

Human Development As Revealed in the Holy Quran an Hadith

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Reproduction:

All living creatures have a limited life span. The mechanism by which God had endowed these creatures to remain on earth, is by reproduction, in which new generations of the same species are produced.

The presence of the two sexes may be occult or manifest, they may be separate in two individuals or combined in one.

In most multicellular organisms, the sexes are separate in two distinct individuals, the male and the female.

The sex cells are called gametes, the male sex cells are the spermatozoa, the female sex cell is the ovum (egg). The organs which produce the gametes are called the gonads. The male gonads are the testes, the female gonads are the ovaries. The unified cell resulting from the union of the male spermatozoon and the female ovum is called the zygote. The process of union is called fertilization. The zygote contains half its content from the mother i.e the ovum, and the other half from the father

i.e. the spermatozoon (sperm). Thus the new individual inherits many of its characteristics from both its parents and their ancestors.

There is an interplay between the hereditary factors and the environmental factors, which complicates the matter further. In itself the hereditary factors are not simple. Some of the characteristics are dominant and some are recessive. In dominant characteristics only one gene either from the father or mother, if present, is sufficient to show in the new born, while in recessive characteristics, only when genes from both the mother and father are donated to the offspring that it may appear or become expressed.

It is quite astonishing to find the Quran and sayings (Hadith) of the prophet Mohammad have discussed the subject of reproduction and Genetics.

Here we will mention a few of the verses that mention parity and reproduction .

Sura 51/Verse 49

"And of everything we have created pairs, that you may consider thought fully."

Sura 36/36

"Glory to God who created in pairs all things that the earth produces, and in human kind, and other things of which they have no knowledge".

Sura 53/45

"And He created both male and female from a drop of liquid that has been ejaculated."

Sura 75/39

"And He out of that semen made both sexes the male and the female."

Sura 43/12

"He created pairs in all things."

Sura 30/21

"And among his signs, He created for you mates from among yourselves that you may dwell in tranquility with them. And he put love and mercy between your hearts. Verily in that are signs for those who reflect."

The human being is formed by the union of both male gamete (sperm) and female gamete (ovum), forming a union-cell called zygote. The zygote is the Quranic Nufatulamshag, which forms from the mingling and mixing of the male Nutfah and female Nutfah.

The prophet Mohammad told a Jew that man is created from both the male Nutfah (sperm) and the female Nutfah (ovum).

He also spoke of the genetic factors and told a Arab that once the Nutfah is inside the womb (Uterus) God brings forth its genetic relation with its ancestors up to Adam. He told another Beduin Arab who complained that his wife delivered a black boy while neither of the parents was black, that the boy could have inherited this color from his ancestors.

Many such extraordinary revelations are found in the Holy Quran and the Prophet Mohammad's (Peace be upon him) sayings (Hadith).

The formation of male and female gamete (Nutfah).

The male Nutfa (sperm) is formed in the testes.

God says: "Was he (viz. man) not a mere sperm out of semen ejaculated. Thereafter he became a leech like clinging object, which He created and gave its form and shape. And He out of that semen, made both sexes the male and the female. Is it not He then, able to bring the dead back to life."

Sura 75/37-40

The sperms constitute 1/2 to 1 per cent of the whole seminal fluid ejaculated by the male. Nevertheless it contains an average of 200-300 million sperms. Only one of these millions succeeds in fertilizing the ovum (egg) of the female. The testes secrete daily 100 million sperms.

On the other hand the ovary of the unborn female infant contains more than 400,000 eggs. The majority die even before the child is born. Only 30,000 eggs are found at the time of birth. By the time the girl reaches puberty thousands of these eggs will die. Only one egg matures monthly, and no more than 400 eggs are produced through the whole life span.

Nevertheless, only few eggs are fertilized, and even few of these fertilized eggs are allowed to grow into babies. The majority of the

fertilized eggs are aborted, even before the mother knows that she is pregnant.

These astonishing facts were only known very recently (in the seventies of the twentieth century). The holy Quran 14 centuries ago says. "God made man's progeny from a quintessence of despised liquid." Sura 32/8. In another Sura (75/37) He says: "Was he (i. e man) not a mere sperm out of semen that has been ejaculated."

The Prophet Mohammad (Peace Be upon him) said: " Not from the whole fluid (ejaculated), man is created," but only from small portion of it.

When asked by a Jew from what thing man is created, He answered: "O Jew from both male Nutfah (sperm) and female Nutfah (egg) man is created."

The characteristics of the female ovum are completely different from those of the male sperm. The ovum is a beautiful ,receptive moon like cell which moves very little and resembles a queen wearing her radiating crown (Corona radiata) while the male sperm is small, active, agile , resembles a rocket, faces dangers and is aggressive, which either reaches its goal or dies. In short the sperm is positive and dominating while the female ovum is negative and receptive.

Sura 76/ Verse 2 reads as follows:

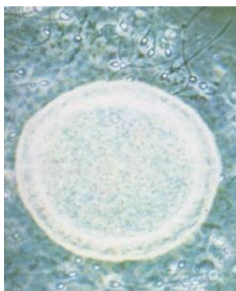
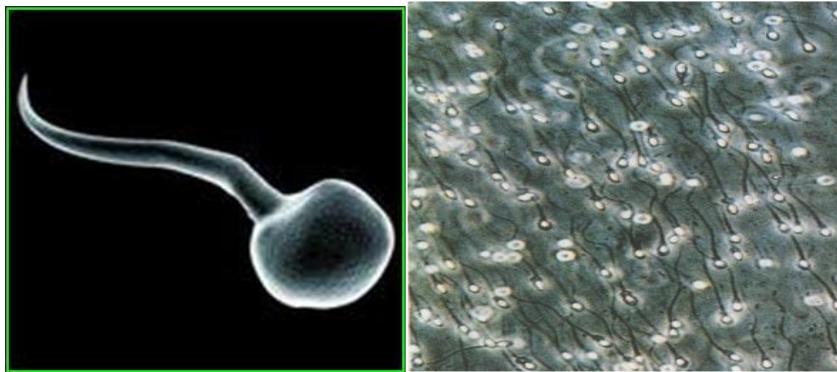
"Verily , we have created man from a drop of mingled liquids of both male and the female". The so called Nutfatul amshag is the resultant of the mixing and mingling of the male Nutfah (sperm) and female Nutfah (ovum).

The ovum is surrounded by hundreds of sperms.

Only a few of the hundreds of millions of sperms do reach the ovum after a very dangerous and hazardous journey . The ovum (egg) looks like a full moon surrounded by the corona radiata (the radiating crown). It moves very little in contrast to the active and agile sperms. Its size is 120 microns (0.12 mm), i. e. it is the biggest cell in the human body, while the head of the sperm measures only 5 to 6 microns.

Single sperm

sperms in seminal fluid



The ovum surrounded by sperms before fertilization



the ovum coming out of the ovary.

Fertilisation

The ovum remains in the Fallopian tube up to 12 hours. If it is not fertilized by a sperm, it will die and be extruded.

The sperm and ovum are both capacitated in the fallopian tube i.e. they acquire the ability for fertilization.

