Embryology in the Qur'an: The 'Alaqah Stage

By Elias Kareem

© Elias Kareem, 2000, 2012. All rights reserved
Last Updated: 6 March 2012, version 1.78 (pre-release)

1. INTRODUCTION

The Qur'an is the holy book or scripture of Islam revealed to the Prophet Muhammad by God through the Archangel Gabriel over a 23-year period from 610 to 632 CE. The language of the Qur'an is Arabic; its style "is neither prose nor poetry, but a unique fusion of both."[1] The text is divided into 114 *surahs* or chapters with each chapter consisting of individual *ayahs* or verses. There are in total 6,348 verses in the Qur'an.

The Qur'an describes itself as a "Book of Guidance"[2] and addresses its message to all humanity. The Qur'an deals with many issues and topics such as wisdom, doctrine, worship and law. It provides guiding principles for society, human conduct and commerce. The Qur'an also contains numerous references to natural phenomena such as embryology, astronomy and geology.

The word "Qur'an" means "recitation" and the first verse of the Qur'an to be revealed to the Prophet Muhammad was a command to read:

> *Read! In the name of your Lord who created: He created man from '**alaq** (clinging form). Read! Your Lord is the Most Bountiful One who taught by [means of] the pen, who taught man what he did not know.*
>
> Surah Al-'Alaq (The Clinging Form) 96:1-5

'Alaq is a stage in the development of the embryo. The Qur'an mentions that human development passes through a number of distinct stages.[3] These stages are descriptive of the embryo's external appearance and have been assigned the following names:

> *And We (God) created man[4] from a quintessence (gentle extraction) of clay. We then placed him as a **nutfah** (drop) in a place of settlement, firmly fixed (i.e. the womb). Then We made the drop into an '**alaqah** (clinging form), and then We changed the clinging form into a **mudghah** (chewed-like form), then We made out of that chewed-like form, **izam** (skeleton, bones), then We clothed the bones with **lahm** (muscles, flesh), then We **(ansha' nahu)**, caused him to grow and come into being and attain the definitive (human) form. Blessed be God, the Perfect creator.*
>
> Surah Al-Mu'minoon (The Believers) 23: 12-14

---

[1] Arberry (1998, p. x).

[2] Qur'an 2:185.

[3] Qur'an 39:6 and 71:14.

[4] The creation of the first man Adam.

© Elias Kareem, 2000, 2012. All rights reserved

The terminology used to describe human development in the Qur'an is characterized by descriptiveness, accuracy and ease of comprehension. Until recently these statements were not fully appreciated, since they referred to details in human development which were scientifically unknown in earlier times.

This essay focuses on the term *'alaqah* – the second stage of development. Although an emphasis is placed on the outer appearance of the embryo and its internal structures, this essay is nevertheless limited in its scope and should not be considered as a detailed and complete exposition of the *'alaqah*.

2. THE MEANING OF THE TERM *'ALAQAH*

The Qur'an mentions the term *'alaqah* علقة as the second stage of human prenatal development. The word *'alaqah* according to many linguistic Arabic dictionaries has several meanings. It is a derivative of *'alaqa* which means attached and hanging to something. *'Alaqah* is a leech that lives in ponds and thrives on the blood of animals to which it attaches itself. Additionally, *'alaq* is "the red blood in general" or "the thick clotted blood."[5] *'Alaqah* also denotes "the wet blood."[6]

3. DESCRIPTION OF *'ALAQAH* AS "ATTACHED AND HANGING TO SOMETHING"

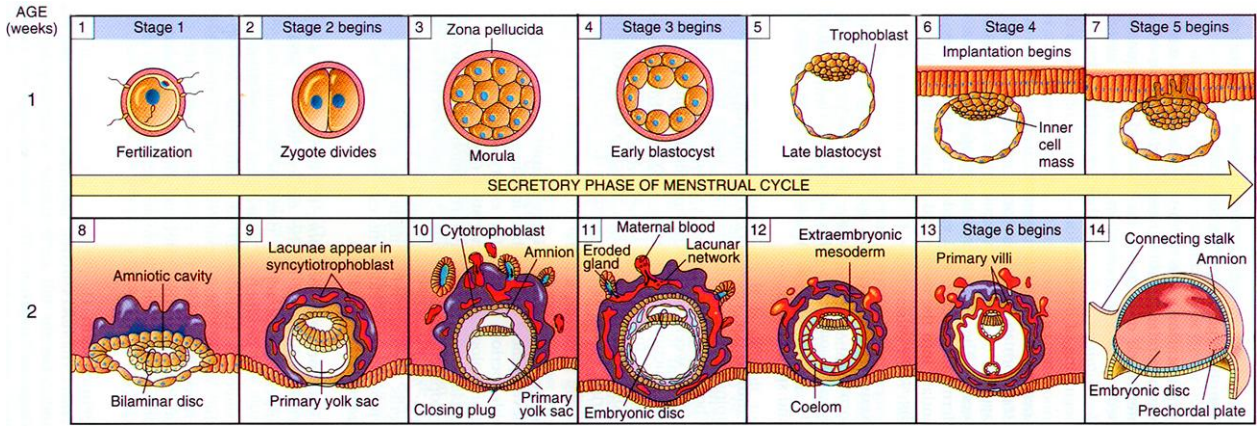


Figure 1 Human prenatal development during weeks 1 and 2, from fertilization to implantation of the blastocyst. (From Moore and Persaud (2007)).

Human development begins when a sperm fuses with the ovum to create a unique single cell called the zygote (Figure 1). The zygote contains all of the genetic information (DNA) needed to become a baby. The zygote travels down the fallopian tube toward the uterus. As it travels the cells of the zygote divide repeatedly to form a hollow ball of cells called a blastocyst.

---

[5] Ibn Manẓūr, in *Lisān al-'Arab*, Dār Ṣādir, Beirut, n.d., vol. 10, pp 261-268; Al-Jawharī, *Aṣ-Ṣiḥāḥ*, vol. 4, p 1529; Ibn Fāris, *Mu'jam Maqāyīs al-Lughah*, Dār al-Kutub al-'Ilmiyyah, Iran, n.d., vol. 4, pp 125-128; Al-Fayrūzabādī, *Al-Qāmūs al-Muḥīṭ*, vol. 3, p 275; and Al-Isfahanī, *Al-Mufradāt*, p 343. As cited in Zindani, Ahmed, Tobin, and Persaud (1994, p. 68).

[6] Al-Biqā'i, *Naẓm ad-Durar fī Tanāsub al-Āyāt was-Suwar*, vol. 13, p 115; Ibn Al-Jawzī, *Zād Al-Masīr fi 'Ilm at-Tafsīr*, vol. 5, p 406; Al Khāzin, *Majmūah min at-Tafāsīr*, vol. 4, p 336; Al-Alusī, *Rūḥ al-Ma'ānī fī Tafsīr al-Qur'ān al-'Azīm was-Sab' al-Mathāni*, vol. 30, p 180; Ash-Shawkānī, *Fatḥ al-Qadīr al-Jāmi' Bayna Fannay ar-Riwāyah wad-Dirāyah min 'Ilm at-Tafsīr*, 3rd edition, Dār al-Fikr, Beiruit, 1393 AH, 1973 CE, vol. 5, p 468; *Al-Baḥr Al-Muḥīṭ*; vol. 6, p 468; and Al-Qurṭubī, *Al-Jāmi' li-Aḥkām al-Qur'ān*, Dār Iḥyā at-Turāth al-'Arabī, Beirut, n.d., vol. 10, p 119. As cited in Zindani et al. (1994, p. 68).

© Elias Kareem, 2000, 2012. All rights reserved

The blastocyst attaches to the lining of the uterus on about the 6th day and continues to implant itself in the uterus wall with cells which eventually form the placenta. This process takes more than a week until cell differentiation occurs, developing the embryo and placenta from the blastocyst. The embryo is now *attached* to the primitive placenta and *hanging* via the 'connecting stalk' that will eventually become the umbilical cord:

> Day 12: The endodermal germ layer produces additional cells which form a new cavity, known as the secondary or definitive yolk sac. The extraembryonic coelom expands to form a large chorionic cavity, within which **the embryo and the attached amniotic and yolk sac are suspended by the connecting stalk**.[7]

As we see in Figure 2 the embryo (which is represented by the bilaminar embryonic disc) is attached to the placenta and is hanging or suspended in the chorionic cavity by the connecting stalk. The Qur'an describes this attachment as *'alaqah*. This is in agreement with the meaning of the word *'alaqah* as "attached and hanging to something".

