

CORRESPONDENCES OF THE DEVELOPING HUMAN FORM

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INTRODUCTION

The human form, to be fully understood, must be seen dynamically, as a process. It is not a static arrangement of forms, but the lens on which all activity in the universe converges and from which it radiates. Each thread of activity consists of two strands, one spiritual and one natural, which are bound together by correspondence and are essential to one another. In following the strands of human development attentively, we can see where and how they touch each other.

In *True Christian Religion* 230 we are warned against drawing doctrine from the internal sense of the Word, knowledge of which is obtained from correspondences. In this study I am not drawing doctrine from correspondences (especially made-up ones), but drawing tentative correspondences from doctrine. It is not easy to distinguish truth from falsity in this endeavor, or to say whether a particular correlation is merely metaphor or actual correspondence. However, it is altogether too easy to distort both science and doctrine for the sake of a closer fit between them. I am sure I have distorted from ignorance, and I have certainly distorted in the interest of simplification. In fact, as this study progresses, I recognize that isolating bits of knowledge in the spiritual and natural planes respectively, and drawing rigid, one-to-one, linear parallels between them, is a simplistic approach. The real universe is far too rich and subtly woven to fit into such a framework and keep its true shape. But with our limited view we cannot see all things at once in their staggering fullness and perfection. If we keep its limitations in mind, such a model as I have employed can shed light. Indeed, an oversimplified view, being easily held in the mind, can aid understanding; finding where it approaches and where it falls short of the truth guides the mind, by virtue of its own coherence, through an otherwise bewildering tangle of complexities. I intend to point out not only the aptness of the parallels I draw, but also the discrepancies, puzzling facts, and unanswered questions.

The following table illustrates the diversity of the human form:

	<i>Natural</i>	corresponds to	<i>Spiritual</i>						
Individual:	Body		Soul						
Individual Sequence:	<table border="0" style="width: 100%; text-align: center;"> <tr> <td style="width: 50%;">Gestation</td> <td style="width: 10%; font-size: 2em;">↔</td> <td style="width: 50%;">Regeneration (Marriage)</td> </tr> <tr> <td style="border-left: 1px solid black; border-right: 1px solid black;">Evolution</td> <td style="font-size: 2em;">↔</td> <td style="border-left: 1px solid black; border-right: 1px solid black;">Five Churches (History)</td> </tr> </table>			Gestation	↔	Regeneration (Marriage)	Evolution	↔	Five Churches (History)
Gestation	↔	Regeneration (Marriage)							
Evolution	↔	Five Churches (History)							
General Sequence:									
Final Form:	Anatomy		Grand Man of Heaven						
Creation:	Natural Universe		Spiritual World						
Word:	Literal Sense		Internal Sense						
Union of:	Understanding		in Creation						
	Female and Male		in Man						
Love and Wisdom	Egg and Sperm		in Marriage						
Substance and Form	Heart and Lungs		in Conception						
Will and	in the Lord		in Body (at birth)						

Each item on this chart embodies an aspect of the human form, so we can draw a parallel between any two of them. Those items directly opposite each other in the first half of the table are assumed to be direct correspondences.¹

I am going to focus on the sequential aspects of the human form (those boxed in the table)—the processes of evolution, gestation, human history, and regeneration—and on the parallels between each possible pairing of these (see arrows), particularly the correlation between gestation and regeneration. These parallels rest on the assumption that the soul and body correspond (AC 6319), and their exposition requires a knowledge that each bodily organ represents a heavenly use—in short, the anatomy of the Grand Man.

THE HUMAN FORM IN SWEDENBORG'S WRITINGS

First let us look at what the Writings say about the human form in all aspects of creation, and about man's formation, particularly with respect to the interaction of the soul and the body.

¹ In connection with this, see the table on p. 100 ("The Seven Days of Mental Growth") of George de Charms, *The Growth of the Mind*, Academy Book Room, Bryn Athyn, Penna., 1953, in which he shows the parallel between mental growth in childhood, the Creation story, the entire Old Testament, and the life of the Lord, each divided into seven stages.

The Human Form in Creation

God Himself is in the human form. He is Substance itself and Form itself, the only true substance and form (TCR 20). Since this form is the human form, God is the true Man.

The nature of this form is the conjunction of love and wisdom. "The human form, from creation, is in its inmosts a form of love and wisdom" (CL 361), "and this form in itself considered is Divine" (DLW 389). Love and wisdom are united in the Lord, and the human form in man is according to his reception of good and truth from the Lord (HH 460) and the degree to which he unites them in himself. Love and wisdom are conjoined in use, which is their "complex, containant, and base" (DLW 213). The human form would not be complete without use.

The human form is not only, though most fully and perfectly, in God and man, but in all creation:

The universe in greatest and least things, and in first and last things, is so filled with Divine Love and Wisdom that it is...Divine Love and Wisdom in an image...from the correspondence of all things of the universe with all things of man. Each and every thing which exists in the created universe has such a correspondence with each and every thing in man, that...man also is a kind of universe (DLW 52).

Since "the Divine is the same in greatest and least" (DLW 79), the human form of the whole creation is expressed in every part of it. In every event or object of this world there is a conjunction of love and wisdom. Even in the very existence of a stone, substance and form unite. Many levels of this universal conjunction, the marriage of good and truth, occur both within and outside man. Not only the whole of creation, but the solar system, the earth, nations, societies, animal populations, food chains—each expresses the human form in a different way. And within the body, the heart alone, the lungs alone, the heart and lungs together, the digestive system, each organ, each tissue, each cell, and each molecule and atom, whether inside or outside the human body, express the human form.

Everything that is whole and displays organization and the working together of its parts reflects the human form. Everything that contributes to the preservation of human life has a human use, and through it reflects the human form.

As for the spiritual world, the Writings stress over and over again that heaven is in the form of a man. "Heaven is like itself in general

and in particular, and the human form is the form of the whole, of every society, and of every angel" (HH 460). In the Grand Man of Heaven, the heart and lungs correspond to love and wisdom and to the will and understanding in the individual, and rule in the body as to good and truth in creation (AC 3889). The right side of the body, and the right side of each organ, and the right organ or member of every pair, relate to the good of love, and the left to the truth of faith (DLW 384).

The cycle of descent and ascent in creation is a dynamic aspect of the human form. Ascent leads to conjunction with the Lord: "The end of creation exists in ultimates, which end is that all things may return to the Creator, and that there may be conjunction" (DLW 167). In order for this to be a reciprocal conjunction, God had to create a universe outside of Himself, for it was necessary that man be created truly distinct from God, as *Divine Love II* shows:

The uncreated and infinite is the very Divine in itself. Out of this man cannot be formed, for in such case he would be the Divine in itself; but he can be formed out of things created and finite, in which the Divine can be, and to which it can communicate its own life...by heat and light.