About 400 sperms reach the ovum, but only one of them is chosen by God, to fertilize it.

The factors which make one sperm succeed while the others fail are not yet known.

Once the sperm unites with the ovum and discharges its genetic material stored in its head, the ovum builds a thick wall that will not allow further sperms to penetrate.

It is clear that one sperm out of millions and probably billions is chosen for the fertilization of the ovum.

Similarly one egg is chosen to mature out of thousands that will eventually die monthly in every cycle.

Only a few hundred reach the end of the Fallopian tube. The smallest cells of the body (the sperms) meet the largest cell (the ovum).

The ovum begins to roll slowly like a planet out in space in counter clockwise rotation, the same as that of the electrons around the nucleus of the atom or the earth around the sun.

It is interesting to know that Muslims making Tawaf (worship in Ka'aba at Makkah) go in swirls in counter clockwise fashion. It seems, as if the ovum, just before it is fertilized, goes into the same swirling counter clockwise fashion, like Tawaf.

Sura 17/44:

"The seven Heavens, the earth , and whatever they contain, extol His limitless glory, but you men fail to understand their way in glorifying Him."

Sura 36/40 :

"All (things) float in their orbit".

The chosen surviving sperm then penetrates the ovum, and delivers its genetic material to the ovum. This is the moment of conception. The main results of fertilization are.

- 1- Restoration of the diploid number of Chromosomes (i.e. the zygote containing 46 chromosomes).
- 2- Determination of the sex of the new individual. An X-carrying sperm will produce, by God's will, a female, while a Y-carrying sperm a male embryo.
- 3- Initiation of cleavage or cell division of the zygote.

Brief look into the History of Embryology:

In order to evaluate the Embryological data in the Holy Quran, we have first to look into the human knowledge of this subject at the time when the Holy Quran was revealed to Mohammad (Peace be upon him) 14 centuries ago, down to our time.

Aristotle (384-322 B.C.) wrote the first known treatise on embryology, in which he described the development of the chick and other embryos.

At this time there were already two theories concerning the development of embryos. Vis:

- a. Preformed in the male semen, or the female secretion in which they exist as miniature creatures which tend to grow inside the womb.
- b. Actual formation and creation from the menstrual blood.

Aristotle took sides with the second theory. The role of a male's semen in reproduction was limited to the role of a catalyst in which the menstrual blood coagulated. He actually said that it resembles the curdling of milk into cheese.

So great was the effect of Aristotle that nobody dared to challenge his views for many centuries. Redi in 1668 dealt a blow to this theory, and Pasteur 1864 wrote the final obituary to the doctrine of Spontaneous generation.

However the Holy Quran and the prophet Mohammad (Peace be upon him) challenged Aristotle, exactly 1100 years before Redi dared to put forward his theory.

In sura 76 Verse 2 the Quran says:

"Verily we have created man from a drop of mingled liquids" (of both male and the female).

The prophet was asked by a Jew. O Mohammad , tell me from what thing man is created. He replied. O. Jew Man is created from both the fluids of male and female.

Ibn Abbas , the cousin of the Prophet, when asked to explain the above verse (Sura 76/2). Said. The word Nutfatul Amshaq is the fluid of male and female intermingled and then it passes into many evolutionary stages (Tafsir Ibn Garir, Tafsir Ibn Kathir).

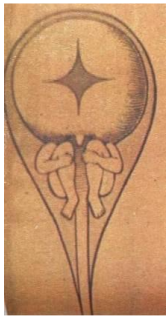
Ibn Hajar Al Asqalani who lived in the 14th century says many of the anatomists claim that semen of the male has no role in creation of the baby. It's role, they claim, is limited to curdling the menstrual blood from which man is born. The sayings of the prophet denies what they say. The semen of the male actually participates equally to that of female in formation of the embryo.

We find the same discussion brought forward by Ibn Al Qaim who lived in the 13th century.

Galen (the 2nd century A.D.) was probably the first man to write a book on the subject of embryology. His book was titled . "On the formation of the fetus". Nevertheless he stuck to Aristotle's view (just explained).

In the middle ages the Holy Quran and prophet Mohammad (Peace be upon him) (570-632 A.D.) revealed many astonishing facts about the creation of man, especially in the field of embryology.

Until the 18th century it was generally believed that a fully formed animal exists in miniature in the egg needing only the stimulus of the sperm to initiate growth and unfolding , or that similarly pre-formed organism , male and female, constitute the sperms and these merely enlarge when they get inside the womb.



Human sperm containing a miniature human being, drawn by Hartsoecker (1694), Paris, from "essay de Dioptrique", illustrating the pre-formation doctrine that prevailed during the 17th century

The original pre-formation theory was virtually destroyed by Wolff (1759-69) who described globules (cells) in the egg from which the embryo was built gradually, step by step , starting from the shapeless globules to the more complex human embryo. This phenomenon was called epigenesis.

Many years elapsed before Wolff's views were accepted. The final blow to the original pre-formation doctrine was dealt by Driesch (1900) who separated daughter cells of a fertilized egg and allowed them to grow into complete embryos.

Pander in 1817 demonstrated the three primary germ layers in the chick embryo. Von Bear (1829 – 37) broadened this concept to all animals, and identified the human egg (150 years after Leeuwenhoek first discovered the human sperm). Von Baer was called the Father of modern Embryology.

Cleavage. i.e. subdivision of the egg into building units of the embryo, was first described by Prevost and Dumas in 1824. However, its true meaning was not understood until Schwann and Schleiden (1839) put forward the doctrine of cells as being the biological units from which the whole body of animal or plant is built. Twenty years later the eggs and sperms were recognized as cells.

Hertwig in 1875 was the first to describe scientifically the fertilization of an egg by a sperm.

Von Benden 1883 proved that male and female cells equally to the embryo.

It is quite astonishing to find that the Holy Quran and the prophet Mohammad (570-632) (Peace be upon him) has stated emphatically that:

1- Both male and female contribute equally to the formation of human embryo.

2- That the human embryo is not preformed but is created in stages.

Sura 71, Verse 13-14:"What is amiss with you that you cannot look forward to God's majesty. He has created (every one of) you in successive stages."

Sura 23/ 12-14:" We created man from the quintessence of mud.

Thereafter we cause him to remain as a drop of sperm in a firm lodging (i.e. the womb). Thereafter we fashioned the sperm into a clinging substance(Alakah),then a chewed like lump. (Modgha). The chewed like lump is fashioned into bones which are then covered with flesh. Then we nurse him unto another act of creation. Blessed is God, the best of artisans".

These stages are:

1- Nutfa

2- Alaqa.

3- Modgha.

The Nutfa:

The Nutfa literally means a drop of fluid . In the Quran and Hadith (Saying of the Prophet Mohammad. Peace be upon him) it is used in three different but interwoven connotations:

1- The male Nutfah (the male gamete).

- 2- The female Nutfah (the female gamete).
- 3- The intermingled and mixed nutfatul Amshag which is made of the complete mixing and mingling of the male with the female.

Van Benden in 1883 proved that both male female participated equally in the formation of the human zygote.

