو أربعة قرنا من الزمان، وتومض بإشارات دقيقة يوم كانت حدود المعرفة لم تتوصل بعد إلى أصل الجنين أهو ! الإجتماعية الهامة لهذا وهذه الوالدين لهم، إن هذا الديني العلمي يظهر المعرفة التشريعية كدين إلهي، ويفتح العلمية المبنية الدينية الصحيحة خصوصا. ويُختم البحث باستنتاجات وتوصيات.

: القرآن الكريم، السنة النبوية الشريفة، إعجاز، وراثه، الوراثة السيتوبلازمية والكروموسومات الجنسية وتحديد الجنس.

Introduction

Genetics is the branch of biology that studies heredity and variation in organisms or the means by which traits are passed from parents to offspring (Glanze, 1996). Even if ancient people had practical understanding of genetics and transmission of genes, it was an empirical knowledge not scientifically formulated. They practiced plant and animal selection for breeding in the next seasons. They evidently practiced human genetic selection upon choosing their mates! However, only relatively recently, the precise statistical and molecular basis of genetics were discovered (e.g. Mendel's first and second laws of inheritance, the gene idea, the double helical structure of DNA, central dogma of the information flow in the cell from DNA to RNA to final product like proteins, different species of RNA,...). Actually, Gregor Mendel (1822-1884), an Austrian Augustinian priest and scientist, found out spectacular and fundamental laws named after him (Mendel's Laws: the first law of segregation of alleles upon meiotic cell division and Mendel's second law of independent assortment of the alleles of different loci upon independent assortment in gametes). Mendel is therefore, considered the "Father of modern genetics".

In Holy Qur'an and the Sayings of the Prophet of Islam, Mohammad, peace be upon him (PBUH), spectacular relevant indications with genetics are found. In this paper, extra-nuclear genetics, sex chromosomes and sex determination are explored with important social conclusions (e.g. beneficence to parents...) and theological (e.g. the authenticity of Islam with its texts) as well as scientific conclusions (conducting research based on authentic religious texts). Details are presented in the following sections (Extra-Nuclear Genetics, Sex Chromosomes, Sex Determination and their Applications in Holy Qur'an and the Honorable Hadith).

And say: Praise be to Allah, He will show you His signs so that you shall recognize them; nor is your Lord heed- less of what you do (AL-Naml, The Ant, The Ants, Qur'an Chapter 27, Verse 93)

(93) ﷻ سِيرِيكُمْ آيَاتِهِ فَتَعْرِفُونَهَا

Important consequences can be extracted in our social life especially kindness with parents and close relatives and caring for them:

وهذه الرَّحْمُ لها	يقول	وصلها وصلته،
حديث صحيح	قطعتها قطعتة)	4/157 وصلحه
1694	1680	
<u>وصلها وصلته، ومن قطعتها قطعتة</u>		
(صحيح البخاري 5989)		

The scientific inquiry is a religious duty to fear and get closer to God as Those truly fear Allah, among His Servants, who have knowledge!

And of men and beasts and cattle are various species of it likewise; those of His servants only who are possessed of knowledge fear Allah; surely Allah is Mighty, Forgiving (Fatir, The Angels, Originator, Qur'an Chapter 35, Verse 28).

الْوَالِيَةُ كَذَلِكَ يَحْتَسِبُ

عَزِيْرٌ غَفُوْرٌ (28 :35)

Methodology

All the relevant texts (verses from the Holy Qur'an, the Sayings of Mohammad's Mohammad's or Hadith of Mohammad, PBUH) were taken into consideration to screen for genetic knowledge. The focus is made in this paper on extra-nuclear genetics, sex chromosomes, sex determination and their applications in Holy Qur'an and the Honorable Hadith. Screening and exploration of links were conducted in both senses: religious texts were projected on modern genetics and *vice versa*. In some cases holy texts were read in order to find links with genetics. In others, modern genetics were screened in order to find links with the holy texts. In addition to the Qur'an verses, Hadiths of authentic order only were considered.

Extra-Nuclear Genetics and Sex Chromosomes in Qur'an and the Sayings of Prophet Mohammad (PBUH)

When most people think of DNA, they think of it as stored in chromosomes that reside and perform their functions like replication inside the nucleus. Extra nuclear inheritance is the transmission of genes that occur outside the nucleus. It is found in most eukaryotes and is commonly known to occur in cytoplasmic organelles such as mitochondria and chloroplasts (Birky *et al.*, 1994).

Sex chromosomes are represented by a pair of chromosomes, usually designated X or Y, in the germ cells of most animals and some plants, that combine to determine the sex and sex-linked characteristics of an individual, with XX resulting in a female and XY in a male in mammals. The opposite is true in birds (where the designations ZW for female and ZZ for male are often used). Sex chromosomes carry the genes that control the development of reproductive organs and secondary sex characteristics. In some organisms, sex is determined by environmental conditions such as temperature influencing the sex eggs of crocodiles upon hatching. In some organisms like honeybees, the ploidy (number of haploid sets of chromosomes) status determines the sex. Haploids (1n chromosomes) are males and diploids (2n chromosomes) are females!