This is accomplished by ascent from absolute ultimates. "Out of the earth forms of uses are continually being raised by the Lord the Creator, in their order up to man, who as to his body is also from the earth" (DLW 171). The same work gives a comprehensive picture:

The universal end...of creation is that there may be an eternal conjunction of the Creator with the created universe, and that is not possible unless there are subjects in which His Divine can be as in itself, thus...can dwell and abide. And these subjects,...that they may be His dwelling-places..., must be recipients of His Love and Wisdom as of themselves, to elevate and conjoin themselves. ...The uses of all created things ascend by degrees from ultimates to man, and through man to God the Creator from whom all things are (170).

It is use through which the cycle is perpetuated and renewed. All effects, or ultimate ends, become first ends in a continuous series from the Lord, who is the First, to the ultimate end, the conjunction of man and God (DLW 172). The ascent of good and truth from ultimates back to their source, God's Love and Wisdom, is effected by the "enjoyment of uses" (DLW 316), and by their flowing back to

the source of love whence they spring, the cycle is completed and conjunction effected. There is a stirring toward uses in ultimate things, since the Lord brings all uses out of ultimates (DLW 310e). This is necessary, as was said, for reciprocal conjunction. And since use is the medium of conjunction of love and wisdom in the human form, it follows that ultimates are in conatus toward the human form.

Man is the means by which creation ascends back to the creator and is conjoined with Him; and this occurs through use. Man is the complex of all uses, and every use is like a man, for man receives life from the Lord, which is the complex of all uses (D. Love V:iv).

The idea that the conjunction of love and wisdom in man leads to conjunction with God is implied in *True Christian Religion* 3, which speaks of the articles of faith of the New Church. The final particular refers to "the union of charity and faith, and thereby of the Lord and man." The Lord constantly strives to unite charity and faith, or love and wisdom, in man, for this union makes possible mans reception of and conjunction with Him.

And finally, "The most perfect and the noblest human form is when two forms become one form by marriage, thus when the flesh of two becomes one flesh according to Creation" (CL 201). This is because male and female were created to be the very form of the marriage of good and truth.

In *Divine Love and Wisdom* 314e the cycle is summarized well: "The progression of the creation of the universe was from its first, which is the Lord encircled by a sun, to ultimates which are earths, and from these through uses to its First, that is the Lord." Since this is the progression of creation, it is the progression of the human form—the human form unfolding in time. The cycle of descent and ascent is the path of the human form through creation.

This cycle both includes man and occurs within him. When we apply it to creation as a whole, man fits in on the ascending side, for he is the means to the conjunction of God with creation. In *Divine Love and Wisdom* we read: "The uses of all created things ascend by degrees from the lowest things to man, and through man to God the Creator from whence they are" (65).

Mans existence is made possible in the first place by the prior reception and conjunction of God's love and wisdom in the lowest things of nature. The lowest conjunction leads to the highest conjunction. This cycle applies to all parts of creation, most notably man, in whom it happens both once and many times. Each time he

learns truth and applies it to life from genuine affection, a cycle is completed, each cycle contributing to the next one and to the larger cycle of his life as a whole.

This comprehensive cycle begins with the descent of the soul from God through the father, where it clothes itself in seed. The ultimate conjunction is the physical union of the egg and sperm at conception, which immediately sets up the potential for eternal human life (in itself an ascent), and serves as a basis for all that follows. The embryo whose life is thus begun forms from the head down, and begins to function physically as an ultimate expression of the soul's life. At birth the conjunction of the activities of the heart and lungs forges the permanent connection of the body with the soul which formed it.

In infancy the highest remains are implanted; as the child ascends in strength and intelligence, the influx of life from the Lord grows less direct, entering first through celestial, then spiritual, and finally through natural angels. When regeneration begins, the three degrees of the mind are opened successively, from the lowest to the highest. In all these processes, descent and ascent occur simultaneously and facilitate one another; the nesting of smaller cycles within larger ones shows that "greatest are contained in leasts" (DLW 79). Later we will see what an important part this cycle plays in every aspect of human prenatal development. With this circular progression in mind, we will now look at how man is formed by the descent of the soul into the body.

The Formation of Man

In *Divine Wisdom* VIII:iii we read: "All Divine influx is from first things into ultimates, and through a connection with ultimates into intermediates, and thus the Lord binds together all things of creation." This is exemplified by man's place in creation, on the ascending side (see DLW 65, above); God created man through ultimates. The formation of the individual man shows it even more vividly, for in the womb the soul forms the body, and the interaction of the soul and body gives rise to the spirit, wherein man's consciousness and freedom reside. Every internal is in its fulness in ultimates, and so it is with the soul and body.

The soul in its essence is love, or the will (AC 10076⁴), which strives unceasingly towards the human form (DLW 400). "Love is the very being of man, and...forms man according to an image of itself.... The body is as the effect and the soul as the cause in which is the end; consequently the soul is the all in the body..." (AC 4727²).

The soul, being in the human form, fashions the body in that form: "The soul itself of man, because it is in the marriage of good and truth, is not only in the perpetual effort to that union, but is also in a perpetual effort to fructification and the production of its own likeness" (CL 355⁴). The soul is from the father, and wills to make the external, which the mother contributes, an image and likeness of itself (AC 671 6²).

The soul orders the working of the body:

Unless the soul in universals and singulars flowed into the viscera of the body, nothing could take place in the body with order and regularity, but when the soul flows in singularly and thus universally then all things are set in order of themselves (AC 6338e).

More specifically, the soul orders the body's formation. Man's beginning is his soul, which initiates and produces all things of the body in their order, and when that is complete, all the operations of the body (TCR 166). "Love and wisdom with use...propagate man; for in the seed of man is his soul, in perfect human form, covered over with substances from the purest things of nature, out of which a body is formed in the womb of the mother" (CL 183).

The soul, being man's inmost, is the first thing of man to receive influx from the Lord, and His life flows thence into the mind and the body. "In this way the marriage of good and truth flows into man from the Lord, immediately into his soul; and thence...to the things that follow..." (CL 101).

From all this it follows that the soul and body correspond. As stated in *Arcana Coelestia* 6319, the connection between the soul and the body is like the influx of the spiritual world into the natural, because man's soul or spirit dwells in the spiritual world, and his body inhabits the natural world; "thus it is according to correspondences."

The correspondence of the soul and body is basic to the correspondence of physical gestation with spiritual regeneration; and it also leads to the conclusion, not stated in the Writings but to my mind implied, that the biological evolution of man has a similar correspondence to human history, or the succession of the Five Churches. This conclusion is strengthened by the truth that each individual human life parallels that history (to be discussed later), and the correlation that can be made between evolution and gestation.

I will begin with the correspondence of gestation and regeneration, which underlies all the other parallels, and then I will briefly treat each of the others.

GESTATION AND REGENERATION

There is a likeness and analogy between the formation of man in the womb and his reformation and regeneration....[They are] altogether similar...with this difference only, that for a man to be reformed he must have will and understanding, while in the womb he has no will and no understanding.... Man is reformed and regenerated, and receives love in his will and wisdom in his understanding, from which two he was formed in the womb.... Through love and wisdom, which are the Lord, new things are born in a regenerate man as in a womb (D. Wis. V; see Appendix B).