Prior to the discovery of Hertwig and Boveri, there were hot discussions between those who claim that the whole embryo is made from the ova, the ovist, and those who claim that it is wholly made from the male sperm.

In fact they believed that the embryo is already pre-formed either in the female's egg (ovum) or in the male sperm.

The Quran and the Hadith have clearly revealed these unknown facts, long before they became discovered by the scientists of the 19th century. The Quranic verses stand out as a remarkable revelation never known to humans before the 19th century.

Role of Genes (Hereditary Factors):

Sura 80/17-19: "Does man ever consider out of what substance God created him? Out of a drop of fluid (Nutfah) He created him, in which he determined his nature". Lesline Arey in Developmental Anatomy states the following: "The present view on these matters is that development is

strictly preformational as regards the genes and their hereditary influences, but vigorously epigenetic in actual constructional activities". All the authorities of Embryology agree to this fact, Hamilton, Boyd and Mossman, Jan Langman, Bradley Patten.

A Bedouin Arab told the prophet that his wife has delivered a black boy while he and his wife were not black. He wanted to deny the child. The Prophet asked him: "Have you got camels? The man said :yes, I do .The prophet asked what is their color? He said reddish yellow, and the prophet asked: is there any blackish one in them? And the man agreed. The prophet then asked the man: How does it acquire this color? The man said: It must have been inherited somehow? The Prophet said: Then your child might have inherited this blackish color from ancestors.

That man is determined (a better word than preformed which is used by the embryologist of today) at the level of Nutfa (male and female gametes) and then developed into subsequent stages (i.e. epigenesis), is only understood recently by modern embryologists:

The Holy Quran and Hadith of the prophet had already revealed these facts 14 centuries ago.

Alakah (Alaqa)

The Arabic word Alakah literally means something that clings or attaches to something else. The word also means a leech. The medicinal leech has

been notorious for its clinging property to the skin whereby it sucks blood, a phenomenon that was often used in medicine as remedy (blood letting). It also has a meaning seldom used in Arabic and that is a clot or congealed blood.

The word Alakah was mentioned in the Holy Quran five times. These are in Sura 22 verse 5, Sura 75/36-40, Sura 40/67 and Sura 96/67 and Sura 96/1-3.

As soon as fertilization has been accomplished by the sperm, the fertilized ovum goes into successive divisions forming smaller cells called blastomeres. On the third day 12-16 such cells are formed in a mulberry like fashion and hence the name morula, which grows and becomes filled with fluid from the inside forming a ball. The ball like structure is called blastula and the cavity filled with fluid is called the blastococele. The blastula is only 0.1 mm in diameter.

As the fertilization usually occurs in the outer third of the uterine tube, there must be some means of propulsion to carry the fertilized ovum into the uterus. The morula and blastula has no means of propulsion. It is passive ball like structure which is gently moved by the cilia of the uterine tube itself.

That is why when the cilia are damaged by inflammation it ends in sterility.

The blastula reaches the uterus in 4 to 5 days and lies free in the uterine secretions for further 2 days before it clings and gets implanted into the uterine wall (usually the upper third of the posterior wall as it is the most suitable part for implantation).

It is amazing to find Ibn Hajar Al Asqalani in his highly esteemed book Fatah Albary Sharah Sahih Albokhari, saying when the semen enters the womb, it remains for 6 days before it is supported by the womb.

He also quotes Ibn AlQaim (13th century) saying when the semen enters the womb it forms a ball like structure which remains for 6 days before it attaches itself to the womb. These feats were not known except in recent times.

Implantation or formation of the Alakah (Alaqa):

The blastocyst's outer layer cells attach themselves to the endometrial epithelium (inner most layer of the uterus) by hair like projections which inter-digitate with similar projections from the endometrial epithelial layer.

As soon as this hinging and clinging occur, the trophoblast (outer layer of the blastula) proliferates and forms a mass of cells that interdigitate and lose its cell boundaries (called Syncytiotrophoblast). These finger like processes invade the endometrial epithelium and endometrial stroma. By the end of the first week, the blastocyst is superficially implanted in the compact layer of the endometrium (inner layer of womb).

This process of clinging, attachment and implantation is expressed in the Quran by one elegant word Alakah 14 centuries ago, long before any man has known anything about this amazing process.

The finger like processes of the Syncytiotrophoblast invading the endometrium soon become surrounded by lacunae (small lakes) of blood. The nutrient material seeps through these lacunae into growing embryo. The endometrium under the effect of progesterone secreted by the corpus luteum (now corpus gravidarum), grows remarkably, its glands become more tortuous and its cells more abundant.

There are about 15.000 uterine glands which secrete liquid called Uterine milk that nourishes the fastly growing blastocyst.

An amazing phenomenon is occurring here. A new organism is growing inside the uterus, half of it is completely foreign to the body and yet not rejected. How the immune defense system of the body is muted is not known.

The implantation process of the blastocyst into endometrium takes 5 days i.e. from the 7th to the 12th day and we quote Keith Moore in his book "the Developing Human" saying: "the implantation of the blastocyst is the main characteristic of this stage . Hertig in 1968 described the syncytiotrophoblast as invasive, ingestive and digestive.

At the 10th day from fertilization , the blastocyst is completely embedded in the uterine edometrium , the defect in the surface is plugged by blood

clot and cellular debris. By the 12th day this plug is replaced by regenerating epithelium and minute elevation on the endometrial surface is noted.

It is very impressive indeed to find the holy Quran describing this phenomenon which is only very recently discovered.

Sura 1318:"God knows what any female bears in her womb. And by how much the wombs may decrease and by how much they may increase. For Him everything is created in due proportion."

The word Taghiz has two meanings literally. One is to decrease, the other is to hide or disappear.

The second meaning will be considered here i.e. hide or disappear. The blastocyst tends to completely hide or disappear in the 10th day after fertilization, and not until the 12th day that a tiny elevation is seen on the surface of the endometrium.

This is exactly what has been described in the Quranic word Tagheez where the alakah disappears inside the womb.

The syncytiotrophoblast forms digital like processes called the villi which arborate like a tree. Soon it covers the whole ball .

The chorionic villi which are solid at first become invaded by a core of loose connective tissue, thus converting the primary villi into secondary villi at the 15th day. Soon blood vessels form inside these secondary villi appear, thus converting them into tertiary villi (15th – 20th day).

Thus we see another type of anchoring and hinging of the embryo to the womb. Still there is no better descriptive term than Alakah.

As the embryo proper forms from the inner cell mass we see the third type of attachment or hanging between the embryo and the uterus.

The connecting stalk forms at the caudal end of the embryo. It connects the embryo proper and its coverings, the amnion and yolk sac to the outer wall of the blastocyst.

To sum up – we find from the 7th to 21st day three consecutive processes in which clinging is the most dominant feature.