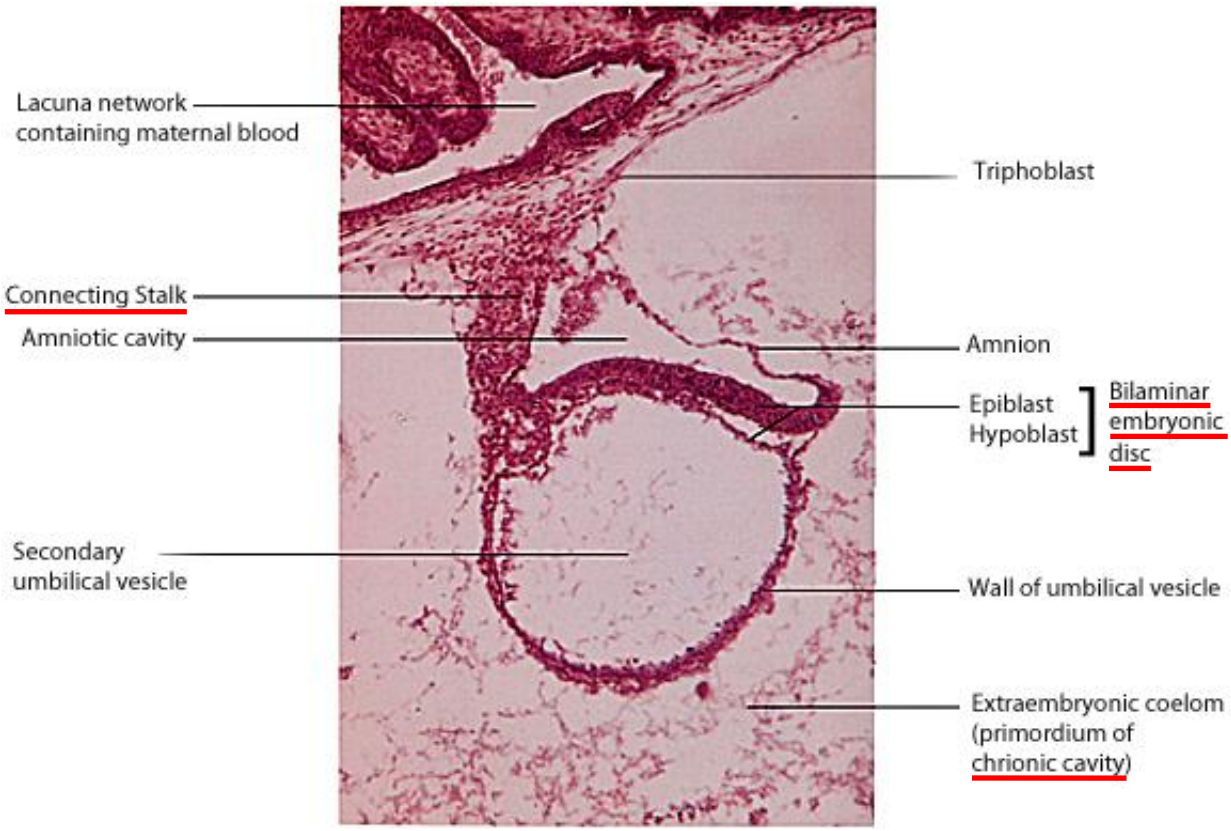


Figure 2 Photomicrographs of longitudinal sections of an implanted embryo at approximately 14 days. High-power view (Ã—95). The embryo is represented by the bilaminar embryonic disc composed of epiblast and hypoblast. (From Nishimura H [ed]: *Atlas of Human Prenatal Histology*. Tokyo, Igaku-Shoin, 1983). The embryo is now attached to the primitive placenta and is suspended or hanging via the 'connecting stalk'.

[7] Saraga-Babic and Sapunar (n.d.). See also Allan and Kramer (2010, p. 27) and Drews (1995, p. 58).

© Elias Kareem, 2000, 2012. All rights reserved

4. DESCRIPTION OF *'ALAQAH* AS A "BLOOD CLOT"

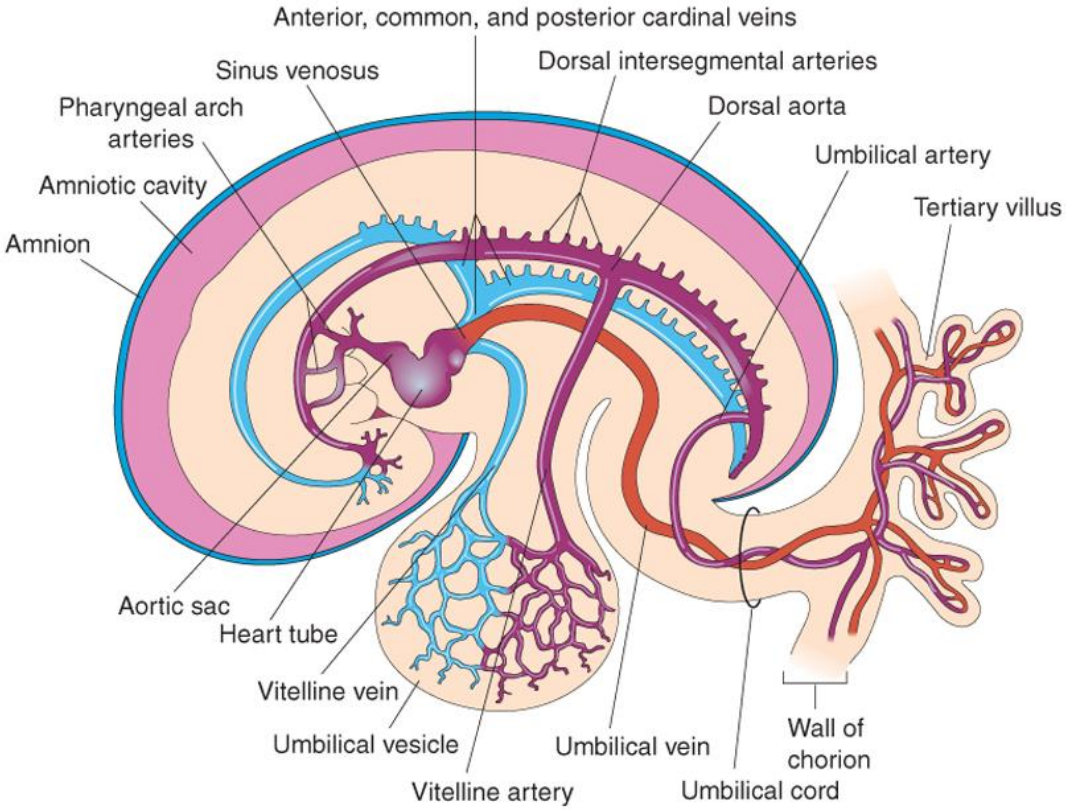


Figure 3 Diagram of the primordial cardiovascular system in an embryo of approximately 21 days, viewed from the left side during the *'alaqah* stage. The external appearance of the embryo and its sacs is similar to that of a blood clot, due to the presence of relatively large amounts of blood present in the embryo and the chorion. The umbilical vein carries well-oxygenated blood and nutrients from the chorion sac to the embryo. The umbilical arteries carry poorly oxygenated blood and waste products from the embryo to the chorion. (From Moore and Persaud (2007)).

Another meaning mentioned for *'alaqah* in classical commentaries is "blood clot" or "similar to a blood clot". Figure 3 shows a diagram of the primitive cardiovascular system in an embryo of about 21 days. During this stage we find that the **external appearance of the embryo and its sacs** is similar to that of a blood clot.[8] This is due to the appearance of the chorionic sac, primitive heart, and the cardiovascular system. The blood, though fluid, does not circulate until the end of the third week. On the 21st day, the heart of the embryo connects with the blood vessels in the embryo, the connecting stalk, the chorion and the umbilical vesicle (yolk sac), and the blood starts to circulate and the heart begins to beat. **Thus the embryo takes the appearance of a blood clot even though its blood is fluid** as we see in Figure 3 and Figure 4. These features incorporate the meanings of "a blood clot" and "wet blood" for *'alaqah* as given above.[9]

---

[8] An implanted blastocyst would also resemble a blood clot: "Implantation begins at about the 6th to 7th day after fertilization. The part of the blastocyst projecting into the uterine cavity remains relatively thin. The syntrophoblast contains a proteolytic enzyme which causes destruction of the endometrial cells so that that the blastocyst sinks deeper and deeper into the uterine mucosa…The final deficiency in the endometrium is sealed off by **a blood or fibrin clot**, overlying the blastocyst. This cover is called the operculum. By about 10 to 12 days after fertilization, the blastocyst is completely encased in the endometrium and thus, implantation is complete." Allan and Kramer (2010, p. 23).