In the womb, the vessels of the body are formed and disposed to receive the Lord and to be joined with an immortal soul. In regeneration the vessels or organic forms of the mind are modified to receive the Lord more and more interiorly.

In the entire process of gestation can be seen the Divine operation from primes through ultimates into mediates (see p. 452). I see prenatal life as divided into three stages which represent the soul, body, and operation, which are different from the usual division into three-month trimesters. The first stage, from conception to implantation, takes seven days. This is the period that marks the beginning of an individual human life, when the soul first enters into a vehicle suitable to express in ultimates its drive toward the human form. At the end of this stage the embryo is attached to the lining of the uterus, and only then does it begin to increase in size.

The interval between implantation and the end of the embryonic period is seven weeks long. This is the time of major organization of the body, from a simple, almost microscopic disc shape to something distinctly person-shaped. The end of the embryonic period is not as clear a cutoff point as implantation, but is usually considered to be when all organ primordia are present and all systems have begun to show their final form, about eight weeks after conception. Some important things that occur about this time are the beginning of the replacement of cartilage with real bone (seven weeks), first reflex movements (seven weeks), and the closing of the eyes (ninth week). At this point the embryo begins to show a finished appearance—

quite deceptive, of course. The previously bumpy contours of the head and back have smoothed and rounded out, and the limbs are well-molded (fig. 1).

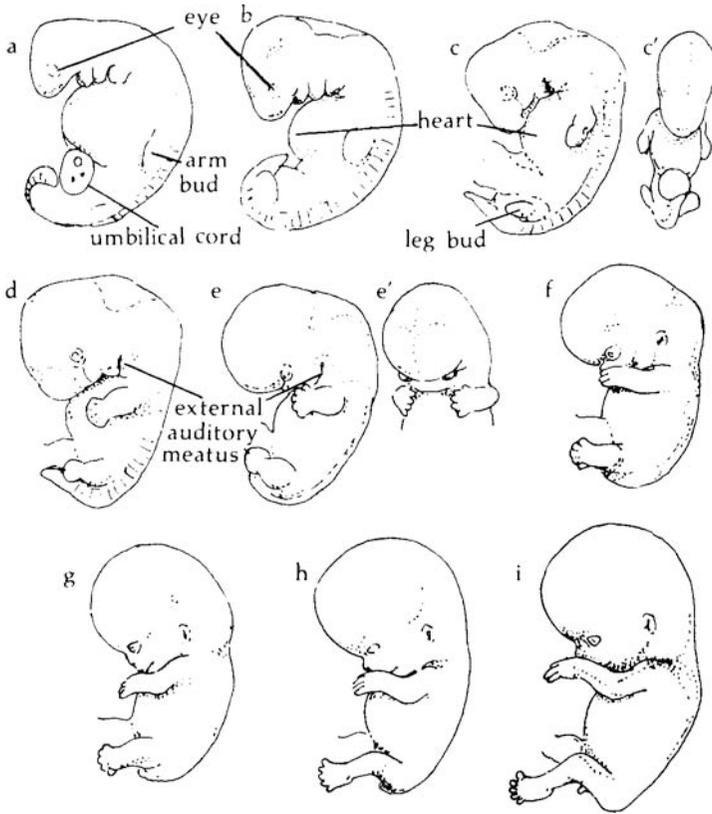


Fig. 1. Human embryos in the second month of development. Not drawn to scale, (a) 30 days; (b) 32 days; (c) 37 days; (d) 40 days; (e) 42 days; (f) 46 days; (g) 49 days; (h) 54 days; (i) 60 days. [All but (c') drawn from photographs, (a), (b), (c), (d), (f), (i) from Hamilton, *et al.*, *Human Embryology*, figs. 119-125; (c') from Blechschmidt, E., *The Stages of Human Development Before Birth*; (e) from *Encyclopedia Britannica*, 6:747; (e') from Nilsson, L., *A Child is Born*, p. 61; (g) from *Encyclopedia Britannica*; (h) from Flanagan, G. L., *The First Nine Months of Life*, p. 65.]

The final stage, from the beginning of the fetal period to birth, takes seven months. During this time the fetus exercises its muscles, learning to breathe and kick and suck; the brain and body are progressively integrated and come into a truly functional state. Various finishing touches are added: during the third month the face and genital organs begin to take on their definitive form; the eyes and ears continue to develop, and the lungs and brain continue to differentiate throughout fetal life; the relative sizes of head, trunk and limbs change markedly (fig. 2). This last period is largely devoted to a dramatic increase in size. In the fifth month, the middle of the gestation period, the fetus is increasing in absolute length more rapidly than ever before or after; but it must still increase its weight tenfold before birth.

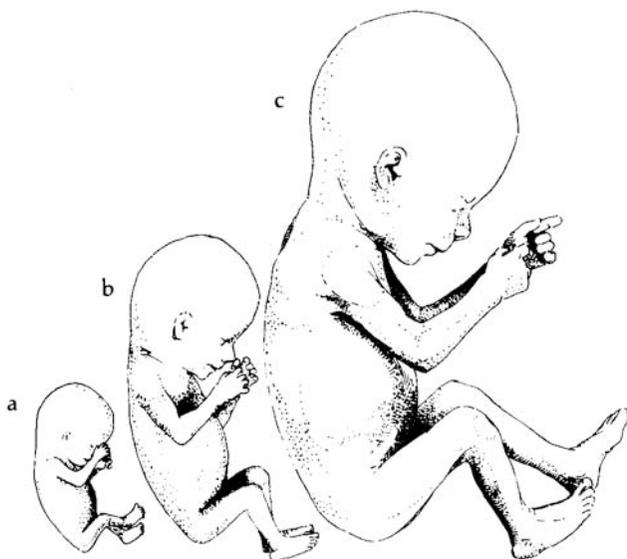


Fig. 2. Human fetuses in the third and fourth months of gestation. Half size, (a) 10 weeks; (b) 13 weeks; (c) 17 weeks. Note changes in size, proportion, and contour: the head now grows more slowly than the trunk and the limbs grow more quickly; the back straightens and there is more of a neck; the abdominal bulge caused by the heart and liver subsides. Tight quarters and the accumulation of fat will continue to modify the baby's appearance in the second half of pregnancy. (Drawn from photographs: (a) from Hamilton *et al.*, fig. 130; (b) and (c) from Moore, K. L., *The Developing Human*, figs. 6-7 and 6-8.)

The periods of gestation just described are three groups of seven—seven days plus seven weeks plus seven months. The first stage is the establishment of the soul's influx, the second the formation of the body from the soul, and the third the beginning of their union in operation.

Now let us take a closer look at the early events of prenatal life and their correspondential significance.

Conception and Implantation

Conception is the first and most basic union in embryonic development—the fusion of the germ cells, the egg and sperm. In conception, the union becomes more and more interior; first the joining of bodies, next the union of gametes, then the fusion of nuclei and finally the pairing-off of the chromosomes (fig. 3).