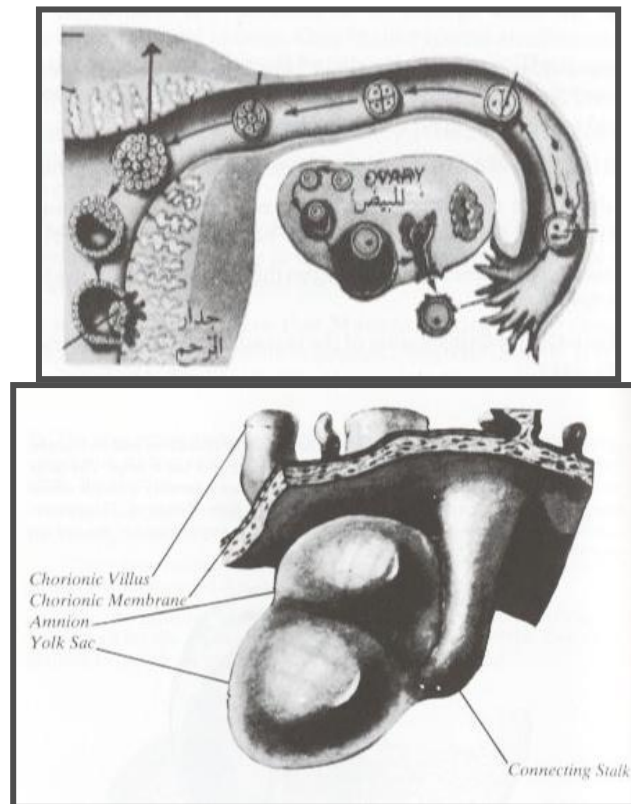
- 1- From day 7, implantation of the blastocyst occurs. It becomes completely embedded by the 10th day.
- 2- The chorionic villi appear for the first time by day 13 and 14, and soon cover the whole blastocyst attaching the ball like structure to the uterus (womb) by the anchoring villi.
- 3- The connecting stalk connects the embryo proper (the embryonic disc) with its true coverings , the amniotic sac and yolk sac to the outer ball, the chorion.

Thus we find 3 different ways of clinging and attachment of the developing fertilized ovum to the womb of the mother.

There is no better word for this stage, which describes it eloquently than the Quranic word Alakah.

The real meaning of Alakah was not fully understood in the past. It has to wait for the medical and scientific achievements of the twentieth century to be fully appreciated and deeply comprehended.

The ovum being fertilized in the uterine tube and converted into blastula which implants in the uterus



Drawing showing the connecting stalk to the chorion

The Modgha

The Modgha in Arabic means a chewed lump, something that has been masticated. Yousuf Ali in his translation of the Quran chose the word morsel of flesh which does not exactly translate the word modgha.

Mohammed Assad, Maurice Bucaille and others have chosen the correct translation i.e. a chewed like lump.

The word Modgha is mentioned twice in the Holy Quran, Sura 22 verse 5 and Sura 23/ Verse 14. In the Hadith (sayings of the prophet) it has been mentioned several times.

Sura 22/5:

"O man if you have doubt about Resurrection. Consider that we created (every one of) you out of dust, then out of a drop of liquid (Nutfah), then from something that clings and adheres (Alakah) then from a chewed like lump (modgha) which become differentiated into formed and non formed parts (mokhalaga and non Mokhalaga). We rest whatever we want to the time we decide to bring you forth as babies."

Sura 23/13:

"We created man from the quintessence of mud, thereafter we placed him as a drop of liquid (sperm) in a firm lodging (the womb). Then We fashioned the sperm (Nutfah) into something that clings (Alakah) which We fashioned into a chewed like lump (Modgha). The chewed like lump is fashioned into bones which are then covered with flesh. Then We devoit into another act of Creation. Blessed is God, the best to create."

While process of implantation is going on, the inner cell mass differentiates into 2 layers at the 8th day after fertilization. Viz:

a- Flattened cell layer forming the inner layer known as endoderm,
and

b- And outer layer of cubical cells forming the ectoderm.

In the third week of embryonic life the bilaminar (2 layers) embryo is transformed into a trilaminar (3 layers) embryo. A primitive streak is formed on the surface of the ectoderm which ends cephalically (head wards) in a knot called the primitive knot or node.

The primitive streak is a very important hallmark in the developing embryo . It gives rise to a third layer of flattened cells that creep between the outer ectoderm and the inner endoderm, and completely separates the two layers .

The primitive streak regresses rapidly after the 19th day and completely disappears at the end of the fourth week.

The notochord is the structure around which the vertebral column will grow. It also degenerates and disappears, only a part remains in the centre of the intervertebral discs which called Nucleus Pulposus.

The notochord induces the overlying ectoderm to form the neural tube from which the whole nervous system will grow.

Formation of Somites:

The mesoderm on each side of the notochord and neural tube thickens to form a longitudinal column of paraxial mesoderm (i.e. thickened

mesoderm near the axis) at the end of the third week. It soon breaks up into segmented blocks, called the somites.

The first pair of Somites appear at the 19th to the 21st day at cranial (headwards) end of the embryo. New Somites appear subsequently – 3 pairs of somites daily. By the end of the fifth week, we find 42-44 pairs of somites. These are 4 occipital, 8 cervical, 12 thoracic, 5 lumbar, 5 sacral and 8-10 coccygeal. The first occipital and the last 5-7 coccygeal disappear, the rest form the vertebral column and part of the base of the skull. (the 3 occipital fuse in the basiocciput).

The "somites" as Hamilton Boyd and Mossman say are conspicuous features of embryos in the period under consideration and are readily seen in the surface contour. They are the bases from which the greater part of the axial skeleton and musculature are developed. The age of the embryo is expressed at this stage by the number of somites since "they form one of its characteristic external features.

The Quranic term Modgha is even more accurate than the term somite period of development which is used in the texts of embryology.

The Modgha or chewed like lump with marks of indented teeth on it does not describe the Somites which are very conspicuous at this stage alone, but includes the five pairs of pharyngeal arches which also appear at this period (4th week) as thickening and puckering of the mesoderm to fill the grooves formed from these pharyngeal arches.

The term somite period of development does not include the pharyngeal arches which are important hallmarks at this stage.

The word Modgha is therefore more precise descriptive term for this stage. The holy Quran divides the modgha into Mokhalaga and nonmokhalaga i.e. differentiated and non differentiated.

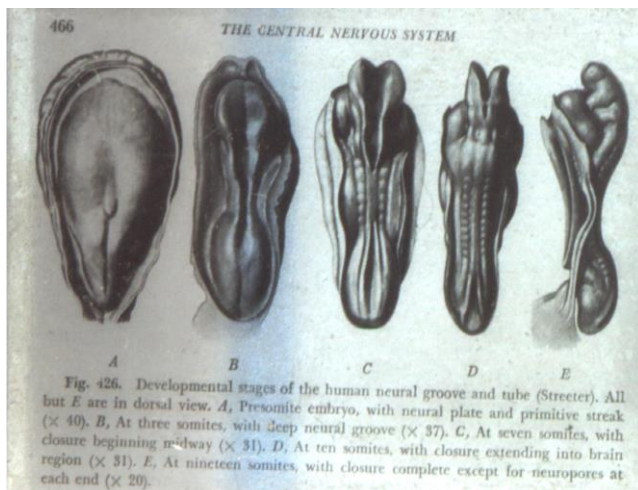
It is amazing to find that the zenith of differentiation of the cells of the embryo occur at this stage 4th to 8th week.