[9] From Zindani et al. (1994, p. 72).

© Elias Kareem, 2000, 2012. All rights reserved



Figure 4 Embryo in the fourth week (about 22-24 days) shows the clear rudiments of brain and backbone. Its heart pumps blood to the liver and into the aorta. (*A Child Is Born*, Lennart Nilsson, 1990). The meaning of "a blood clot" describes the most prominent internal structure that affects the external appearance, for in the '*alaqah* stage, blood forms in the blood vessels in the form of isolated islands. The vessels resemble coagulated blood since the blood is circulating very slowly.

© Elias Kareem, 2000, 2012. All rights reserved

5. THE DESCRIPTION OF *'ALAQAH* AS A "LEECH"

This final section considers the meaning of *'alaqah* as a "leech" and examines some similarities between the leech and embryo.

5.1 Meaning of *'alaqah* as a "Leech"

Scholars, linguists and dictionaries have all mentioned one of the meanings of *'alaqah* as a leech. The fourteen century dictionary *Lisān al-'Arab* states that "*'alaqah* refers to a worm living in the water that sucks blood, the plural of which is *'alaq*" [10] and in the dictionary of *al-Qāmūs al-Muḥīṭ* *'alaq* is "a small creature of water that sucks blood [a leech]."[11] The word *ʿalaqah* also occurs in several languages related to Arabic. In Hebrew there is עֲלוּקָה *ʿalûqāh* (or *alukah*)[12], the generic name for any blood-sucking worm or leech. And in Aramaic and Syriac there are words with apparently similar meanings:

> The first word *ʿalûqāh* is a typical *hapax legomenon*[13], though it does occur in the post-Biblical literature in meanings apparently similar to an Aramaic and Syriac word.
>
> The word *ʿalûqāh* or *ʿalûqā* ʾ in Aramaic and *ʿalqā* or *ʿalûqā* in Syriac, means a "leech" particularly the tiny variety which is swallowed when drinking water and which sucks blood inside the body. The Tal. Bab. [Babylonian Talmud] describes it as a dangerous affliction; therefore we should perhaps understand this word [in Proverbs 30:15] as the name for a disease, one of its symptoms being the swelling of the belly...
>
> The word *ʿalaq* also exists in Arabic where it means "a clot of blood" and, as a verb, "to stick, cling, hang onto, etc. " hence *ʿalaqah* = leech. In Arabic, however, it essentially indicates the worm itself, and not necessarily the disease. The word is also known in Amharic and also in the dialect of Tigrē, as *ʿalaqĕtĕ* = leech.[14]

In Ad-Damīrī's Arabic zoological lexicon, *Hayāt al-Hayawān* (The Life of the Animals, 1372 CE), there is an article on the leech *('alaq)*[15] and in Ibn Wahshīya's *Kitāb al-Sumūm* (The Book on Poisons, *c.* 950 CE) there is the treatment for the one who has swallowed a leech *('alaq).*[16]

In Qur'anic translations, Abdullah Yusuf Ali (1934 CE) translates *'alaqah* as a "leech-like clot"[17], Saheeh International (1997 CE) has a "clinging substance" and "clinging clot"[18] while Professor Abdul

---

[10] Ibn Manẓūr, in *Lisān al-'Arab*, Dār Ṣādir, Beirut, n.d., vol. 10, pp 261-268; as cited in Zindani et al. (1994, p. 68) . The *Lisān al-'Arab* (لسان العرب, "The Tongue of the Arabs") was compiled by Ibn Manẓūr (1232-1311CE). It is a monumental work of immense importance that continues until the present day to be the major reference work for the Arabic language.

[11] *Al-Qāmūs al-Muḥīṭ*, vol. 3, p 275 as cited in Zindani et al. (1994, p. 68). *Al-Qāmūs al-Muḥīṭ* (القاموس المحيط, "The Surrounding Ocean") by Al-Fayrūzabādī (1326-1414 CE) is another major reference work of classical Arabic.

[12] "The leech (עֲלוּקָה *alûqāh*) has two daughters: Give and Give." Proverbs 30:15 (ESV). Hebrew עֲלוּקָה *alûqāh* meaning a leech. (Blue Letter Bible, `aluwqah:Strong's 5936). Although the Hebrew word is translated leech in most versions of the Bible, there has been much dispute whether this is the proper meaning. Recourse is therefore had to the Arabic language. See Kaltner (1996, pp. 86-87).

[13] "Words or forms of words that occur once only. There are about 1,500 of these in the Old Testament; but only 400 are, strictly, "hapax legomena"; i.e., are either absolutely new coinages of roots, or cannot be derived in their formation or in their specific meaning from other occurring stems." Hirsch, Casanowicz, Jacobs, and Schloessinger (1906).

[14] Gluck (1964, pp. 368-369). Gluck's opinion of *alûqāh* as used in Proverbs 30:15 is that it does not appear to have been used in the context of a leech and proposes the translation "erotic passion" but this interpretation cannot be supported by the Arabic sources, see Kaltner (1996, pp. 86-87).

[15] *Kitāb Ḥayāt al-ḥayawān* (The Book of the Lives of the Animals) finished in 1372 CE as mentioned in De Somogyi (1950, p. 42).

[16] Ibn Wahshīya's Book on Poisons c.950 CE. Known under various titles: *Kitāb al-Shānāq fī al-Sumūm wa'al-tiryaq*, *Kitāb al-Sumūm wa'al-tiryāqāt*, and *al-Sumūm wadaf' madārrhā*. Levey (1966, p. 84).

© Elias Kareem, 2000, 2012. All rights reserved

Haleem (2005 CE) has "clinging form."[19] A popular ninth century Christian polemic against Islam charges that Muslims believe that "God created man from a leech" based on the work of Nicetas of Byzantium. Nicetas, who wrote between 842 and 867 CE, had a copy of the Qur'an in Greek translation which he made use of to identify the tenets of Islam. His Greek translation renders both *'alaq* and *'alaqah* as *bdella* (βδελλα), meaning "leech".[20]

And in Qur'anic commentaries, Aṣ-Ṣābūnī (b. 1930 CE) also mentions a "leech-like clot"[21] while Ibn Kathīr (b. 1302 CE) mentions the meaning of "elongated like the shape of a leech."[22] Sikandar Hussain (1980 CE) in his essay *The Clot (al-ʿAlaq)* gives one of the meanings of *'alaqah* as a leech[23] and *The Qur'an: an Encyclopedia* entry for *'alaq* also mentions the same meanings:

> The linguistic definition of *ʿalaq* (singular *ʿalaqah*) is 'leech', 'medicinal leech', '(coagulated) blood', 'blood clot', or 'the early stage of the embryo'.[24]

5.2 The Leech worm

Leeches are bloodsucking worms with segmented bodies. They belong to the classification phylum Annelida (which includes earthworms, leeches and bristleworms) and are in the subclass Hirudinea.[25] A major feature common to all these groups is the organization of the body into repeating units called segments: "[A]ll annelids are segmented. Segments, also called metameres, are structures that occur repeatedly along the body of the animal."[26] Also of interest to this essay is the gut, which is described as "a straight tube."[27]

The Latin name for the well known blood sucking leech is *Hirundinea Medicinalis.* Leeches were once widely used by physicians and barbers for bloodletting practices. "Despite their close association with medieval medicine, leeches today are used for a variety of medical purposes including providing useful treatments for arthritis, blood-clotting disorders, varicose veins and other circulatory disorders and are also used in modern plastic and reconstructive surgery."[28]

---

[17] Qur'an 40:67. Ali (1938).

[18] Qur'an 96:2 and 75:38. Saheeh International (1997).

[19] "[*'Alaq* is a] stage in the development of a foetus (cf. 22: 5), i.e. embryo. *'Alaq* can also mean anything that clings: a clot of blood, a leech, even a lump of mud. All these meanings involve the basic idea of clinging or sticking." Abdel Haleem (2005, p. 428).