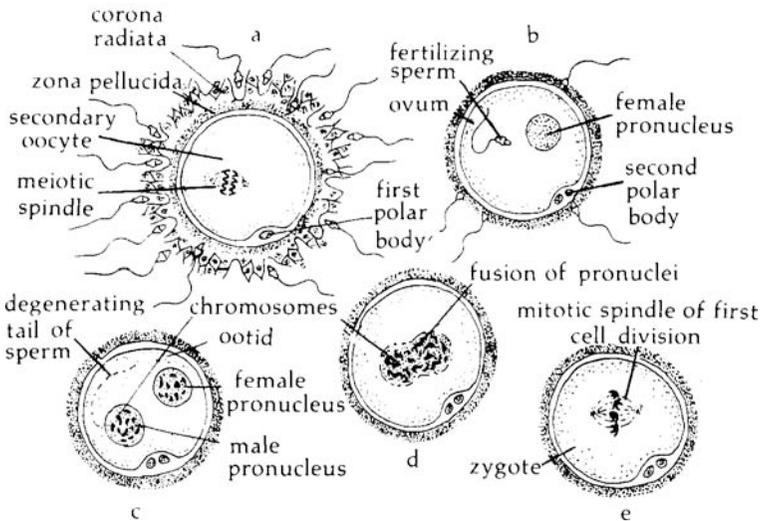


Fig. 3. Successive unions in fertilization. In (a), the secondary oocyte is still undergoing its final meiotic division, which is not complete until after the sperm has entered (b), and the second polar body is ejected. The corona radiata has disappeared. In (c), the sperm sheds its tail and its head enlarges to become the male pronucleus. In (d), the pronuclei are fusing to form the nucleus of the zygote (e), in which the chromosomes double and are aligned on a mitotic spindle in preparation for the first mitotic division. (Redrawn from Moore, fig. 2-12.)

It is possible that the egg actually chooses from the sperm surrounding it which have penetrated the corona radiata, the outer covering of the ovum, and are in contact with the egg's surface,² much as a woman chooses from among her suitors. With this in mind, the period after the sperm enters the egg but before the nuclei have joined can be considered parallel to the state of betrothal, when the choice has been made and consent given, but before the full union of marriage. Or alternatively, after the physical union has taken place but before the spiritual union is complete. In some ways that is a better analogy, because cytoplasm is the "body" of the cell, and the information-containing nucleus (the cellular brain, so to speak) is like its spirit.

The cell division which occurs in the next few days does not involve an increase in size or organization, but is simply a means of dividing the zygote into bite-sized chunks suitable for building blocks, for the undivided zygote is a single cell much larger than an average-sized body cell. This separation is necessary to later organization, which involves a higher, more complete union than that of mere single-celledness. This is one of the earliest examples of the cycle of descent and ascent in embryonic development, where it takes the form of alternate separation and fusion of body components. Shortly I will list examples of this process, but now let us press onward chronologically.

By now the dividing zygote has become a hollow ball of cells known as the blastocyst (fig. 4); it has traveled down the Fallopian tube and entered the cavity of the uterus. Implantation of the blastocyst into the uterine lining begins on about the seventh day after fertilization, as we noted before (fig. 5). The number seven, especially seven days, represents the completeness of one state and the beginning of another: in the case of the week-old embryo, the change from the free-floating state, when it depends on its own diminishing resources and is nourished by uterine secretions, to a definitive and more enduring union with the mother's body and the tapping of her blood supply. Again there is an analogy with betrothal and marriage, and indeed with birth, for at birth the soul is anchored to the natural world (as the embryo is anchored to the uterus) and becomes eternal.

² Robert D. Allen, "The moment of fertilization," *Sci. Amer.*, July 1959, p. 134.

Fig. 4. Sections of human blastocysts, (a) four days; the blastocyst is shedding the zona pellucida in preparation for implantation, and the blastocyst cavity has begun to form, (b) 4 1/2 days; the cavity is larger. The inner cell mass will become the embryo; and the trophoblast will form the amnion, chorion, and placenta. (Drawn from photographs in Moore, fig. 2-14.)

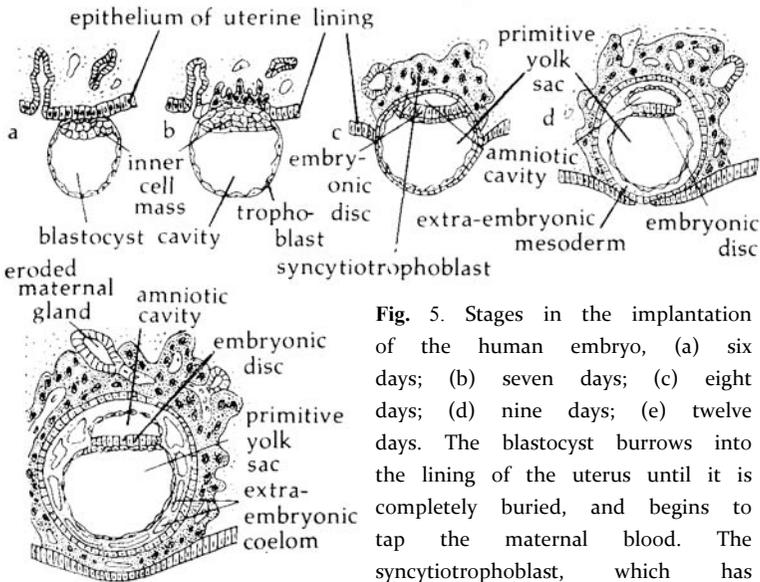
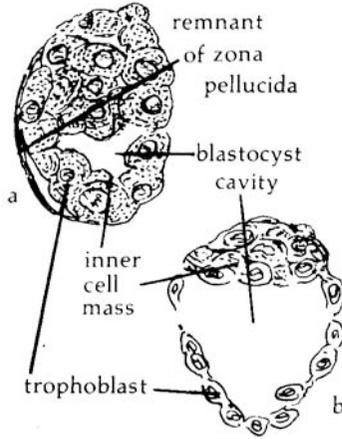


Fig. 5. Stages in the implantation of the human embryo, (a) six days; (b) seven days; (c) eight days; (d) nine days; (e) twelve days. The blastocyst burrows into the lining of the uterus until it is completely buried, and begins to tap the maternal blood. The syncytiotrophoblast, which has many nuclei but no cell boundaries, will eventually become the placenta. (Redrawn from Moore, figs. 2-15, 3-1, & 3-2.)

The Germ Layers of the Embryo

It is after implantation that real organization begins in the embryo, for now it has an abundant supply of nourishment. For a discussion of the correspondences of the three germ layers of the embryo, see my article, "The Human Form: Correspondences in Embryology."³ From it I quote the following:

...The three germ layers of the embryo appear to correspond to the three degrees of the human mind. Love, or the celestial degree, appears on the mesoderm, which develops into the heart, circulatory system, muscles, bones, and connective tissue. Wisdom, or the spiritual degree, is represented by the endoderm, which differentiates into the lungs, respiratory and digestive tracts. And use, or the natural degree, takes form in the ectoderm, from which the brain, spinal cord, nerves, and skin arise.