EXTRA-NUCLEAR GENETICS, SEX CHROMOSOMES, SEX DETERMINATION AND THEIR APPLICATIONS IN HOLY QUR'AN AND THE HONORABLE HADITH (SAYINGS OF PROPHET MOHAMMAD (PBUH))

In an illuminating Saying of the Prophet, he indicated that the mother has to be given three-fold respect as the father. Actually, this has a vital importance in our social life, let us recall that women in general live more than men do and they need more service from their children. A woman's care for her kid is incomparable to anything else and is irreplaceable (pregnancy, labor, birth, breast-feeding, weaning, care throughout life...).

: (2548 5971) :

In addition, genetically speaking, a woman gives her child more than what he or she receives from his or her father. This can easily be demonstrated in case of boys who receive their sex chromosome X from the mother and the other sex chromosome Y from the father. The X chromosome is much longer (154,913,754 bp) and carries 1,846 genes, much more genes than Y (57,741,652 bp with 454 genes). This is not, however, the case in girls, but still they take more from their mother than they do from fathers. Indeed, the cytoplasm (the part of a cell that is enclosed within the cell membrane) of the zygote (formed from the union of two gametes by a fertilization event to compose the first single diploid cell) comes exclusively from the cytoplasm of the oocyte (the maternal inheritance). Cytoplasm contains the mitochondria, which harbors 37 genes in humans, which come ultimately from our mothers and grandmothers. Genetically speaking, we owe more to our mothers than to our fathers! Upon teaching genetics for several years, the results of a class discussion questionnaire, students especially boys tend to believe that they resemble more their maternal uncles than their paternal ones. That is clear in the phenotype especially in boys where they might resemble their maternal uncles more than their paternal uncles:

(أخاها أياها)

This imbalance resemblance in favor of maternal uncles is remarked in the popular traditions and inscribed in many proverbs like:

(تلتين الولد لخاله)

Nevertheless, both parents are worthy of respect and care and whatever we do, we cannot compensate except for a tiny part of our debts!

And make yourself submissively gentle to them with compassion, and say: O my Lord! have compassion on them, as they brought me up (when I was) little (Al-Isra', The Israelites, Qur'an Chapter 17, Verse 24)

(24 : 17) لهُمَا

Disobedient impious is one of worst sins in Islam:

نفع : _____ :
ألا وقول الزور، وشهادة الوالدين :
الزور، ألا وقول الزور، وشهادة . فما زال يقولها، حتى قلت: لا يسكت (5976)

() (إشراك بالله. وعقوق الوالدين. وشهادة الزور أو قول الزور وكان رسول الله صلى الله عليه وسلم متكئا فجلس. فما زال يكررها ليلته سكت (87)

ينظر اليهم يوم القيامة :
لوالديه :
وثلاثة لا يدخلون الجنة: العاق لوالديه، والديوث، (الألباني في صحيح الترغيب 2511 وحسنه و صححه)

يعجل لصاحبه العقوبة في الدنيا مع ما يدخره له في الآخرة من البغي وقطيعه :
وصححه 4902

And We have enjoined man in respect of his parents-- his mother bears him with faintings upon faintings and his weaning takes two years-- saying: Be grateful to Me and to both your parents; to Me is the eventual coming (Luqman, Qur'an Chapter 31, verse 14).

ووصينا بوالديه حملته أمه وهنا وهن وفصاله عامين ولو الذيك المصير (14 : 31)

When Qur'an recommends Muslims to take care for their parents, it reminds them of the pregnancy and labor fatigue as well as breast-feeding, weaning and continuous care throughout life. Almost all these tasks are accomplished by the mother who merits as much three-fold honoring as the father! The Qur'an verses focus on the mother more than the father. In this respect, an important recommendation is given in these verses to wean after two years of breast-feeding:

And We have enjoined on man doing of good to his parents; with trouble did his mother bear him and with trouble did she bring him forth; and the bearing of him and the weaning of him was thirty months; until when he attains his maturity and reaches forty years, he says: My Lord! grant me that I may give thanks for Thy favor which Thou hast bestowed on me and on my parents, and that I may do good which pleases Thee and do good to me in respect of my offspring; surely I turn to Thee, and surely I am of those who submit (Al-Ahqaf, The Wind-Curved Sandhills, The Dunes, Qur'an Chapter 46, verse 15).

وَوَصَّيْنَا شَهْرًا بِوَالِدَيْهِ حَمَلَتْهُ أُمُّ كُرْهَا وَوَضَعَتْهُ كُرْهَا وَحَمَلَهُ وَفَصَّالَهُ أَرْبَعِينَ ذُرِّيَّتِي إِلَيْكَ الْمُسْلِمِينَ (15 : 46)

Beneficence to parents is an invaluable duty in Islam. What ever done to parents, it compensates but for a tiny part of our debts to our parents and what they gave us voluntarily. A companion of the Prophet carried his mother on his back and performed the tasks of pilgrimage while carrying his mother. He asked Ibn Omar (the great companion of the Prophet), did I compensate my mother, Ibn Omar responded, never, even for just a cry of labor!