This period is indeed very important, as each of the three germ layers gives rise to number of specific tissues and organs.

All the major organs and organ systems are formed during the fourth to the eighth week. This period is therefore , also called the period of organogenesis . It is the time when the embryo is most susceptible to factors interfering with development, and most congenital malformations seen at birth find their origin during this critical period. (Langman. Medical Embryology).

The descriptive Quranic term Mokhalaga and non Mokhalaga is very astonishing indeed.

The modgha chewed like lump is described to differentiate into formed and non formed parts



The prophet Mohammad (peace be upon him) said. "When 42 days pass after the Nutfah settles in the womb, God sends an angel to shape it and create its hearing , its vision, its skin, its flesh and bones, and then the angel says. O God, is it a boy or a girl ? and God dictates whatever He wants". NarrateIt is well known that this period (6th week) sees the zenith of organogenesis whereby hearing system, visual system, bones, flesh and skin are laid down. This is rapidly followed by the differentiation of the gonads into testes or ovaries, as the Hadith proclaims.

It is indeed very revealing to grasp all these embryological data that has been expounded in the Holy Quran and sayings of prophet (peace be upon him).

Only recently it was known that the gonads start to differentiate into testes or ovaries at 7th – 8th week of intra uterine life.

Bone formation: (Sura 23/1):The somites are the bases from which the greater part of the axial skeleton and musculature develop as Hamilton, Boyd and Mossman say.

The truth and preciseness of the Quranic verse is really breathtaking.

The somites early in the fourth week begin to differentiate, whereby the ventromedial mass of cells of the somite show high proliferative activity), chondroblasts (precursors of cartilage) or Osteoblasts (precursors of bone).

These cells migrate towards the axis where the notochord and neural tube are formed.

This part of the somite is known as the sclerotome. The vertebral column is formed by cells of the sclerotome migrating in front of the notochord and neural tube .The neural tube is later enclosed by the arches form the vertebral bodies, while the notochord regresses and disappears . The remnant of the notochord is found in the centre of the intervertebral discs in the form of the nucleus pulposus.

The remaining cells of the somite that were not used in forming the sclerotome soon differentiate to form the myotome, which provide the muscles that enwrap the developing bones.

Thus we find the sclerotome, the precursor of bones laid down first, followed immediately by the myotome, the precursor of muscles. The latter is covered by the precursor of skin, the dermatome.

The Quran declares that bone formation precedes muscles. Once the bones are laid down they are covered by muscles.

We find this both in the vertebral column and in the limb bones.

The fore limb bud appears at 5th week. While The chewed lump is fashioned into bones which are then clothed with flesh."

The precision of this description is not excelled in its beauty, simplicity and accuracy.

In another verse, we read.

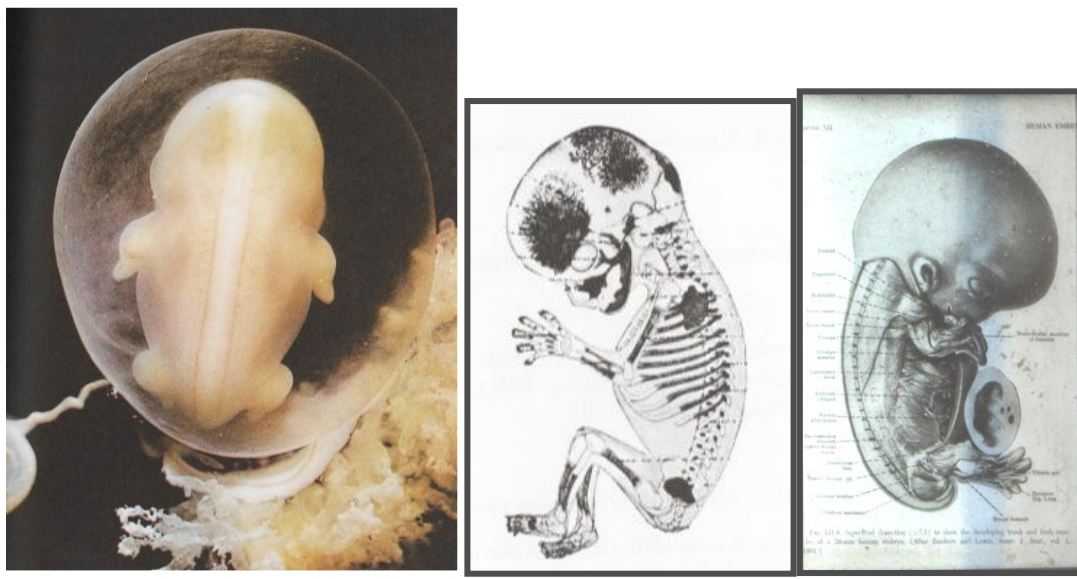
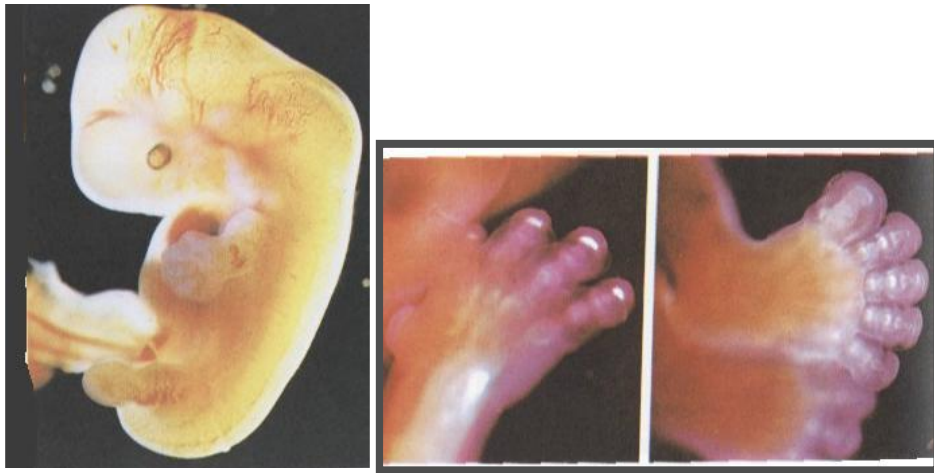
Sura 2/259:" And look at the bones how we erect them , then we enclothe them with flesh" Another translation goes like this: " look at the bones how we bring them together and clothe them with flesh".

The word Nan Shuzuha literally means erect it , or make it prominent or conspicuous . the other reading "Nan Shuruha" means put life again in it.

Langman describes bone formation as follows: "with time a number of needle like bone spicules are formed which progressively radiate from the primary ossification centers towards the periphery".

The word "Nan Shuzuha" say what Langman has expressed in the above quotation.

Such is the beauty and accuracy of the Quranic descriptive terms . there is no comparable term in the human language, let alone one that can excel it



The Sex of the Emryo:

There are three levels which determine the sex of human beings.