There are other interesting facts to note in connection with this: the generative organs, which correspond to conjugal love, arise from the mesoderm, while the actual germ cell primordia, which will eventually become eggs and sperm, originate in the endoderm of the yolk sac.⁴ This is another example of the interaction of mesodermal and endodermal derivatives as love and wisdom—the generative organs as love, and the germ cells, which are forms of truth, representing wisdom. The heart and lungs are the prototype of this interaction.⁵

Another fact to think about is that the first mesoderm that forms is outside the embryo. It lines the chorion, the outer fetal membrane, and is called the extra-embryonic mesoderm. It is continuous with the intra-embryonic mesoderm, which arises later. Since in the scheme I have proposed the mesoderm corresponds to love, this might signify that the first love of spiritual things implanted by the Lord through celestial remains is not man's own, and the more external vessels of life must be formed to make possible the free and active reception of love.

³ Linda Simonetti, "The human form: correspondences in embryology," *New Philosophy*, Jan.-June 1982, pp. 10-25.

⁴ Keith L. Moore, *The Developing Human*, Saunders, 2nd ed., Phila., 1977, p. 111.

⁵ Simonetti, *loc. cit.*, p. 17.

The point that truth is basic to this progression is illustrated by the fact that the first blood and blood vessels are formed in the endoderm of the yolk sac; later the liver, also an endodermal structure, becomes a primary source of blood, and it is quite a while before this function is taken over by the bone marrow, which originates in the mesoderm. Truth, like the development of the endoderm, is first in time.

Separation and Fusion

One of the most striking features of embryonic development is the alternate separation and fusion of bodily elements that continually takes place. As I have said, this represents the cycle of descent and ascent in creation. In each instance of this process, the separation paves the way for a more comprehensive union—a joining of complementary structures for the performance of a use.

The beginning of the Creation story in Genesis shows the importance of distinctions in the creation of separate beings, and in the spiritual sense they all have to do with man. In the first part of the Creation story, three distinctions are made:

Genesis 1:4: "God distinguished between the light and the darkness." This represents a distinction between what is God's and what is man's (AC 21).

Verse 7: "And God made the expanse, and made a distinction between the waters which were under the expanse, and the waters which were above the expanse." This is a distinction between internal and external knowledge (AC 24).

Verse 9: "And God said, Let the waters under the heaven be gathered together in one place, and let the dry land appear." This signifies a distinction between external knowledge and the external man himself. (AC 27).

It is interesting to see that the first and third distinctions are between what is man and what is not man. This kind of distinction is made at conception, when the sperm leaves behind its outer covering and tail (fig. 6), and it is not until then that the egg separates from its second polar body and completes meiosis (see fig. 3). A similar distinction is made later, around the time of implantation, when the fetal membranes—amnion, chorion, placenta, and yolk sac—become separate from the embryonic disc, which will actually grow into the human body.

Each great change in life requires leaving something behind that is not essential. At birth the umbilical cord and placenta are no longer

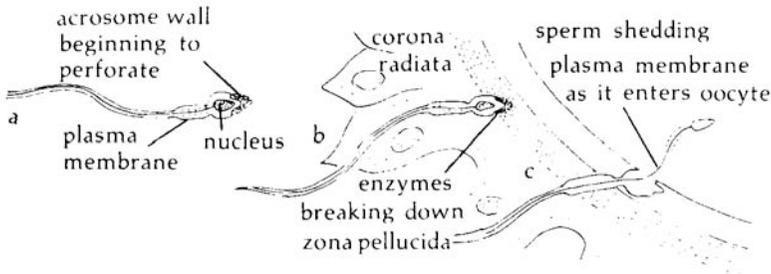


Fig. 6. Changes in sperm at fertilization, (a) the acrosomic cap disintegrates, releasing enzymes which aid in penetrating the zona pellucida (b). (c) the plasma membranes of the sperm and oocyte meet, fuse, and break down at their point of contact, permitting the sperm to enter the cytoplasm of the oocyte, leaving its membrane behind. (Redrawn from Moore, fig. 2-11).

needed, and so are separated from the baby; at death the physical body is shed. In spiritual rebirth, or regeneration, man must abandon his natural proprium, which was necessary to his growth in childhood. In each case there is a distinction between the essential man and what is not man.

Since, as stated in *Divine Love and Wisdom* 384 and 409, the right side of the body relates to good and the left to truth, the splitting into pairs of midline structures and the central fusion of paired elements represents the separation and union of love and wisdom. Organs which fuse from separate halves are the nose, tongue and palate in the face (figs. 7 and 8), the sternum,⁶ head, jawbones, and hip girdle in the skeleton, the cerebellum, the uterus in the female,⁷ the pancreas, whose halves are not strictly symmetrical, the dorsal aorta (fig. 9), and the heart, which goes through three complete cycles of separation and fusion before reaching its final form.⁸

Organs which pair off from central structures are the cerebral hemispheres of the brain; the eyes, which evaginate from the brain primordium; the primordial germ cells, which enter the paired gonads from a central source; and the lungs, which originate from the paired pharyngeal arches. These arches first fuse across the midline

⁶ Edmund S. Crelin, "The development of the musculoskeletal system," *Clinical Symposia*, 33:1, p. 10.

⁷ W. J. Hamilton, J. D. Boyd, & H. W. Mossman, *Human Embryology*, Williams & Wilkins, 3rd ed., 1962, p. 288.

⁸ Discussion in Simonetti, *loc. cit.*, pp. 23-25.

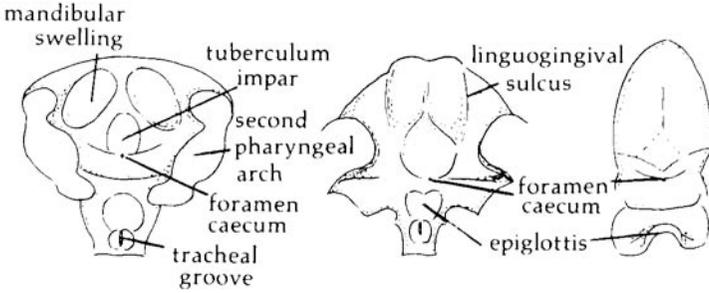


Fig. 7. Three stages in the fusion of the tongue. View from above. (Redrawn from Hamilton, *et al.*, fig. 212.)

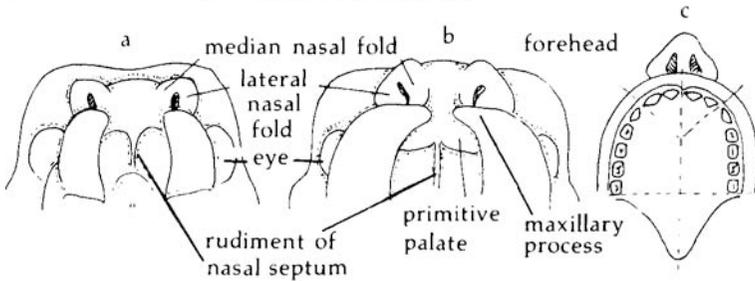


Fig. 8. Three stages in the fusion of the nose and palate. View from below, (a) and (b) 6th week; (c) adult. (Redrawn from Hamilton, *et al.*, figs. 199, 200, 212.)