هذا رجل جاء بأمه من خراسان إلى مكة وهي على ظهره، وقضى بها
غير ذلك وهي ظهره، هل ترون أبها
هذه؟ هذا قضيت بها المناسك، جزيتها، فسأله وقال له: طلقاتها
ولكن أحسنت وسيببك الله على القليل كثيرا.

كثيرك يا هذا لديه يسير	لأمك حق عليك لو علمت كثير
لها من جواها أنة وزفير	كم ليلة باتت بثقلك تشتكي
منها الفؤاد يطيرُ	ع لا تدري عليها مشقة
وما حجرها إلا لديك سرير	نك الأذى بيمينها
ومن ثديها شربُ لديك نميرُ	فتديك مما تشكيه بنفسها
حناناً وإشفافاً وأنت صغير	عطنتك قوتها
وطال عليك الأمر وهو قصيرُ	فضبعتها لما أسنت جهالة
لأعمى القلب وهو بصيرُ	عقل ويتبع الهوى
فأنت لما تدعوه إليه فقير	في عميم دعائها

God places beneficence to parents, goodness and obeying them just after His worshipping and serving:

And your Lord has commanded that you shall not serve (any) but Him, and goodness to your parents. If either or both of them reach old age with you, say not to them (so much as) “Ugh” nor chide them, and speak to them a generous word * And make yourself submissively gentle to them with compassion, and say: O my Lord! have compassion on them, as they brought me up (when I was) little (Isra, The Night Journey, Children Of Israel, Qur'an Chapter 17: 23-24)

وقضى ربك ألا تعبدوا إلا إياه وبالوالدين إحساناً إما يبلغن عندك الكبر أحدهما أو كلاهما فلا تقل لهما أف ولا تنهرهما وقل لهما قولا كريماً * واخفض لهما جناح الذل من الرحمة إرحمهما ربياني صغيراً (17: 23-24)

In this respect, Muslims are instructed to name children after their biological rather than their adoptive parents. This is highly important as it side steps social (e.g. very close relative marriages...) and legal (e.g. heritage conflicts...) problems based on misleading genealogies.

Allah has not made for any man two hearts in his (one) body: nor has He made your wives whom ye divorce by Zihar your mothers: nor has He made your adopted sons your sons. Such is (only) your (manner of) speech by your mouths. But Allah tells (you) the Truth, and He shows the (right) Way * Proclaim their real parentage (fathers). That will be more equitable in the sight of Allah. And if ye know not their fathers, then (they are) your brethren in the faith, and your clients. And there is no sin for you in the mistakes that ye make unintentionally, but what your hearts purpose (that will be a sin for you). Allah is ever Forgiving, Merciful (Al-Ahzab, The Clans, The Coalition, Qur'an Chapter 33, verses 4- 5).

... أَدْعِيَاءَكُمْ
أَدْعُوهُمْ لِأَبَائِهِمْ هُوَ أَقْسَطُ عِنْدَ اللَّهِ)
فَوَلَّكُمْ بِأَفْوَاهِكُمْ يَقُولُ وَهُوَ يَهْدِي بَيْنَ *
(33: 4-5).

Sex Determination in Qur'an and the Sayings of Prophet Mohammad (PBUH)

Old Hypothesis on the Origin of Fetus

In the ancient times, it was not clear whether males or females were responsible for the determination of sex. Two hypotheses about the origin of creatures including man were prevailing since the ancient times until the middle age. In one hypothesis, it was believed that a miniature child exists in the male semen and just grows in the uterus. In the other, it was hypothesized that a child originates uniquely from the mother's fluids, which just coagulate to form a child upon fertilization. The man and woman's attitudes were inscribed in a beautiful ancient poetry where every partner considers that the other as the only responsible for determining the sex of children:

يأتينا	يظل في البيت الذي يلينا
غضبان ألا نلد البنينا	تالله ما ذلك في أيدينا
زارعينا	نبت ما قد بذروه فينا

The social life however, based abominable practices on false conclusions regarding females that is feeling shameful when begetting girls and horribly, burying them alive!

He hides himself from the people because of the evil of that which is announced to him * Shall he keep it with disgrace or bury it (alive) in the dust? Now surely evil is what they judge (An-Nahl, The Bee, Qur'an Chapter 16 verses 58-59).

حَدُّهُمْ
يُسْرُ بِهِ أَيْمَسْكَهُ هُونٌ يَدْسُهُ
وَجْهَهُ مُسَوِّدًا وَهُوَ كَطِيمٌ * يَنْوَارِي
(59-58: 16) يحكمون)

More often, women (the socially alienated, historically) were considered responsible for the sex of their offspring especially in case of girls (the less desired by parents, traditionally!). A woman begetting just females could have been easily accused, abandoned or divorced!