[20] "Nicetas accuses the Qur'an of teaching that man comes from a leech (*Confutatio*1, lines 90–92): λέγει, ὅτι ἐκ βδέλλης ὁ ἄνθρωπος γίνεται (he says that man is created from a leech). The phrase is then picked up by Zigabenos, who finds it absurd..." Simelidis (2011, pp. 900-902).

[21] Aṣ-Ṣābūnī (1980, p. 281).

[22] Ibn Kathīr (1980, p. 242): فصارت علقة حمراء على شكل العلقة مستطيلة

[23] Hussain (1980, pp. 107-110).

[24] Sahin (2006, p. 27)

[25] Yeh (2002).

[26] Yeh (2002).

[27] "Annelid", Funk & Wagnalls New Encylopedia (1995).

[28] Govedich and Bain (2005, p. 1).

© Elias Kareem, 2000, 2012. All rights reserved

5.3 The external appearance of the Leech

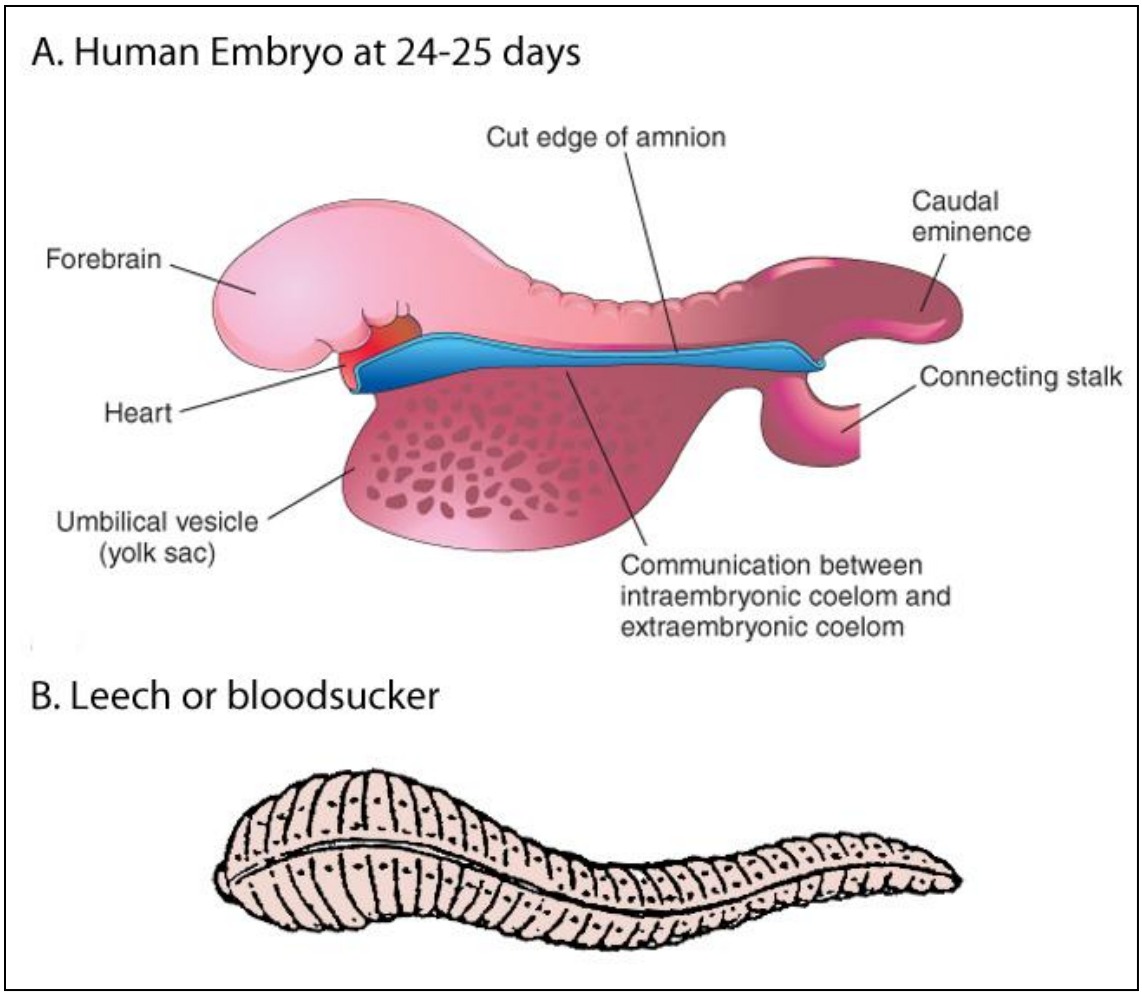


Figure 5. Drawings illustrating the similarities in appearance between a human embryo and a leech (‘*alaqah*). ***A,*** shows a lateral view of an embryo (size 2.5-3.0mm) at days 24 to 25 during folding, showing the large forebrain and the ventral position of the heart (from Moore & Persaud: *The Developing Human* 8th Edition). ***B,*** shows a drawing of a leech. Note the leech-like appearance of the human embryo at this stage.

A leech is an apt description of the early human embryo. The embryo clings to the endometrium or lining of the uterus (day 7) just as a leech clings to the skin.[29] The embryo is also surrounded by amniotic fluid just as the leech is surrounded by water.

If we consider the literal meaning of “leech” for *‘alaqah*, we find that during the third week, the embryo loses its round shape and elongates until it takes the shape of a leech. Figure 5 above and Figure 6 below clearly indicate that the shape of the embryo does in fact resemble a leech. At this stage the cardiovascular system has started to appear and the embryo is now dependent upon the maternal blood for its nutrition like a leech which feeds on the blood of others.[30]

[29] Moore (1986, pp. 15-16).

[30] As we see in Figure 3 the umbilical vein carries well-oxygenated blood and nutrients from the chorion sac to the embryo. The arteries carry poorly oxygenated blood and waste products to the chorionic villi for transfer to the mother's blood.