First: at genetic level. This is determined very early at the time of fertilization when the male gamete unites with the female gamete. It is the male gamete, viz. the sperm which determines the genetic sex of the future embryo. If the sperm which fertilizes the ovum is carrying a y chromosome, the offspring will be a boy, while if it is carrying an x chromosome it will be a girl (by the will of God).

The Holy Quran succinctly described these facts , which were only known scientifically in the twentieth century.

Sura 53/45-46:

"God fashioned both male and female from a drop of fluid (sperm) that has been ejaculated."

Sura 75/39:

"And he out of semen made both sexes, the male and female."

Second :

Gonadal Sex:

This is determined at the seventh and eight week when the genital ridges, become invaded by germ cells forming the primitive sex cords proliferating and differentiating into either the ovaries or testes. The sex of an aborted fetus at six weeks cannot be determined by histological examination of the gonads.

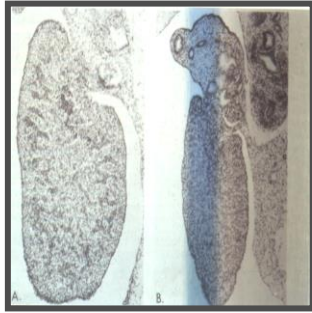
The Origin and time of formation of the Gonads:

Sura 86/5-9:

"Let man then observe out of what he has been created, he has been created out of gushing water (ejaculated fluid) which comes out from between the vertebral column and the ribs. He (God) can get him back to life on the Day when all secrets will be laid bare."

The prophet Mohammad (peace be upon him) said: "When the Nutfa enters the womb and stays there forty nights. God sends an angel to give

it its form and creates its hearing , visual apparatus, skin bone and flesh,
Then he asks: O God, is it aboy or girl? And God determines whatever
He decides". Narrated by Muslim (Kitab Al Qadar).



The above mentioned Quranic Ayas (verse) states clearly the site of
formation of human gonads.

Ibn Al Qaim , Al Qurtobi , Al Oloosi said that the Quranic ayas are clear
in indicating that both the male and female sexual gonads come from a
place in between the bones of the back and the ribs i.e. loins.

Al Qortobi quoted Al Hasan Al Basri who lived in the first century Hijra
(7th century A.D.) as taking sides with this view.

In recent times Al Maraghy took the advantage of supporting this view,
by the advances of science in the field of anatomy and embryology.

Al Maraghy, though he was the Sheikh of Al Azhar, grasped well the
scientific data and presented them succinctly in his Tafsir.

It is well known, now, that the gonads appear in the region of the future
loins. The genital ridges make their first appearance in a 4 week embryo
on each side of the midline between the mesonephros(the primitive

kidney) and the dorsal mesentery. Germ cells do not appear in the genital ridges until the sixth week of development.

The gonads once formed become differentiated into male and female gonads by the seventh and eighth weeks.

The gonads then start a process of descent, the female gonads (the Ovaries) stop in the true pelvis, while the male gonads continue their descent before birth to reach the scrotum outside the body through the inguinal canal.

However, the nerve supply the blood supply and the lymph drainage remain even in the adult, connected to the area cited in the Holy Quran as between the vertebral column and the ribs. The testicular arteries come from the abdominal aorta at the level of second lumbar vertebra. The right testicular vein drains into the inferior vena cava, while the left drains into the left renal vein.

The anatomical and embryological data greatly help in understanding the Quranic ayas and the sayings of the prophet. It is also quite revealing to find the Holy Quran and the Hadith of the prophet (peace be upon him) mention such an accurate statement of what goes on inside the wombs in very early stage of development. These facts were never known by the scientists except in the twentieth century.

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The third: the formation of the external genitalia . .

By the end of the sixth week the external genitalia of both male and female are identical and it is impossible to distinguish between the two sexes.

This again emphasizes the importance of the Hadith of the prophet Mohammad (peace be upon him) which was narrated by Muslim and already quoted.

The differentiation of the external genitalia starts after the sixth week. It goes on slowly so that by the twelfth week it becomes relatively easy to recognize the male from the female.

To sum up it is astonishing to find the Holy Quran and the Hadith of prophet Mohammad (peace be upon him) have described succinctly these three levels of sex determination.

Certainly the study of these Quranic verses and the sayings of the prophet (peace be upon him), in the light of scientific knowledge of twentieth century , give a better understanding for these scriptures. It is also clear that such pristine knowledge which was revealed fourteen centuries ago, was beyond the capacity of any mortal to grasp at that era.

Giving the Shape and Form (formation of the face)

Sura 3/6: "He it is who shapes you in the wombs as he will. There is no God but He, the almighty, the Wise."

Sura 40/64: "And He has given shape , and made your shapes beautiful, and has provided for you sustenance."

Sura 82/6-8:

"O man. What has seduced thee from the Lord Most Benefice? He who created thee, and fashioned thee in due proportion, and gave thee a just bias. In whatever form He wills, does He put thee together."

Sura 59/24:"He is God , the Creator, the Evolver, the Bestower of forms. To him belong the most Beautiful names."

The shaping and reshaping of the embryo and fetus while still in the womb of his mother is a continuous dynamic process.

Sura 39/6:"He creates you in your mother's wombs, one act of creation after another, in three veils of darkness."

Sura 71/13-14:

"What is amiss with you that you cannot look forward to God s Majesty.He has created every one of you in successive stages."

By the end of the third week the primitive heart starts to beat and will continue until cessation of life.

Between the primitive mouth and the heart, the future face begins to take shape.

At the end of the fourth week an ectodermal depression ,the Stomodeum (or the primitive mouth) become surrounded by the first pair of

pharyngeal arches. These arches are due to aggregation of mesodermal masses on each side of the future neck.

The first (or mandibular arch) consists of two portions: Both participate in formation of the face, and the small bones of the middle ear (incus and malleus).

The second arch forms part of the hyoid bone (tongue bone).

The third arch forms the rest of it.

The fourth and sixth arches fuse to form the cartilages of the larynx .

The face is formed by five elevations (tubercles) of the mesoderm, at the fifth week.

During the sixth and seventh week the appearance of the face changes considerably. The maxillary swellings grow medially, thus compressing the medial nasal swellings toward the midline, and ending in their fusion.

The upper lip is thus formed.

The cheeks develop by positional changes of the tongue, the floor of the mouth and broadening of the mandible.

By a complex process the maxillary swellings unite with the lateral nasal swellings. Any disturbance of growth at this stage will result in many congenital malformations ranging from the simple hare lip to the more complex cleft palate.

Sura 16/78:

"And God has brought you forth from your mothers' wombs knowing nothing - but He has endowed you with hearing, sight and minds so that you may be grateful to God."

Sura 76/2:

"Verily it is We who have created man from a drop of mingled liquids, in order to try him; so We gave him (the gifts) of hearing and sight."

In the above mentioned Quranic verses and wherever hearing and sight are mentioned as gifts from the benevolent God, the hearing is always mentioned first, denoting that hearing is even more important than seeing for the human being.

The language and the learning capabilities are dependent on the presence of normal hearing, more than anything else.