The Origin of Fetus in Islam and Science

Scientifically, it is well established that both the father and the mother participate by their gametes to compose the first cell of the embryo, the zygote. The Holy Qur'an confirmed that both the male and female play an important role in the creation of the offspring:

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 Al-lah is the one among you most careful (of his duty); surely Allah is Knowing, Aware (Al-Hujurat, the Private Apartments, Qur'an Chapter 49: verse 13)

يَا أَيُّهَا
عَلِيمٌ خَبِيرٌ (49 : 13)

Determination of Offspring's Sex in Islam and Science

Each human cell (except gametes) contains 23 pairs of chromosomes in its nucleus (Diploid cells). Chromosomes are the carriers of hereditary characters, genes. Of these, both chromosomes in each pair are similar (homologous chromosomes) in 22 pairs. It is not so in the 23rd pair which determines the sex of the embryo or fetus. Cells of females have two similar chromosomes (XX) whereas those of males have two different chromosomes (XY). The gametes are called sex or haploid cells and contain half the number of chromosomes (i.e. sperms and ova). The cell division leading to formation of such haploid cells is called meiosis (a halving division). The mother's meiosis gives an X-bearing ovum by default but the father's meiosis gives either an X or a Y bearing chromosome. If the mother's ovum is fertilized with an X bearing gametes coming from the father, then, there will be female, otherwise, there will be a boy. During conception, the female cell (egg) bearing X-chromosome fuses with male cell (sperm) bearing X or Y chromosome.

The father genetically determines the sex of the embryo. Actually, his sex chromosomes X and Y segregate into gametes. Formation of zygote bearing XY chromosomes would result in a male offspring, and that bearing XX chromosomes would result in a female offspring. The limiting factor is therefore, the Y chromosome, more precisely, the SRY (Sex-determining Region Y) gene within the short arm of the chromosome in the placental mammals and marsupials called the therians (Wallis, 2008). This intron-less gene encodes a transcription

factor that is a member of the high mobility group (HMG)-box family of DNA-binding proteins. This protein is the testis determining factor (TDF), also referred to as the SRY protein, which initiates male sex determination. Mutations in this gene give rise to XY females with gonadal dysgenesis, Swyer syndrome (Stoicanescu *et al.*, 2006). Translocation of part of the Y chromosome containing this gene to the X chromosome causes XX male syndrome. Whenever a functional SRY exists, it determines a male. Humans with one Y chromosome and multiple X chromosomes (XXY, XXXY etc.) are usually males. Individuals with a male phenotype and an XX (female) genotype have been observed; these males have the SRY gene in one or both X chromosomes, moved there by chromosomal translocation. (However, these males are infertile). Similarly, there are females with an XXY or XY genotype. These females have no SRY gene in their Y chromosome or the SRY gene exists but is defective or mutated or another mutated gene. Experiments in human cells suggest that the mutations in *CBX2* shut off SRY (Callaway, 2009; Isidor *et al.*, 2009).

During gestation, the cells of the primordial gonad that lie along the urogenital ridge are in a bipotential state, meaning they possess the ability to become either male cells (Sertoli and Leydig cells) or female cells (follicle cells and Theca cells). SRY initiates testis differentiation by activating male-specific transcription factors that allow these bi-potential cells to differentiate and proliferate. SRY accomplishes this by up-regulating SOX9, a transcription factor with a DNA-binding site very similar to SRY's. SOX9 in turn up-regulates fibroblast growth factor 9 (Fgf9), which is necessary for proper Sertoli cell differentiation and possibly will stimulate the production of male hormones. Fgf9 then feeds back and up-regulates SOX9. SOX9 can also up-regulate itself by binding to its own enhancer region. This is known as a feed-forward loop, where a gene product can feed back and increase its own expression. Once proper SOX9 levels are reached, the bi-potential cells of the gonad begin to differentiate into Sertoli cells. Additionally, cells expressing SRY will continue to proliferate to form the primordial testis. Otherwise, the embryo will develop into a female via mechanisms that are not fully understood. While this constitutes the basic series of events, this brief review should be taken with caution since there are many more factors that influence sex differentiation (Moniot *et al.*, 2009; Clarkson and Harley, 2002). The father is considered (in the religious texts and in science as well) an important player in sex determination of the child and from the very beginning of conception. However, we find in the authentic Sayings of the Prophet that Allah, God (The All Mighty) determines to create the sex after 40 (Or 45) nights:

From Hudhayfa in Al-Bukhari and Muslim state:

"The angel is sent to the sperm and ovum drop after it has settled in the uterus for 40 or 45 nights and says, "Lord! Is it to be wretched or happy?" Then this is inscribed. Then he says, "Lord! Is it to be male or female?" Then this is inscribed..." (Muslim: Book 33: Hadith 6392).