© Elias Kareem, 2000, 2012. All rights reserved

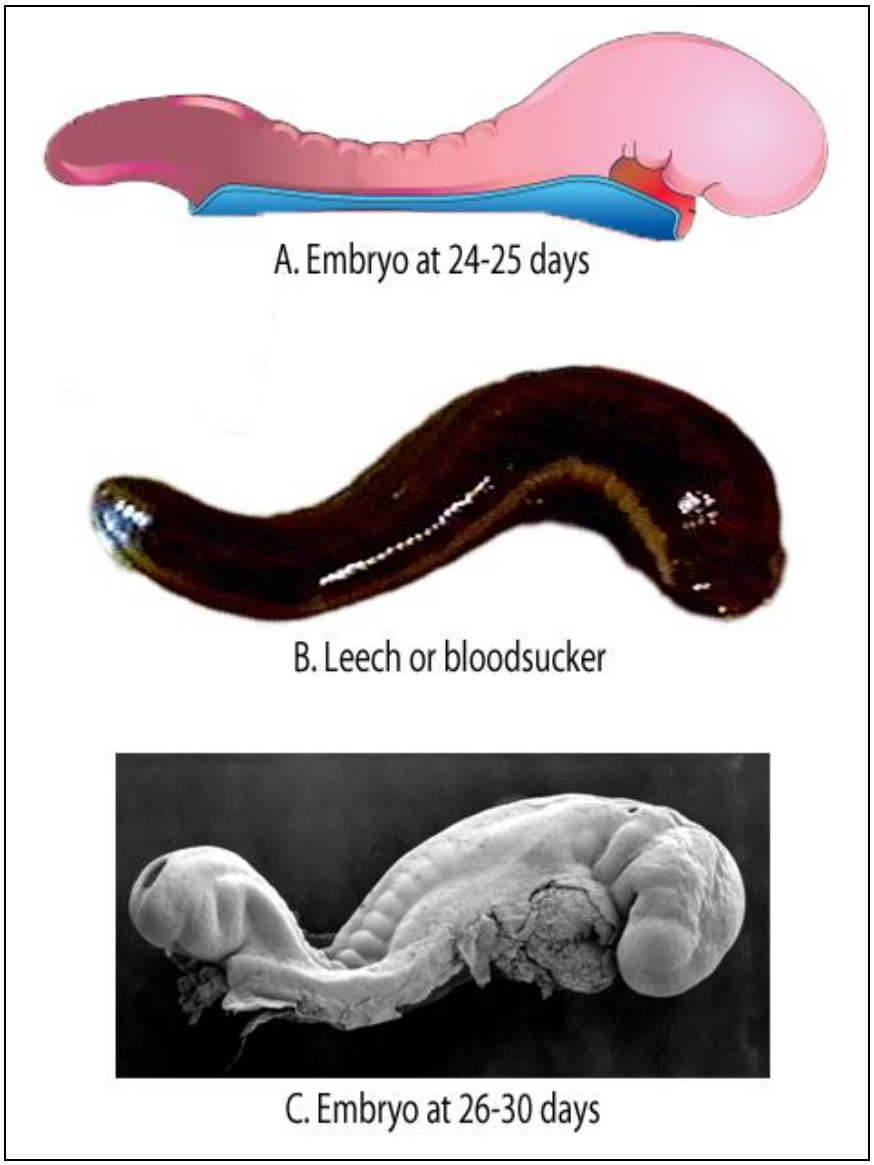


Figure 6 ***A,*** shows a lateral view of an embryo (size 2.5-3.0mm) at days 24 to 25. (Modified from Moore & Persaud: *The Developing Human* 8th Edition) ***B***, Hirudo medicinalis, medicinal leech (modified from *The Human Body. The Incredible Journey from Birth to Death*, © BBC Worldwide Ltd, 1998) ***C,*** Scanning electron micrograph of an embryo at Week 4, 26 - 30 days. (Professor Kathy Sulik, The University of North Carolina). Note the leech-like appearance of the human embryos at this stage.

In *The Human Body: The Incredible Journey from Birth to Death*, Professor Lord Robert Winston[31] also describes the embryo in a similar way. Lord Winston demonstrates how the embryo obtains nourishment from the blood of the mother which is similar to a leech which feeds on the blood of others (Figure 7):

> "[The leech] takes whatever it needs to live by sucking the blood of whatever it can latch onto; in this case that's me! As it sucks my blood, it takes from it all that it needs to live, it literally lives off me and the whole of pregnancy is shaped by a similar kind of parasitic

[31] Lord Winston is Professor of Science and Society and Emeritus Professor of Fertility Studies at Imperial College, London. http://www.robertwinston.org.uk/.

© Elias Kareem, 2000, 2012. All rights reserved

relationship. Unlike the leech, the developing embryo doesn't suck the mother's blood but it does raid her blood for the raw materials it needs to grow. From the word go both leech and embryo are out for themselves."[32]



Figure 7 Presenter Professor Lord Robert Winston with a blood sucking leech *('alaqah)* attached to his forearm. Professor Winston shows how the embryo obtains nourishment from the blood of the mother, similar to the leech which feeds on the blood of others. (*The Human Body. The Incredible Journey from Birth to Death*, © BBC Worldwide Ltd, 1998).

Similarly, in *Anatomy Demystified* the early embryo is described as worm-like in appearance which is nourished by the mother's maternal blood supply:

> Another membrane becomes the *yolk sac,* which provides nourishment for the early embryo. By 24 days, a *connecting stalk* appears in the middle of the now **worm-like body**. The yolk sac hangs off to one side of this connecting stalk. Both attach to the primitive *placenta* (plah-SEN-tah), a "flat cake" (*placent*) **of highly vascular (blood vessel-rich) tissue that nourishes the developing embryo and later, the fetus.**[33]

It takes about a week from the beginning of implantation (day 6) for the connecting stalk to form (day 14 or 15), such that the embryo becomes "attached and hanging". It takes about 10 days for the notochord[34] to begin development (day 16) in order for the embryo to take on the appearance of a leech.

[32] Lord Winston in BBC Woldwide (1998).

[33] Layman (2004, p. 366).

[34] A rod-like column of cells. It is the first indication of the future vertebrae of the spinal column.

© Elias Kareem, 2000, 2012. All rights reserved

5.4 A segmented body like a Leech

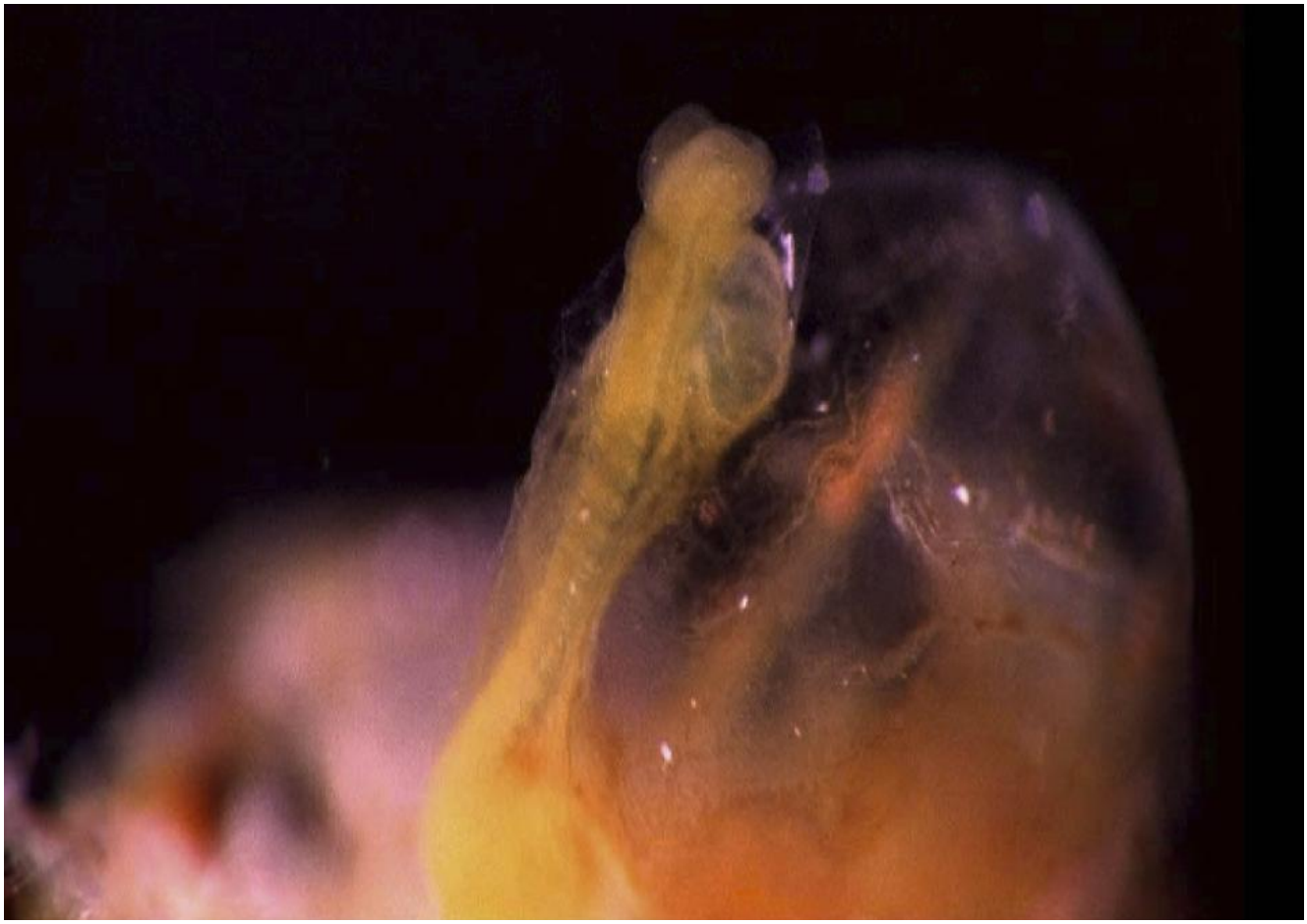


Figure 8 Photograph of a human embryo during the fourth week with visible body segmentation. (*The Human Body. The Incredible Journey from Birth to Death*, © BBC Worldwide Ltd, 1998) .

The body of the leech is divided into a number of segments which gives rise to a ringed appearance of the body, hence the name "ringed worms."[35] The human embryo is also segmented just like a leech or worm as Professor Peter Nathanielsz describes in *A Time to be Born: The Life of the Unborn Child*:

> By the end of the third week the **embryo has undergone segmentation, rather like an earth worm,** and now consists of zones like stacked circular tires. Each segment will give rise to a different part of the body's long axis. The repetition of structures in segments is best seen in the chest. There, each vertebra and the attached rib is produced from one embryonic segment.[36]

The segments of the embryo consist of somites (Figure 9), cell masses which develop into ribs, vertebrae and back muscles:

---

[35] Garwood and Campbell (2007).