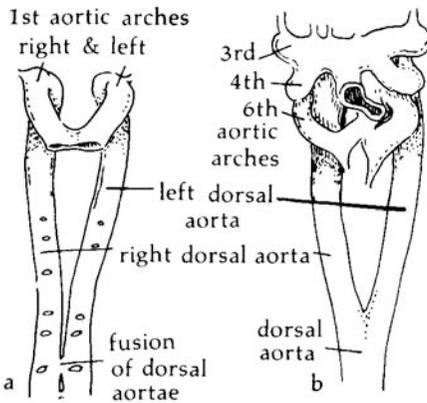


Fig. 9. Fusion of dorsal aortae. Ventral view. Fusion progresses cranially. (Redrawn from Hamilton, *et al.*, figs. 174, 178.) "This fusion extends forward, but never reaches as far as the pharyngeal region" (*ibid.*, p. 183). (Also see fig. 10.) (a) 27 days; (b) 38 days.

to form, among other things, the digestive tube, from which a diverticulum arises and splits into two lung buds; these in turn branch into the pulmonary lobes.⁹

In addition to these right-left activities, many other structures in the embryo coalesce or differentiate. The eyes come together from "diverse primordia"—the surface ectoderm, neural ectoderm, and even some mesoderm.¹⁰ Blood vessels branch off and anastomose countless times, and the aortic arches fuse front to back, one after the other (fig. 10). Nerves and muscles connect in bewildering profusion, and no one knows quite how they do it.¹¹ The face comes together from many separate blocks of tissue (fig. 11).

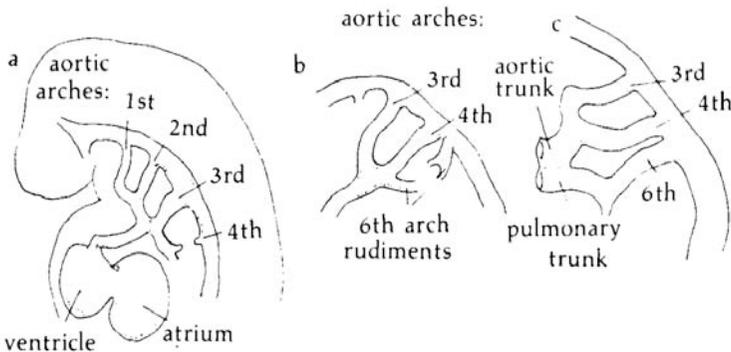


Fig. 10. Fusion of aortic arches. View from the left side, (a) 4 mm embryo; (b) 5 mm; (c) 11 mm (cf. fig. 9b). The arches fuse successively from the first to the sixth, the first, second and fifth regress, and the third, fourth and sixth persist as blood vessels found in the adult. (Modified from Hamilton, *et al*, figs. 175-177.)

Turning to examples of differentiation, we find that the aortic trunk and pulmonary artery arise from a single blood vessel. This goes hand in hand with the septation of the heart, and suggests the separation of the *application* of the will (aorta going forth to serve the body) and the *understanding* (pulmonary artery carrying blood to the lungs to gather truth) (fig. 12). Another is the separation of fingers and toes. These do not simply bud out from the ends of the hands and feet, as you might think, but condense within the limb buds and are at first webbed. This webbing breaks down and gradu-

⁹ *Ibid.*, p. 21; see illustration.

¹⁰ Hamilton, *et. al.*, *loc. cit.*, 369.

¹¹ Maxwell Cowan, "The development of the brain," *Sci. Amer.*, Sept. 1979, pp. 112-132.

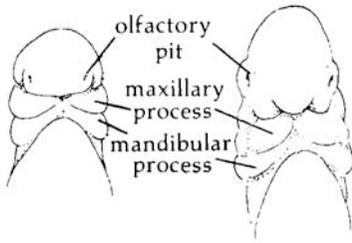


Fig. 11. Fusion of facial elements in the second month. View from below. The embryo is so curled up that its face points downward, (a) 5.7 mm; (b) 6.7 mm; (c) 11.8 mm; (d) 14 mm; (e) 18 mm. (Redrawn from Hamilton, *et al.*, figs. 128-129.)

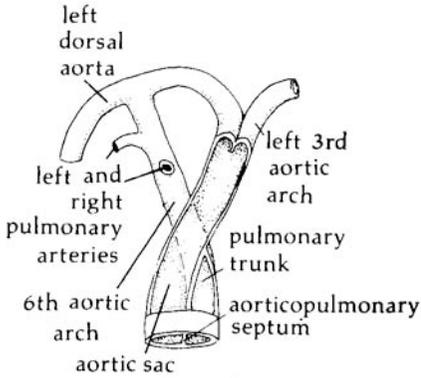
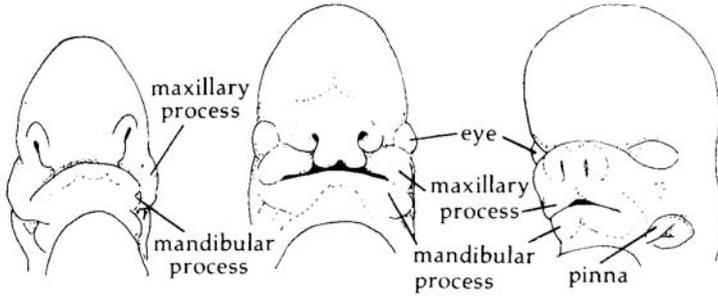


Fig. 12. Septation of the bulbus cordis into the aorta and pulmonary artery. Seen from the right. A spiral partition in the single vessel divides it into two, separating the pulmonary from the systemic circulation. (Redrawn from Hamilton, *et al.*, fig. 168.)

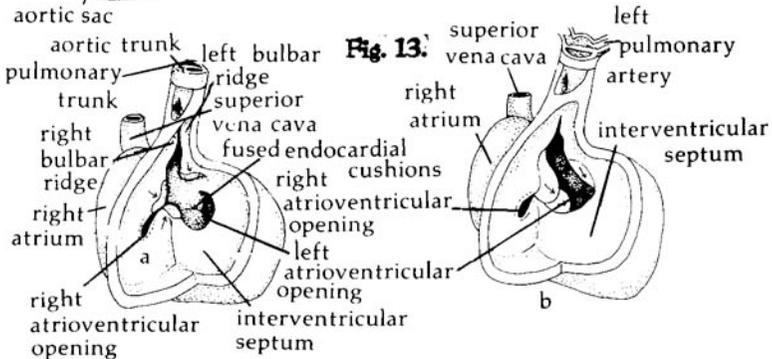


Fig. 13.

ally recedes.¹² Still another is the rupturing of the buccal and cloacal membranes to put both ends of the digestive tract in communication with the outside of the body.