حذيفة أسيد
يدخل الملك على النطفة بعدما تستقر في الرحم بأربعين، أو خمسة وأربعين ليلة فيقول يا رب! أشقي أو سعيد؟ فيكتبان فيقول !
فيكتبان ويكتب عمله وأثره وأجله ورزقه ثم تطوى الصحف فلا يزداد فيها ولا ينقص (صحيح مسلم 2644)

The previous Hadith describes a kind of knowing and determination of the sex of the fetus. Reconciling this piece of information with what is known in science (e.g. determination of the sex since the first moment, which is the formation of the zygote) needs more investigation. In Islamic faith, the information about the future of the fetus, like death, deeds, sustenance, livelihood are also in the knowledge of God. It can be hypothesized that the Angel just knows the sex at 40 or 45 nights even though it was determined from the beginning! The Hadith might intend to state the time at which the knowledge is revealed to angel. So, simply and possibly, it does not necessarily mean that sex of fetus is determined at this time. Besides, although the sex genetics of an embryo is determined at fertilization by the kind of sperm that fertilizes the ovum, there is no morphological indication of a sex difference until the seventh week, when the gonads (future ovaries and testicles) begin to acquire sexual characteristics (Moore, 1998) and Hadith might mean the crucial male and female phenotypes that are evident in the second half of week six (around 40 days).

The question, who is (or are) responsible(s) for the *total* determination of the sex? Qur'an seems to talk about creation of the male and female offspring from the father's semen:

And that He created pairs, the male and the female * From a drop (of seed) when it is poured forth (An-Najm, The Star, Qur'an Chapter 53, verses 45-46)

وَأَنَّهُ لَرَوْحَيْنِ * (46:45-53)

One might understand that () is the semen of the father; however, by focusing on another verse, we realize that the meaning of this word is the zygote:

And certainly We created man of an extract of clay * Then We made him a small seed in a firm resting-place * Then We made the seed a clot, then We made the clot a lump of flesh, then We made (in) the lump of flesh bones, then We clothed the bones with flesh, then We caused it to grow into another creation, so blessed be Allah, the best of the creators (al-Mo'minon, The Believers, Qur'an Chapter 23, Verses 12-14)

طِين* مَكِين*

فَتَبَارَكَ اللَّهُ أَحْسَنُ الْخَالِقِينَ* () (14-12:23)

Consequently, as can be understood from Qur'an, both father and mother seem to participate in determining the sex of their children.

Participation of Mother in Sex Determination of Her Child

In the light of the explanation in the previous section concerning the determination of sex notably the role of SRY on the Y chromosome, the question whether the father is the only player in the child's sex determination is not fully answered yet. As we realized at the end of the previous section, it seems that the mother plays also a role beside the father. The internal environment of the vagina for example the level of acidity can play a role as a sorting office of X-bearing gametes or Y-bearing gametes. Such factors must also be appropriate for the following genetic and biochemical pathway leading to the formation of testicle or ovaries. This needs further investigations to reveals the effect of the internal maternal environment on this cascade.

If the acidic environment characteristic of the woman's vaginal and uterine liquids dominates the basic environment characteristic of the man's seminal liquid, the baby would be a girl. On the contrary, a boy would be more probable (if the basic environment of the male's semen dominates the acidic environment of the female's environment like the vaginal fluids). Actually, the normal pH of vaginal fluid is between 3.8 and 4.5 (Moses, 2000; anonymous 1) whereas the pH of the male semen is typically basic, between 7.2 and 8.0 (anonymous 2). It seems, therefore, that the acidic environment of the internal environment (vagina, uterus...) of the woman enhances conception of girls in contrast to the basic environment of male, which enhances conception of boys. This needs more thorough investigation and in case of validation, again, it is extra evidence that women also share along with men the determination of the sex of baby.

The authentic Sayings of the Prophet, Mohammad (PBUH), dictate that both male and female play a role in the determination of the sex of the offspring. If the male environment (e.g. basic) dominates over the female environment (e.g. acidic), there will be a boy and vice versa:

عن أم سليم أنها سألت نبي الله ﷺ عن المرأة ترى في منامها يرى المرأة فلتغتسل فقالت أم سليم واستحييت من ذلك قالت وهل يكون هذا؟ نعم فمن أين يكون الشبه غليظ أبيض رقيق أبيهما أو سيق، يكون منه الشبه (صحيح مسلم رقم 311)

أخبار اليهود فقال السلام عليك يا فدفعته يصرع منها، يا اليهودي إنما ندعوه باسمه الذي سمّاه به أهله، فقال رسول الله ﷺ إن اسمي محمد الذي سمّاني به أهلي فقال اليهودي جنت أسالك، فقال له أينفعك معه

اليهودي أين يكون الناس يوم تبدّل الأرض غير الأرض والسموات؟ قال فمن أول الناس إجازة؟ قال فقراء المهاجرين قال اليهودي فما تحفّتهم حين يدخلون زيادة غداؤهم إثرها؟ ينحروهم يأكل من أطرافها. شرابهم عليه؟ قال من عين فيها تسمى سلسبيلًا. جنت أسالك عن شيء لا يعلمه أحد من أهل الأرض إلا نبي أو رجلان. قال ينفعك إن ماء الرجل أبيض و ماء المرأة