[36] Nathanielsz (1994, p. 22). Peter W. Nathanielsz is a Professor at the Laboratory for Pregnancy and Newborn Research, Cornell University, Ithaca, USA. "Professor Nathanielsz was amongst the handful of pioneers who assisted at the birth about thirty years ago of the new discipline of fetology and has remained at the forefront of what is now an enormous field. His laboratory has contributed many of the technical advances that now allow the most intimate details of fetal life to be examined with a precision equal to that of a cosmologists' radio-telescope." (ibid, vii).

© Elias Kareem, 2000, 2012. All rights reserved

> Somites are bilaterally paired blocks of mesoderm that give the embryo a segmented appearance... Somites begin to appear by day 20, and number 42-44 pairs by day 35. Beginning in week 4, each somite subdivides into three tissue masses: a **sclerotome**, which surrounds the neural tube and gives rise to bone tissue of the vertebral column; a **myotome**, which gives rise to muscles of the trunk; and a **dermatome**, which gives rise to the dermis of the skin and to its associated subcutaneous tissue.[37]

5.5 The gut like a "straight tube"

The third week is characterized by the development of the three germ layers followed by the formation of three important structures (the primitive streak, the notochord, and the neural tube). During development, cells form three germ layers: the *ectoderm* is the outermost layer, the *mesoderm* is the middle layer, and the *endoderm* is the innermost layer. These three germ layers give rise to all the tissues and organs of the embryo (Figure 10). These layers curl to form a tube-like structure which Anthony Smith, in *The Human Body*, also likens to a worm:

> There are three layers much like a cake with filling in the middle. These three layers then curl to form a tube. **The early embryo is like a worm, with a gut running from one end to the other,** an outer covering also running from end to end and a central layer filling the space between the two.[38]

Ted Zerucha in *Human Development* also describes the gut of the embryo as a tube:

> If one imagines what a cross section through a human body looks like in a very general sense, it would likely resemble something similar to that shown in [Figure 10]. Running through the body, along the anterior-posterior axis, is the gut. **The gut is essentially a tube that runs from the mouth, through the digestive system, to the anus.**[39]

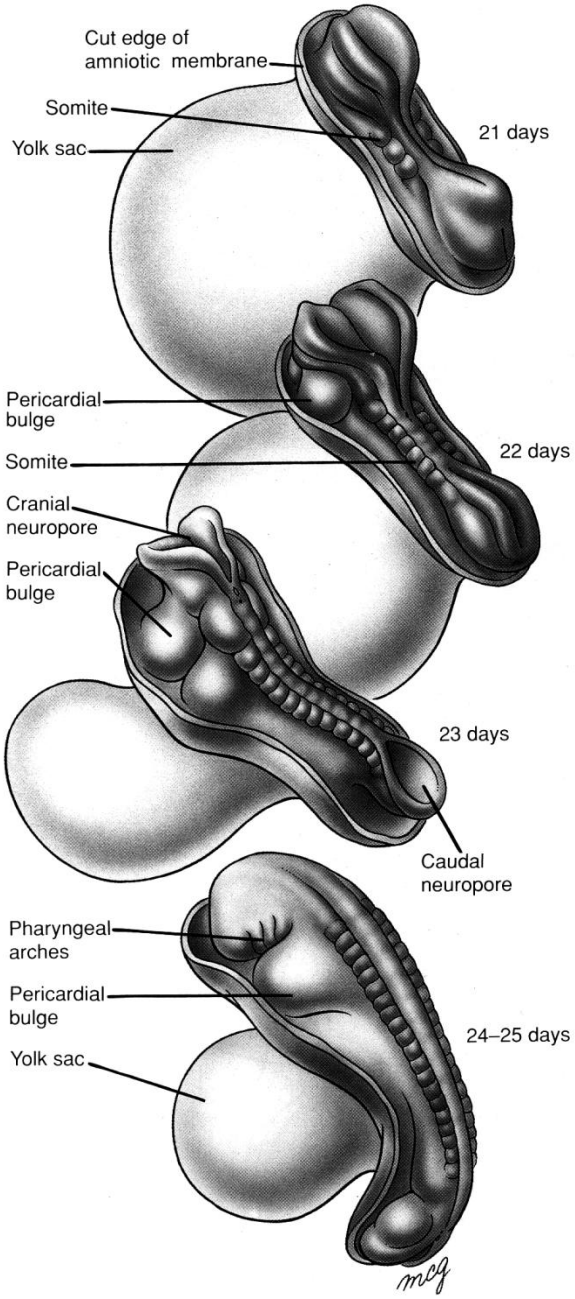


Figure 9 Human embryos during the fourth week, approx. 21-25 days. Note the segments or somites and the leech-like appearance of the embryos. (From Larsen, William J., *Human Embryology*, 2nd ed., Churchill Livingstone, Inc., 1997, p. 75).

[37] Saladin (2007, p. 114).

[38] Smith (1998, p. 38).

[39] Zerucha (2009, p. 52).

© Elias Kareem, 2000, 2012. All rights reserved

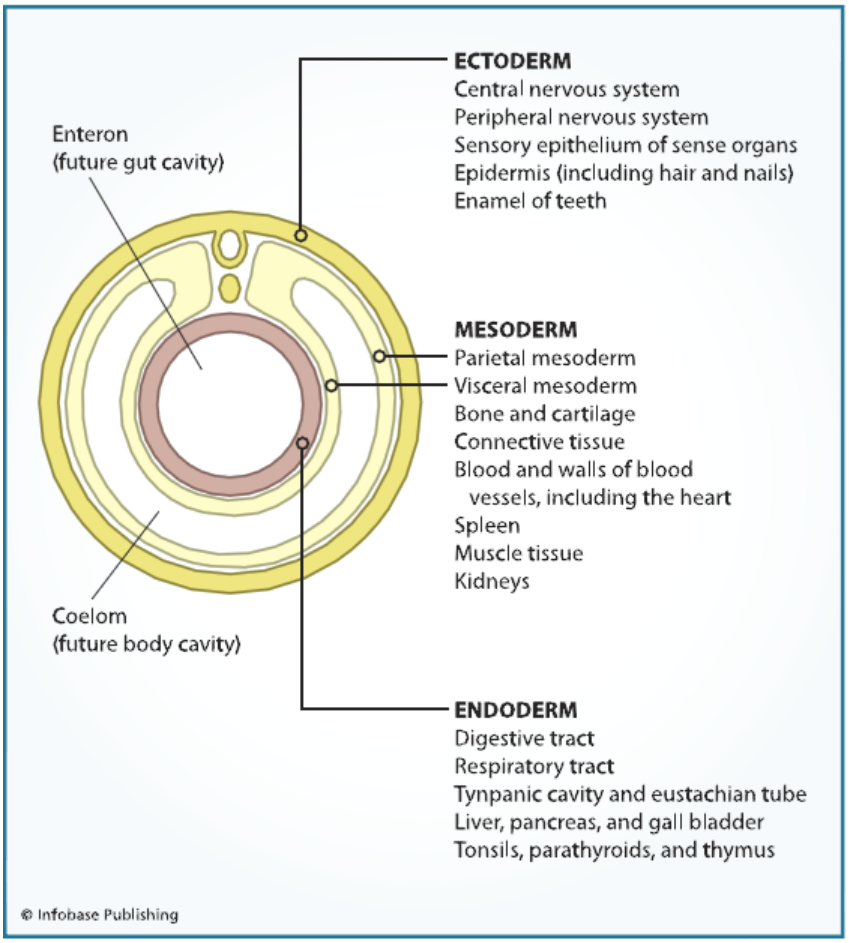


Figure 10 A diagrammatic representation showing the relative positions of the three germ layers and their derivatives. The enteron and coelom form the gut and body cavities, respectively. The **ectoderm** forms the central and peripheral nervous systems, as well as skin cells (epidermis). The **mesoderm** forms many essential organs, including bone, blood, heart, spleen, and kidneys. The **endoderm** forms the remaining organs, as well as the digestive and respiratory tracts. (From Ted Zerucha, *Human Development, 1999,* page 53).

The tube-like depiction of the embryo's gut is not unlike that of an annelid as described in *The Columbia Encyclopedia*:

> The digestive system of annelids consists of an **unsegmented gut that runs through the middle of the body from the mouth, located on the underside of the head, to the anus,** which is on the pygidium [the posterior terminal region]. [40]

[40] "Annelida" in The Columbia Encyclopedia (2008).