A child born deaf is unable to learn language and other things except with marked difficulty. A child born blind is handicapped, but it is much easier to teach him language and other capabilities.

The Holy Quran uses the singular form of the word: 'Al Sama' for hearing while using the plural for seeing" Al Absar".

The visual centers in the brain (occipital lobe) are duplicate while the hearing centre is considered as singular though represented in both temporal lobes of the brain.

In the embryo the ear develops from three distinct parts : (1) the external ear: which serves as a sound collecting; develops from the dorsal portion of the first pharyngeal cleft and six surrounding mesenchymal swellings.

(2)The middle ear: Functions as a sound conductor from the exterior to

(3)the inner ear. Is made up of 2 parts

a] auditory which converts the sound waves into nerve impulses, which are conducted by the auditory nerve to the brain.

b] Vestibular part which registers the changes in equilibrium and conducts them to the brain via the vestibular nerve.

The first indication of the developing ear is found at approximately 22 days. It appears as a thickening of the surface ectoderm on each side of the hind brain . This thickening is called the otic placode. It invaginates and transforms into auditory (otic) vesicle (bubble). This bubble develops into two components; one concerned with hearing (cochlea); the other is concerned with equilibrium (saccule, utricle and semicircular canals.)

These make their first appearance in the sixth week. By the eighth week they are already approaching the final pre born status.

The ears of the fetus function as early as the fourth month. The fetus can hear his mother's voice, the rumblings of her stomach and the sounds she makes while eating and drinking. It can also hear external sounds in the

environment, be it a crying brother, a shouting father or an orchestra played and shown in the house T.V. set.

A new born is already used to an environment which is not silent.

The Sunna "the acts and deeds of the Prophet (peace be upon him)":

is to make "Azan" Call for prayers in the right ear, and iqama. "Call for starting the prayers in the left ear, the moment the child is born.

This is to acquaint the newly born with the message of Islam from the earliest moment.

Development of the Eyes

Sura 23/78:

"It is He WHO created for you the faculties of hearing, seeing, feeling and understanding, (yet) how seldom are you grateful."

Sura 16/78:

"And God has brought you forth from your mothers' wombs knowing nothing - but He has endowed you with hearing, sight and minds so that you may be grateful."

Many Quranic ayas (verses) mention the faculties of hearing and sight as gifts from the benevolent God. It also stresses that we acquire our knowledge via these channels to the minds.

It contradicts Plato's philosophy which claims that we are born with already innate knowledge. Man only recollects these things, as his soul has known them long before it dwelt in his body.

The above Quranic Ayas emphatically stress that man is brought forth from his mother's womb knowing nothing. He acquires knowledge through his senses mainly visual and auditory. The mind grasps, arranges and comprehends these sensations.

The creation of an eye is a remarkable example of the interaction between the developing brain and the thin skin of the embryo.

First the anterior part of the brain sends out a hollow stem on each side, on the 22nd day. This stem is called the optic stalk. The end of the stem bulges forming a vesicle, which when approaching the surface.

become invaginated forming the optic cup. The cup is made up of two layers, separated by a lumen, called the intra retinal space. With further development the lumen disappears, and the two layers are then opposed to each other.

During the seventh week lips of the choroid fissure fuse, and the mouth of the optic cup then becomes a round opening.

Instructions (by the angel who enters the womb at 40th-42nd day, according to Hadith of the Prophet) are forwarded to the surface ectoderm (the skin), "Make a lens!". The skin then pinches off a bubble, which is placed in the opening of the cup, forming a lens.

By the end of the seventh week, the nucleus of the lens is formed.

This conforms with the Hadith of the Prophet narrated by Muslim that angel enters the womb at 40th-42nd day and starts forming the different organs including the eye.

Similarly the surface ectoderm (future skin) forms the cornea, a thin transparent curved part of the skin which covers the pupil in front of the lens.

On the front of the lens the iris grows from the edges inwards. The muscles of the iris which control the eye aperture, the pupil, are the only muscles of the body derived from ectoderm. All the other muscles of the body are derived from mesoderm.

At the end of the fifth week, the eye primordium is completely surrounded by loose mesenchyme. After the sixth week (i.e. after the angel has entered the womb) this mesenchyme differentiates into: i) a loose inner tissue which becomes highly vascularised and pigmented, the choroid ii) a thick outer layer which forms the Sclera.

The choroid is continuous with the pia mater (the thin covering of the brain) and the sclera is continuous with the dura mater (the thick covering of the brain).

The outer layer of the optic cup develops into the pigment layer of the retina, while the inner 4/5 of the optic cup transforms into the rods and cones (the sensitive parts to light), the inner and outer nuclear layers and the ganglion cell layer. The ganglions are nerve cells, their fibres form the optic nerve which is connected to the brain.

These changes start at the seventh week of intra-uterine life, which agrees with the above mentioned hadith of the prophet, whereby an angel sets to

work amazingly the end of the sixth week and the beginning of the seventh week.



Three Veils of Darkness

Sura 39/6:

"God creates you in the womb of your mothers, one act of creation after another, in three veils of darkness."

The three veils of darkness were explained by the commentators of Holy Quran to be: the abdominal wall, the wall of the womb (uterine wall) and the sacs surrounding the fetus.

The amnion is a membranous sac that surrounds the embryo (later on the fetus).

The amniotic fluid increases slowly from 30 ml at 10 weeks to 350 ml at 20 weeks, and 1000 ml by 37 weeks. The volume then decreases sharply.

If the volume of the amniotic fluid is decreased, the case is known as oligohydramnios. It results from either placental insufficiency or renal agenesis (absence of kidneys.)

However, if the amniotic fluid is increased to two litres the case is known as Polyhydramnios. It results from i] multiple pregnancies e.g. twins ii] congenital malformation of the central nervous system e.g. anencephaly, or oesophageal atresia.

The amniotic fluid is not static it is changed completely every three hours. From the beginning of the fifth month the fetus swallows its own amniotic fluid and it drinks about 400 cc daily. If there is oesophageal atresia (gullet blocked) or through lack of nervous control of swallowing as in anencephaly, the fetus cannot swallow the amniotic fluid which accumulates causing Poly-hydramnios.

The amniotic fluid has many functions:

- 1) It protects the fetus from injuries and jolts by forming a protection cushion.
- 2) It prevents adherence of the amnion to the embryo. This is believed to protect against many congenital abnormalities.
- 3) It permits symmetrical external growth of the embryo.
- 4) It controls the body temperature of the fetus.
- 5) It enables the fetus to move freely, thus aiding the development of muscles and bones.

6) It can be withdrawn and examined by the process called amniocentesis.

The second membrane or sac is the Chorion

The chorion forms early after the implantation of the ball like blastula into the endometrium (the inside of the womb). The invading cells, called Syncytiotrophoblasts, form finger like processes, which are solid at first. By the beginning of the third week the trophoblast is characterised by a great number of primary solid villi. Soon loose connective tissue appear inside these primary villi and convert them to secondary villi (16th day onwards). By the twentieth day blood vessels invade these secondary villi, transforming them to tertiary villi.