اليهود عليك يا محمد، فدفعته فدعة كاد يصرع منها، فقال تقول يا رسول الله! فقال اليهودي إنما ندعوه باسمه الذي سمّاه به أهله، فقال رسول الله ﷺ سمّاني به أهلي فقال اليهودي فقال له رسول الله أينفعك شيء إن حدثت؟ قال معه

اليهودي أين يكون الناس يوم تبدّل الأرض غير الأرض؟ قال فقراء المهاجرين قال اليهودي فما تحفّتهم حين يدخلون زيادة غداؤهم على إثرها؟ ينحروهم يأكل أطرافها. شرابهم عليه؟ عين فيها سلسبيلًا. و جنت أسالك عن شيء لا يعلمه أحد من أهل الأرض إلا نبي أو رجلان. قال ينفعك إن ماء الرجل أبيض

قال اليهودي لقد صدقت وإنك لنبى. فذهب، هذا عن الذي سألتني عنه و مالي علم بشيء منه حتى أتاني الله به (صحيح مسلم في كتاب الحيض 315)

It seems strongly that women effectively have a role in the sex determinations of their babies. In a study conducted on 740 women who first-time mothers, fifty-six percent of the women in the group with the highest energy intake had sons, compared to 45 per cent in the least well fed cohort.

Besides, the group of women who produced more males were also more likely to have eaten a wider range of nutrients, including potassium, calcium and vitamins C, E and B12 and astonishingly at least one bowl of cereal breakfast daily compared with those who ate less than or equal to one bowl a week! These surprising findings are consistent with a very gradual shift in favor of girls over the last four decades in the sex ratio of newborns. Actually, there is a reduction in the average energy uptake in advanced economies since the mid-1900s. The number of adults who skip breakfast has also increased substantially. While the mechanism is not yet understood, it is known from *in vitro* fertilization (IVF) research that higher levels of glucose, or sugar, encourage the growth and development of male embryos while inhibiting female embryos (Mathews, 2008). Therefore, the Sayings of Prophet Mohammad (PBUH) predates these findings with some 14 centuries; mothers "have their word to say" in the determinations of their offspring's sex!

This concept is reported also in other Sayings of the Prophet, where it is clear that the determination of the sex is a matter of competition of the father's seminal and the mother vaginal and uterine fluids:

عن أم سليم أنها سألت نبي الله ﷺ عن المرأة ترى في منامها يرى المرأة فلتغتسل فقالت أم سليم واستحييت من ذلك قالت وهل يكون هذا؟ نعم فمن أين يكون الشبه غليظ أبيض رقيق أبيهما أو سيق، يكون منه الشبه (صحيح مسلم رقم 311)

وأما أول ما يأكل أهل الجنة فزيادة كبد الحوت؛ وأما شبه الولد أباه وأمه؛ فإذا سبق ماء الرجل ماء المرأة نزع إليه الولد، وإذا سبق ماء المرأة ماء الرجل نزع إليها (الألباني وصححه في صحيح الجامع رقم 1349)

اليهود عليك يا محمد، فدفعته فدعة كاد يصرع منها، فقال تقول يا رسول الله! فقال اليهودي إنما ندعوه باسمه الذي سمّاه به أهله، فقال رسول الله ﷺ سمّاني به أهلي فقال اليهودي فقال له رسول الله أينفعك شيء إن حدثت؟ قال معه

اليهودي أين يكون الناس يوم تبدّل الأرض غير الأرض؟ قال فقراء المهاجرين قال اليهودي فما تحفّتهم حين يدخلون زيادة غداؤهم على إثرها؟ ينحروهم يأكل أطرافها. شرابهم عليه؟ عين فيها سلسبيلًا. و جنت أسالك عن شيء لا يعلمه أحد من أهل الأرض إلا نبي أو رجلان. قال ينفعك إن ماء الرجل أبيض

اليهودي لقد صدقت وإنك لنبى. فذهب، هذا عن الذي سألتني عنه و مالي علم بشيء منه حتى أتاني الله به (صحيح مسلم في كتاب الحيض 315)

اليهود	بين جبريل	أته	الشبهه
	ذهب بالشبهه		
		يحشر	ذهبت بالشبهه
اللهم	أشهد	ياكله أهل الجنة	
	بإيماني بك بهتوني	بهت وإنهم	يا
	سيدنا سيدنا، وعالمنا		إلهم وسلمهم
	!	الله أرايتم	وخيرنا خيرنا،
يفعل	!	يا	ليفعل
أخبرك يا	وجاهلنا جاهلنا،	هو	
	رسول الله أنهم قوم بهت؟! (الآلثاني وصححه في صحيح ا		
	(1908		

Another hypothesis can be postulated concerning the interpretation of the previous Hadith. In case the fluid of man dominates the fluid of the women.

Y chromosome (characteristic of male) fertilizes the ovum and there will be a boy. In the contrary case, when the fluid of woman dominates (), it is the gamete carrying X (characteristic of female) that will fertilize and there will be a girl. This hypothesis, however, does not exclude the influence of environmental factors (e.g. pH...) on the sex of offspring.