This brings us to an interesting point about separation and fusion. Often the same process can be seen as both, depending on your point of view. For example, the fusion of two blood vessels, such as the primitive dorsal aortae or the heart tubes, involves the breaking down of tissue between them. What is actually joining is the hollow space within them, which carries blood. The division of the heart into four chambers requires the building of walls between them; when the portions of the forming septa meet and fuse the septation is accomplished (fig. 13). In choosing between considering the join-

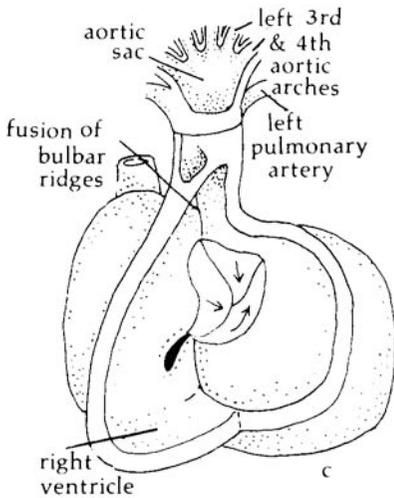


Fig. 13. Septation of the heart, (a) 38 days; (b) 42 days; (c) 49 days. The communication between atria and ventricles divides in two before the septum dividing right and left halves of the heart is complete. (Redrawn from Hamilton, *et al.*, figs. 165-167.)

ing and septation of matter or empty space, empty space is often preferable. But in the body it is not empty: all spaces are filled with coursing fluid. It is illuminating to think of these contrasts in terms of use. The use of a vessel is to be open. When the middle wall builds up in the heart, and the endocardial cushions fuse to make two atrio-ventricular communications, the function of the heart is divided in two—and this leads to a higher union when the lungs take up their task at birth. As in art, negative space is as important as positive space.

¹² Lennart Nilssen, C. Wirsén, & A. Ingelman-Sundberg, *A Child is Born*, Dell, New York, 1965, p. 92.

Of the numbers on paired organs, *Divine Love and Wisdom* 409 mentions testicles specifically, which makes me wonder if the germ cells from the left and right gonads differ in quality according to the representations of right and left. In *Conjugal Love* 316, a wise man in heaven says this: "In heaven the right eye is the good of vision, and the left is the truth of it; the right ear is the good of hearing, and the left is the truth of it; and...the right hand is the good of man's power, and the left is the truth of it; and similarly with other pairs." From this we can conclude that the right gonad is the good of propagating and the left one the truth of it; but does it follow that the right gonad propagates good and the left one truth? This would be analogous to the proposition that the right eye sees good and the left eye sees truth.

If this dichotomy *can* be applied to the gonads, how does it affect the nature of the offspring? If a sperm from the right testis fertilized an egg from the right ovary, would the good of love predominate in the resulting human being? How would the union of a left sperm and a right egg differ from that of a right sperm and a left egg? (An affectional soul in an intellectual body?) And how does all this fit in with the sex of the person? Does the state of the parents influence which cells will join to form a zygote? or the number and viability of germ cells from one gonad or the other? These are hard questions to answer, because of the difficulty in getting data; and I suspect that I am looking at them from too narrow and concrete a viewpoint.

Some possible parallels of the very early development of the heart and lungs are discussed in some detail in my previous article.¹³ In searching for a correlation between the *sequence* of gestation and that of regeneration, I came across *Divine Love and Wisdom* 404, which might illuminate the significance of the development of the heart and lungs, for it sets forth the three conjunctions of the will and understanding.

After the nuptials, the first conjunction comes through an affection for knowing, from which springs an affection for truth. By nuptials is to be understood man's state after birth, from a state of ignorance to a state of intelligence, and from this to a state of wisdom....

The second conjunction comes through an affection for understanding, from which springs perception of truth.... Affection for truth and perception of truth are two faculties of the understanding, that in some persons are united and in some are not. They are

¹³ Simonetti, *loc. ext.*, pp. 18-21.

united with those who love to perceive truths with the understanding, and not with those who only wish to know truths.... Everyone has as much perception of truth as he has affection for understanding....

The third conjunction comes through an affection for seeing truth, from which springs thought. Affection for knowing is one thing, affection for understanding another, and affection for seeing truth another.

These conjunctions seem to me to represent the opening of the three degrees of the mind: natural, spiritual, and celestial. I have tried to relate these three conjunctions to the development of the heart and lungs in the embryo, and I have come up with some tentative parallels.

1. *Affection for knowing, hence affection for truth.* This stage might be represented by the simple proximity of the developing heart and lungs, the forming of the lungs around the heart as a template,¹⁴ and the first formation of the pulmonary blood vessels, which occurs in the second month. The arteries and veins in the lungs correspond to the affection for truth (DLW 412).

2. *Affection for understanding, hence perception of truth.* This might be reflected in prenatal development by the branching of airways in the lungs and the attendant branching of blood vessels in the lung tissue, much of which occurs in the second trimester of gestation. Air vessels correspond to perceptions (DLW 412). Also, by this time the pulmonary artery has separated from the aorta (see fig. 12), and the lungs have a distinct blood supply, which might reflect affection for understanding.

3. *Affection for seeing truth, hence thought.* In the heart, the pulmonary veins (affection for seeing truth) and coronary arteries are the last vessels to form; in the lungs the alveoli and their blood capillaries begin to form in the last months of prenatal life and continue to form for years after birth.¹⁵ "Minutest air cells" correspond to thoughts (DLW 413).

The fact that each conjunction begins with an affection is reflected by the time-lag between the development of the heart and the lungs, and the truth that "the heart forms the lungs" (DLW 402).

¹⁴ *Ibid.*, p. 21.

¹⁵ Moore, *op. ext.*, p. 193.

The exposition of this parallel requires much further study of how the heart and lungs grow together and contribute to each other's development. The heart begins to function about three weeks after conception and is essentially complete at two months, whereas the lungs continue to differentiate throughout the gestation period and do not function until birth. An interesting point with respect to this is that the function of the heart is largely determined by its outward form—how many entrances and exits it has and how they are connected with each other—for this determines the path that blood will take through the heart. The lungs, on the other hand, are devoted to gas exchange, and it is the nature and number of the capillaries that is important. The exact form of the bronchial tree and the number of lobes do not greatly modify the function of the lungs. The heart displays external form, the lungs internal form. The change in circulation at birth, which is a vital aspect of the development of the heart and lungs, will be discussed later, in connection with evolution and human history.

One thing I have not been able to do is to point to one particular stage of development and say, "This corresponds to repentance, this corresponds to reformation, and this corresponds to actual regeneration," any more than a recapitulationist can say "This is the fish stage (or reptile stage, or mammal stage) of development." This does not invalidate the parallel of gestation either with regeneration or with evolution!

Indeed, we cannot assign repentance, reformation, or regeneration to single, clear-cut points in a person's life, because these states occur over and over again, overlapping each other at different levels. So it is with their correspondences in the embryo's development, and also with the parallels of evolution with this development, which stubbornly refuse to follow a simple linear sequence.