© Elias Kareem, 2000, 2012. All rights reserved

5.6 The anatomical structure of the Leech

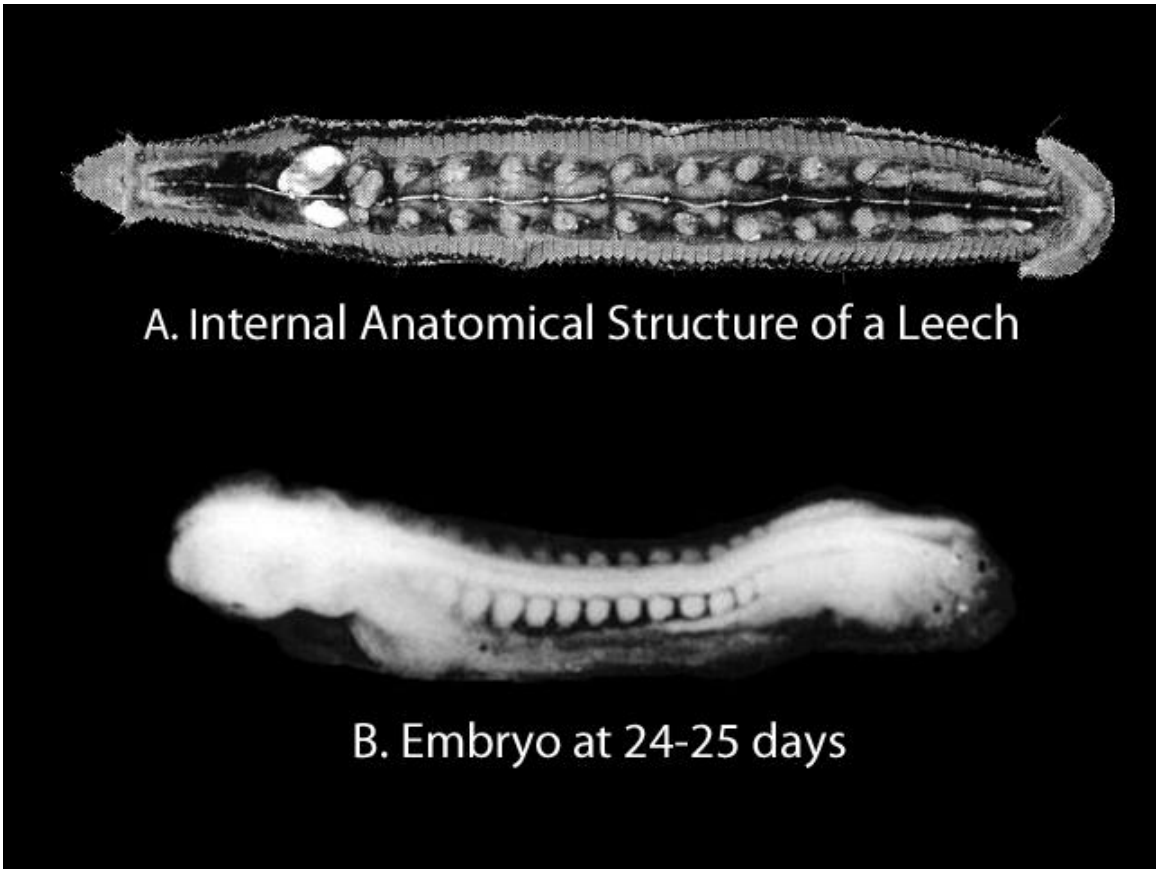


Figure 11 ***A,*** Ventral dissection showing the internal anatomical structure of a leech. (From J.G. Nicholls and D. Van Essen. *The nervous system of the leech*, 1974, Scientific American 230:38-48.) ***B,*** Dorsal view of a 13-somite embryo at approximately 24 days, actual size 3.0mm. (From Professor Hideo Nishimura, Kyoto University, Kyoto, Japan). Note the remarkable similarity in appearance between the human embryo and the internal structure of the leech.

If we examine the anatomy of the leech we find that the appearance of its internal structures is also similar to that of the human embryo:

- **Figure 11** ***A*** shows a ventral view of a dissected medicinal leech. Note how the body is made up of a number of similar segments which resemble the somites in human embryos.

  Figure 11 ***B*** shows an embryo at 24-25 days. The actual size of the embryo at this stage is just 3.0mm.

- **Figure 12** ***A-C*** showing dorsal views of embryos during the third and fourth weeks.

  Figure 12 ***D***, illustrations of the internal structure of the leech. Note the remarkable similarity in appearance between the embryos and the anatomy of the leech.

Due to the small sizes of the embryos involved, scientists could not have recognised the detailed features of the *'alaqah* stage as there were no microscopes or lenses available in the seventh century.

© Elias Kareem, 2000, 2012. All rights reserved

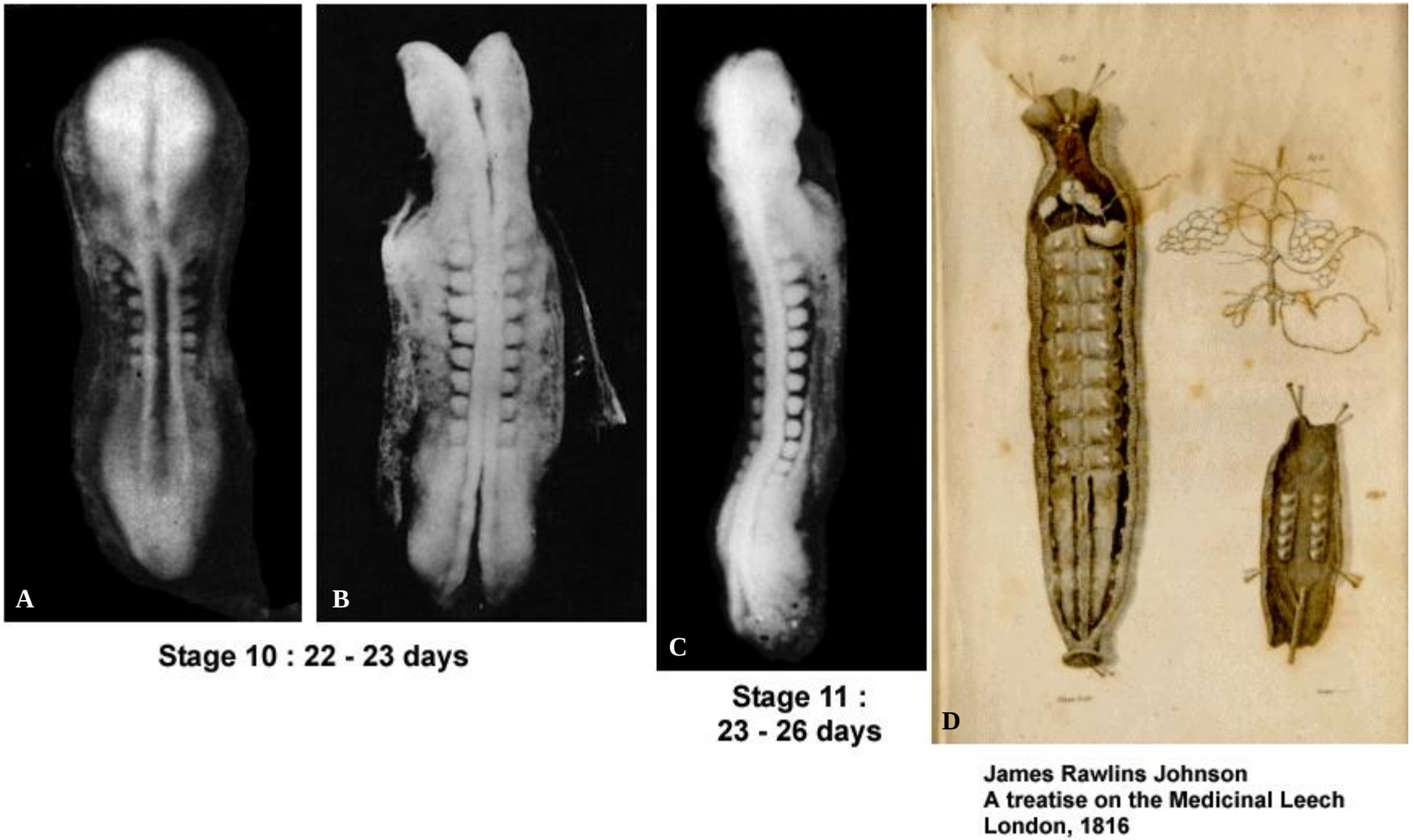


Figure 12 Dorsal views of embryos during the third and fourth weeks. ***A,*** Dorsal view of a 5-somite embryo, actual size 2.5mm. ***B,*** Dorsal view of an older eight-somite embryo, actual size 3.0mm. ***C,*** Dorsal view of a 13-somite embryo at approximately 24 days, actual size 3.0mm. (Photographs from Professor Hideo Nishimura, Kyoto University, Kyoto, Japan.) ***D,*** The anatomical structure of the leech. (Illustrated by James Rawlins Johnson, *A Treatise on the Medicinal Leech,* London, 1816. (Rare – In process) UCLA Biomedical Library: History and Special Collections for the Sciences).