Nevertheless, an old study conducted on rabbits failed to establish a clear correlation between the pH of the seminal fluid and the sex determination of offspring (Muehleis and Long, 1976). Further investigations on this issue are needed to rule on.

As *both* parents participate in determining the sex of children, Qur'an degrades the abominable attitude of girls begetting prevailing and still -to some extent- in the Arabic and generally in the less developed countries. Actually, girls begetting was considered a shame to be hidden and sometimes lead to horribly burying them alive!

He hides himself from the people because of the evil of that which is announced to him * Shall he keep it with disgrace or bury it (alive) in the dust? Now surely evil is what they judge (An-Nahl, The Bee, Qur'an Chapter 16 verses 58-59).

أَحَدُهُمْ وَجْهَهُ دَا وَهُوَ كَظِيمٌ * يَتَّوَارَى
ر به أيمسكه هون يدسه يحكمون (59:58-16)

In this respect, it should be notified that the scientific evidences and texts especially from Holy Qur'an and authentic Saying of the Prophet (PBUH) should be considered collectively in order to avoid misconceptions. The issue of determination of the sex of offspring is demonstrative. We saw that in the light of some scientific evidences (an X is taken by default from the mother and it is the father's sex chromosome that determines the sex, Y for a boy and X for a girl) and religious texts, the father determines the sex of the child, in the light of other texts, the father and mother compete to

EXTRA-NUCLEAR GENETICS, SEX CHROMOSOMES, SEX DETERMINATION AND THEIR APPLICATIONS IN HOLY QUR'AN AND THE HONORABLE HADITH (SAYINGS OF PROPHET MOHAMMAD (PBUH))

determine the sex of their child. Taking the whole texts altogether demonstrates that both the father and mother have a role; the father gives genetically the male or the female gamete, the mother, however, sorts by its internal environment (pH, nutrition...) male and female gametes and favors one over the other depending on parameters of the internal environment to be investigated furthermore. In conclusion, it seems evidently that both the father and the mother play a role in the determination of the sex of their children.

Conclusions and Perspectives

In this paper, convincing links between different aspects and concepts in Holy Qur'an and Honorable Hadith are made with the scientific discoveries in the field of genetics (extra-nuclear genetics, sex chromosomes and sex determination). Such links in genetics and other domains of sciences should be the focus of both religion scholars and scientists.

As also in your own selves: Will ye not then see? (Athariyat, The Winnowing Winds, Qur'an Chapter 51, Verse 21)

الذاريات (51 : 21)

Religion provides a divine source of knowledge. It is interesting to look for science in religion and it must be equally interesting to base scientific research on authentic religious texts (e.g. Holy Qur'an and authentic Sayings of the Prophet, Sahih). Some further investigations in this respect can be followed up as for example more details on the sex determination of the human offspring and the mother's internal environment influencing the sex of children.

It is worthy to notice here that the holy texts should be considered collectively in an integrated procedure. We should not take scientific evidence and project it on just one text without considering the other texts. Actually, the determination of sex fall in this misleading manner. For long time and still many, think that only the father determines the sex of the human offspring. They based that on the scientific evidence that maleness-determining chromosome comes exclusively from the father. They conjugated this piece of scientific evidence with partial texts like:

And that He created pairs, the male and the female * From the small seed when it is adapted (An-Najm, The Star, Qur'an Chapter 53, Verses 45-46)

وَأَنَّهُ الرُّوحَيْنِ * (46-45 : 53)

Where the word () was interpreted as the male semen. Nevertheless when another text is examined, we realize that this word means the zygote rather than the male semen. It is this (), that differentiates into the organs and systems of the organism (The human embryo) as depicted from the following verse:

And certainly We created man of an extract of clay * Then We made him a small seed in a firm resting-place * Then We made the seed a clot, then We made the clot a lump of flesh, then We made (in) the lump of flesh bones, then We clothed the bones with flesh, then We caused it to grow into another creation, so blessed be Allah, the best of the creators (al-Mo'minon, The Believers, Qur'an Chapter 23, Verses 12-14)

طِين* مَكِين*

الله أَحْسَنُ الْخَالِقِينَ* (14-12:23)

Other texts explain that it is a matter of competition between the reproductive fluids of both father and mother that determines the sex of the child:

عن أم سليم أنها سألت نبي ﷺ عن المرأة ترى في منامها يرى

المرأة فلتغتسل فقالت أم سليم واستحييت من ذلك قالت وهل يكون هذا؟

أيهما أو سبق، يكون منه الشبيه (صحيح مسلم رقم 311)

وأما أول ما يأكل أهل الجنة فزيادة كبد الحوت؛ وأما شبيه الولد أباه

وأمه إليها (وصححه صحيح الجامع رقم 1349)

:

اليهود فقال السلام عليك يا فدفعته يصرع منها،

يا ! اليهودي إنما ندعوه باسمه الذي سُمَّاه به أهله، فقال رسول الله

إن اسمي محمد الذي سُمَّاني به أهلي فقال اليهودي جئت أسألك، فقال له

أينفعك اليهودي أين يكون الناس يوم تُبَدَّلُ الأرض غير الأرض والسموات؟

هم جازة؟ قال فقراء المهاجرين قال اليهودي فما

تحفتهم حين يدخلون زيادة غداؤهم إثرها؟ ينحروهم

يأكل من أطرافها. قال فما شربهم عليه؟ قال من عين فيها تُسمى سلسبيلا.