By the 21st day blood starts to circulate through the capillaries of chorionic villi. The villi absorb nutriments from the maternal blood, and excretes the waste material from the embryo and delivers it to the maternal circulation.

Villi arborise like a tree and soon cover the whole embryo including its amniotic sac.

The third Sac is the Decidua. This sac is made by the rest of the endometrium (inner side of the womb) which does not take part in nesting of the blastula. As the embryo grows along with its amnion and chorion, the inner wall of the uterus becomes the third wall. This wall or

membrane falls during a parturition (delivery of the baby) and hence given the name decidua i.e. temporary and not permanent.

It is the part that is shed either during menstruation in non-pregnant ladies or which is shed during delivery.

The placenta has two components:

- a) a fetal portion from the chorion
- b) a maternal portion formed by the endometrium

Before birth, the placenta and fetal membranes perform the following functions:

- 1) protection
- 2) nutrition
- 3) respiration
- 4) excretion and
- 5) hormone production.

At birth the fetal membranes and placenta are expelled from the uterus as the afterbirth.

The fully developed placenta is a plate like organ weighing about 500 Gm and containing 100 ml of blood.

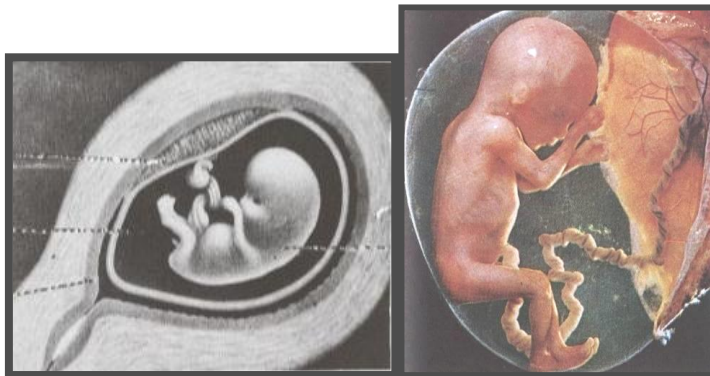
The placenta protects the fetus from the injurious and lethal effect of most of the invading micro-organism and chemical substances in the mother's

blood. However, some of the micro-organism can pass through the placenta like the viruses e.g. Herpes, the spirochetes of syphilis and the parasites of toxoplasmosis and HIV virus.

The placenta also provide the fetus with maternal antibodies to withstand infection against most micro-organisms.

These three veils of darkness are very important, for the growth of the embryo and fetus. Exposure to light can hinder the growth and cause malformation,

The Quranic aya (verse) stresses both the evolutionary epigenetic type of creation of the embryo passing from one stage to another, and the importance of these three veils of darkness to procure a normal growth and differentiation of the various tissues of the developing embryo.



When the soul is inspired?

This is a very difficult subject to tackle. The Quran and Hadith have both mentioned this in many verses (ayas) and many Hadiths.

A practical pragmatic issue comes forth by discerning the time of entry of the soul. Islamic jurists allow abortion, provided there are medical reasons, before the time the soul enters the body. All of them refute abortion or miscarriage after the entry of the soul to the forming body, except in one situation only, and that is if the life of the mother is endangered.

The Holy Quran speaks of "Rooh," soul, in many ayas. At least four meanings were given by the commentators (1) of the Holy Ouran:

- 1) the soul which breathes life into human beings
- 2) the angel Gabriel
- 3) the Quran.
- 4) another angel.

The first meaning will be discussed here.

The stage at which the soul is breathed into the forming body in the womb occurs after it has passed through the Nutfa, the Alaka, the Modgha, bone formation and flesh formation.

Sura 23/12-14:

"We created man from the quintessence of mud. Thereafter we cause him to remain as a drop of fluid (Nutfa) in a firm lodging (the womb).

Thereafter We fashioned the Nutfa into something that clings (Alaka), which We fashioned into a chewed lump (Modgha). The chewed lump is

fashioned into bones which are then covered with flesh. Then We nurse him unto another act of creation. Blessed is God, the best of artisans."

The other act of creation is explained by Ibn Jarir Al Tabri, Ibn Kathir and Al Fakhar Al Razi as being the breathing of the soul unto the forming body.

The Prophet Mohammad (peace be upon him) says:

"The creation of each one of you is collected in forty days: And something that clings (Alaka) he becomes, and then a chewed lump (Modgha) for a similar time. The angel is sent to him and the angel writes four things: his provision (sustenance), his age, his deeds and whether he will be wretched or blessed. Then the soul is breathed into him." Narrated by Moslim Kitab Al Qadar and Al Bokhari (Kitab Al Qadar, Kitab Al Anbiya, Kitab Al Tawhid.,.

So long as the foetus has not reached, the hundred and twenty days; it is permissible, in view of most of the jurists, to perform abortion if indicated medically,

However, after the 120th day, abortion is not allowed unless the life of the mother is endangered.

Ibn Al Qaim puts the following argument:

"If it is asked: Does the embryo before the breathing of the soul unto it, has perception and movement? It is answered that the movement it

possesses is like that of a growing plant. Its movements and perceptions are not voluntary, When the soul is breathed unto the body, the movements become voluntary and are added to the vegetative type of life it had prior to the breathing of soul."

Ibn Hajar Al Asqalani brings a similar argument when discussing which organ form first. "The liver" he says is the site of nutrition, and growth is needed at that stage. not voluntary movement nor perception. These are acquired when the soul gets attached to the body."

It is quite interesting to find the eminent Ibn AI Qaim and Ibn Hajar AI Asqalani link the soul or spirit being attached to the body, by the appearance of voluntary movements and sensation ie sentience.

The higher centers of the brain do not control the lower ones, because of lack of synapses, until 120 days (computed from fertilization) or 134 days computed from last menstrual period.

Before the ensoulment the fetus has reflex movement, and does not feel pain if pricked.

The concept of Ibn Qaim and Ibn Hajar AI Asqalani which links the breathing of soul to the appearance of voluntary movements is a remarkable one.

It links human life to volition, and to the integration between muscle and nerve to produce a voluntary action.

The Nature of the Soul:

Nobody knows anything about the nature of the soul.

Sura 17/85:

"And they will ask about soul. Say the soul (cometh) by the command of my Lord. O Men you have been granted very little knowledge."

Sura 38/72:

"When I have fashioned him (in due proportion) and breathed into him of My spirit, fall you down before him in prostration."

Sura 38/72:

"He Who makes most excellent everything that He creates. He began the creation of man with (nothing more than) clay, and made his progeny from quintessence of despised fluid. Then He fashioned him in due proportion and then breathed into him something of His Spirit".

The nature of the soul or spirit, nobody knows of. All that man knows is that when it is breathed in, he gets the human life (after a vegetative life of the Nutfa, Alaka and Modgha,) and when it departs, he is dead.

The signs of human life in the womb do not start at the time of fertilization as many physicians do claim. This is a vegetative life devoid of volition. The human life starts when voluntary muscles contract in the dark environment of the womb and its membranes. That, as Ibn AI Qaim states, is the beginning of human and not vegetative life.