6. SUMMARY

The Qur'anic term *ʿalaqah* is a **comprehensive expression** for the second stage of embryonic development that descriptively encompasses the primary external and internal features. In this one word the general shape of the embryo as a leech is described, the internal events such as the formation of blood and closed vessels are described, and the attachment of the embryo to the placenta is also brought to mind.

The similarity between the embryo and leech is remarkable:

- the external shape of the leech resembles an embryo at 22-25 days (Figure 5 and Figure 6)
- the internal structure of the leech resembles an embryo of 22-26 days (Figure 11 and Figure 12)
- the embryo clings to the lining of the uterus similar to a leech that clings to the skin (Figure 1)
- the embryo obtains nourishment from the blood of the mother (Figure 3), similar to the leech which feeds on the blood of others (Figure 7)
- the embryo has a segmented body like a worm or leech (Figure 9)
- the early embryo further resembles a leech in that it has a tube-like gut running from one end to the other (Figure 10)

The Qur'anic term *ʿalaqah* refers to the embryo when it is extremely small. The *ʿalaqah* is just 0.7-3.0mm in length. Due to the small sizes involved scientists could not have recognised the detailed features of the *ʿalaqah* stage until the second half of the 19th century and the beginning of the 20th:

> "Even as recently as the nineteen-thirties... the details of human conception and reproduction were largely a scientific mystery, an inaccessible series of poorly understood events that took place deep in a mother's womb."[41]

> "It is remarkable how much the embryo of 23-24 days resembles a leech. As there were no microscopes or lenses available in the 7th century, doctors would not have known that the human embryo had this leech-like appearance. In the early part of the fourth week, the embryo is just visible to the unaided eye because it is smaller than a kernel of wheat."[42]

© Elias Kareem, February 2012. All rights reserved.

[41] Edwards (1989, Forward). Nobel Prize winner Robert Edwards, who devised the fertility treatment IVF. http://www.nobelprize.org/nobel_prizes/medicine/laureates/2010/edwards.html.

[42] Moore (1986, p. 16).

BIBLIOGRAPHY

Abdel Haleem, M. A. (2005). *The Qurʾan*. New York: Oxford University Press.

Ali, A. Y. (1938). *The Holy Qur'an: Text, Translation and Commentary*. Cairo: Al-Manar.

Allan, J., & Kramer, B. (2010). *The Fundamentals of Human Embryology* (2nd ed.): Wits University Press.

Arberry, A. J. (1998). *The Koran*. Great Britian: Oxford University Press.

Aṣ-Ṣābūnī , M. A. (1980). *Ṣafwat Al-Tafāsīr* (Vol. 2). Beirut: Dar al-Qur'ān al-Karīm.

BBC Woldwide. (1998). The Human Body. The Incredible Journey from Birth to Death [VHS]: BBC Woldwide Ltd.

Blue Letter Bible.). Dictionary and Word Search for *ʻaluwqah* (Strong's 5936), from http://www.blueletterbible.org/lang/lexicon/lexicon.cfm?Strongs=H5936&t=ESV

De Somogyi, J. (1950). Ad-Damīrī's Ḥayāt al-ḥayawān : An Arabic Zoological Lexicon. *Osiris, 9*, 33-43.

Drews, U. (1995). *Color Atlas of Embryology*. Stuttgart: Thieme.

Edwards, R. (1989). *Life Before Birth: Reflections on the Embryo Debate*. London: Hutchinson.

Funk & Wagnalls New Encylopedia. (1995) *Funk & Wagnalls New Encylopedia* (CD-ROM Edition ed.): SoftKey Multimedia Inc.

Garwood, P. R., & Campbell, A. (2007). "Segmented Worms". *The Encyclopedia of Underwater Life.* Oxford Reference Online. Retrieved 31 October 2011, from http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t229.e39

Gluck, J. J. (1964). Proverbs XXX 15a. *Vetus Testamentum, 14*(3), 367-370.

Govedich, F. R., & Bain, B. A. (2005). All about the Leeches of Montezuma Well. Retrieved 29 January 2012, from http://www.nps.gov/moca/naturescience/upload/Montezuma_Well_Leeches.pdf

Hirsch, E. G., Casanowicz, I. M., Jacobs, J., & Schloessinger, M. (1906). "Hapax Legomena". *Jewish Encyclopedia* Retrieved 01 January 2012, from http://www.jewishencyclopedia.com/articles/7236-hapax-legomena

Hussain, S. (1980). The Clot (al-ʻAlaq). *The Islamic Quarterly, 24*(3-4).

Ibn Kathīr. (1980). *Tafsīr Al-Qur'ān Al-'Azīm* (1st ed. Vol. 3). Beirut, Lebanon: Dār Al-Fikr.

Johnson, J. R. (1816). *A Treatise on the Medicinal Leech, including its medical and natural history* (Historical Print Edition, March 2011 ed.). London: British Library.

Kaltner, J. (1996). *The Use of Arabic in Biblical Hebrew Lexicography*: Catholic Biblical Association of America.

Layman, D. P. (2004). *Anatomy Demystified*. New York: McGraw-Hill Professional ; London : McGraw-Hill.

Levey, M. (1966). Medieval Arabic Toxicology: The Book on Poisons of ibn Wahshīya and Its Relation to Early Indian and Greek Texts. *Transactions of the American Philosophical Society, 56*(7), 1-130.

Moore, K. L. (1986). A Scientist's Interpretation of References to Embryology in the Qur'an. *Journal of the Islamic Medical Association, 18*, 15-16.

Moore, K. L., & Persaud, T. V. N. (2007). *The Developing Human : Clinically Oriented Embryology* (8th ed.). Philadelphia, PA: Saunders/Elsevier.

Nathanielsz, P. W. (1994). *A Time to be Born: The Life of the Unborn Child*. Oxford: Oxford University Press.

Saheeh International. (1997). *The Qur'an: Arabic Text with Corresponding English Meanings*. Jeddah: Abul-Qasim Publishing House.

Sahin, H. (2006). "Alaq". In O. Leaman (Ed.), *The Qur'an: An Encyclopedia*: Routledge.

Saladin, K. S. (2007). *Human Anatomy* (International ed.): McGraw-Hill

Saraga-Babic, M., & Sapunar, D. (n.d.). "Formation of the germ layers". *Atlas of Human Embryology* Retrieved 15 January 2012, from http://www.embryo.chronolab.com/formation.htm

Simelidis, C. (2011). The Byzantine Understanding of the Qurʾanic Term al-Ṣamad and the Greek Translation of the Quran. *Speculum, 86*(04), 887-913.

Smith, A. (1998). *The Human Body: The Incredible Journey from Birth to Death* (1 ed.): BBC Books.

The Columbia Encyclopedia. (2008). *The Columbia Encyclopedia, Sixth Edition* Retrieved November 6, 2011, from http://www.encyclopedia.com/doc/1E1-Annelida.html

Yeh, J. (2002). "Annelida". *Animal Sciences* Retrieved 23 November 2011, from http://www.encyclopedia.com/doc/1G2-3400500023.html

Zerucha, T. (2009). *Human Development*. New York: Chelsea House Publishers.

Zindani, A. A., Ahmed, M. A., Tobin, M. B., & Persaud, T. V. N. (1994). *Human Development as Described in the Qur'an and Sunnah*: Islamic Academy for Scientific Research.

All images reproduced in this essay from the stated sources are under the provisions of the copyright law.
© Elias Kareem. All rights reserved.
No part of this publication may be reproduced for commercial purposes.