يعلمه أحد من أهل الأرض إلا نبي أو رجل أو رجلان.

قال ينفعك إن حدثتك؟ : ماء الرجل أبيض و

قال اليهودي لقد صدقت وإنك لنبي. فذهب،

هذا عن الذي سألني عنه و مالي علم بشيء منه حتى أتاني الله به (صحيح

مسلم في كتاب الحيض 315)

Briefly, taking texts collectively lead to concluding that the father determines genetically the sex of the child while the environmental conditions including the internal environment of the mother and her nutrition play a role in sorting the gametes coming from the father (maleness gametes or those that carry Y chromosome from femaleness gametes or those that carry X chromosome). The internal parameters of the mother that play a role in sorting the male and female gametes need further investigations (e.g. pH, nutrition...).

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References in Arabic

القرآن الكريم.

1994.

صحيح . أقرأها

1998.

الترمذي، أبو عيسى محمد بن عيسى بن سد

. المستدرك على الصحيحين. المكتبة الأزهرية ()

. تحقيق هيثم تميم.

والتوزيع، 2001.

شعيب

العلمية، بيروت الطبعة الأولى، 1991.

1995 . صحيح زكريا.

موقع الشبكة العنكبوتية: الدرر السننية (مرجع علمي موثق للأحاديث النبوية على منهج أهل السنة والجماعة)

<http://www.dorar.net/enc/hadith>

—REFERENCES IN ENGLISH—

- Anonymous 1: Device and Method for Identifying and Treating Vaginal Affections". http://www.freshpatents.com/Device-and-method-for-identifying-and-treating_vaginal-affections-dt20070920p-tan20070218132.php. Retrieved 2007-10-18.
- Anonymous 2: SEMEN ANALYSIS http://www.uhmc.sunysb.edu/urology/male_infertility/SEMEN_ANALYSIS.html. Retrieved 2007-10-18.
- Birky, C. W. (1994). Relaxed and Stringent Genomes: Why Cytoplasmic Genes Don't Obey Mendel's Laws. *J. Hered.* 85 (5) 355-365.
- Callaway, E. (2009). Girl with Y chromosome sheds light on maleness. *NewScientist* 2704.
- Clarkson, M. J., Harley, V. R. (2002). Sex with two SOX on: SRY and SOX9 in testis development. *Trends in Endocrinology and Metabolism*, Volume 13, Issue 3: 106-111.
- Glanze, W. (Ed.). (1996). The signet Mosby medical encyclopedia (revised edition). New York: Penguin Books Ltd.
- Isidor, B., Capito, C., Paris, F., Baron, S., Corradini, N., Cabaret, B., Leclair, M. D., Giraud, M., Martin-Coignard, D., David, A., Sultan, C., Le Caignec, C. (2009). Familial frameshift SRY mutation inherited from a mosaic father with testicular dysgenesis syndrome. *J Clin Endocrinol Metab.* Sep; 94 (9): 3467-71.
- Mathews, F. (2008). *Proceedings of the Royal Society B*, vol 275: pp 1661-68.
- Moniot, B., Declosmenil, F., Barrionuevo, F., Scherer, G., Aritake, K., Maliki, S., Marzi, L., Cohen-Solal, A., Georg, I., Klattig, J., Englert, C., Kim, Y., Capel, B., Eguchi, N., Urade, Y., Boizet-Bonhoure, B., Poulat, F. (2009). The PGD2 pathway, independently of FGF9, amplifies SOX9 activity in Sertoli cells during male sexual differentiation. *Development* 136 (11):1813-21.
- Moore, K. L. (1998). *The Developing Human*, 6th edition (Saunders). Moses, S. (2000). Vaginal Fluid pH. Family Practice Notebook, LLC. <http://www.fpnotebook.com/GYN78.htm>. Retrieved 2007-02-04.
- Muehleis, P. M., Long, S. Y. (1976). The effects of altering the pH of seminal fluid on the sex ratio of rabbit offspring *Fertil Steril* 27(12):1438-45.
- Stoicanescu, D., Belengeanu, V., Amzar, D., Popa, C., Hrubaru, N., Rosianu, A. (2006). Complete Gonadal Dysgenesis With XY Chromosomal Constitution. *Acta Endocrinologica (Buc)* 2 (4): 465-70.
- Wallis, M. C., Waters, P. D., Graves, J. A. (2008). Sex determination in mammals - Before and after the evolution of SRY. *Cell. Mol. Life Sci.* 65: 3182.