There is one more point I would like to make in connection with the heart—a similarity between its development and that of the digestive system. The heart undergoes a complete 360-degree rotation in the first month which suggests a connection with *Arcana Coelestia* 4931³: man is conceived in the kingdom of the heart, comes into the kingdom of the lungs at birth, and returns to the kingdom of the heart when he is regenerated.¹⁶ The lower part of the digestive system—the intestinal tract—makes a similar rotation a little later in development, but in horizontal direction. The digestive system represents assimilation of knowledges of truth (AC 9412).

¹⁶ Simonetti, *loc. cit.*, pp. 18-20.

Associated with this rotation is the herniation of a portion of the gut into the umbilical cord, which is the baby's link with the mother and the medium of its nourishment. This herniation might represent the dependence on authority for knowledge which belongs to childhood, while the rotation might reflect a reversal in interest from spiritual to natural knowledge. The hernia has completely retracted by the end of the tenth week of development, perhaps signifying the thought from self which characterizes the beginning of adulthood, and the completeness of rotation, when the orientation of the intestines approximates the adult form, could represent the attendant return of interest in spiritual things. Although the rotation is essentially horizontal, the part taking place within the umbilical cord is vertical, and this verticality remains when the intestines return to the abdomen, particularly in the ascending colon (fig. 14). The

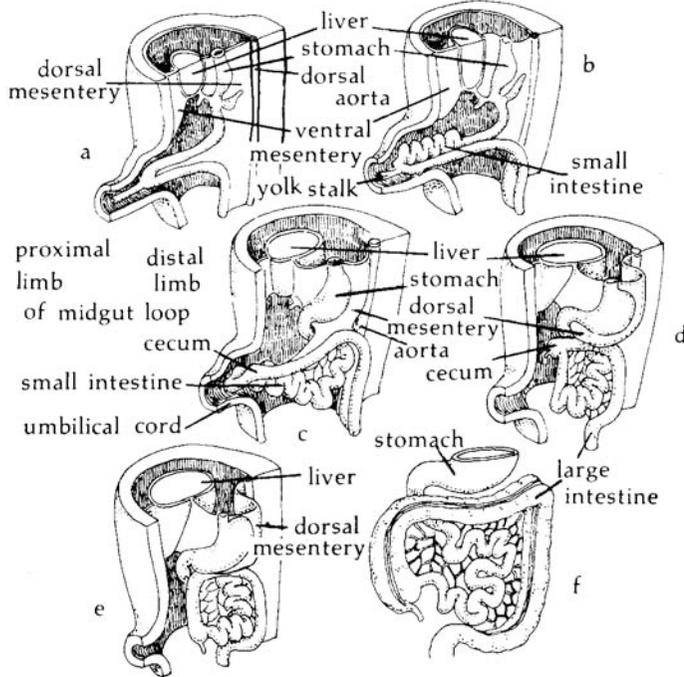


Fig. 14. Rotation of the intestines, seen in cutaway view from the left, (a) beginning of the sixth week, showing midgut loop within the umbilical cord; (b) & (c) show rotation within the umbilical cord; (d) about 11 weeks, after intestines have returned to abdomen; (e) late fetal period, showing descent of cecum; (f) final form. (Redrawn from Moore, figs. 12-9, 12-16.)

rotation of the heart represents a reversal of the will, that of the intestines a reversal of understanding. It may be noted that the lungs perform no comparable acrobatics. Their formation can be said to be passive rather than active; they grow into the empty space left by the boundaries of the heart, liver and ribs.

This appears to have a connection with the significance of eye development as pointed out in Rev. Alfred Acton's article, "Human Development."¹⁷ In it he points out that the eyes are open until the ninth week of development, when the lids meet and fuse, not to reopen until the seventh month. This illustrates that little children have a perception of spiritual things, which they lose as they grow older and are more concerned with the natural world. This perception begins to return when they reach maturity, and becomes richer and more profound as regeneration progresses.

These reversals in the embryo are another illustration of the cycle of descent and ascent in creation, which takes an incredible variety of forms and appearances throughout life.

The Prenatal Environment

The amniotic fluid surrounding the baby, which consists mainly of water, has some functions similar to those of natural truth, to which water corresponds. Amniotic fluid equalizes pressure and temperature and cushions jolts, affording protection and permitting the symmetrical growth of the embryo.¹⁸ In the same way, a knowledge of truth can protect a vulnerable growing person from the harmful effects of difficult experiences and emotional extremes. It serves as a stabilizer, a buffer, even a distraction. Amniotic fluid prevents the amnion from sticking to the baby's skin, as truth affords a measure of detachment from worldly concerns. It also enables the fetus to move freely, and thus indirectly contributes to its musculoskeletal development.¹⁹ Knowledge allows the exercise of choice, and so help to build and strengthen freewill. In addition to this, the amniotic fluid is the first thing the baby swallows, providing something for the digestive system to practice on, and this foreshadows the beginning of independent learning. It prevents dehydration while the skin is forming, and constantly bathes the developing lungs. Natural knowledges protect inner truths, and foster the budding capacity to perceive those truths.

¹⁷ *New Philosophy*, Jan.-March, 1976, pp. 339-375.

¹⁸ Moore, *op. cit.*, p. 111.

¹⁹ *Ibid.*

(To be continued)

On Astronomy in the Middle Ages and Beyond

A glimpse of the significance of astronomy in the medieval world and beyond is gained from the following extract from Olaf Pedersen's essay on astronomy in *Science in the Middle Ages* (ed. David C. Lindberg, *Univ. of Chicago Press*, 1978, p. 305). Aside from its forming the basis for the prevailing interest in astrology, and its use in navigation and time-reckoning, Pedersen says:

"Astronomy also benefited from its position as one of the seven liberal arts, which...formed the educational framework of the medieval schools. In antiquity these seven disciplines [geometry, arithmetic, astronomy, music, grammar, logic, and rhetoric] were regarded as 'liberal,' in that they represented proper occupations for free citizens, in contrast to the manual labor of slaves. An echo of this attitude is occasionally heard in medieval educational theory, but...the humanists of the twelfth century preferred to regard the liberal arts as means of liberating man from his innate ignorance and darkness. Since these were consequences of the Fall, the study of the liberal arts, including astronomy, could be regarded as an aspect of the great work of redemption.

"Finally, in the thirteenth century, the growth of natural theology led to the belief that the investigation of nature's visible operations could uncover their hidden causes and so reveal some of God's ways. Astronomy became particularly important because Aristotle's Prime Mover of the heavenly spheres could easily be associated with the Christian idea of God as upholder of all creation. The metaphor of 'The Book of Nature' as containing a revelation of its own parallel and supplementary to that of Scripture began to provide motivation for the study of nature in all its aspects. Slightly damaged by the *devotio moderna* and pietist movements in the fifteenth century, it returned with full force in the seventeenth century to be utilized by Galileo and many others."

Editor