

THE EMBRYO AND ITS DEVELOPMENT IN REGARDS TO ITS FORMATION AS A COMPLETE HUMAN BEING

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A. Introduction

The unpredictable and rapid progress of embryology, genetics and the health sciences, in combination with research and numerous clinical applications, have removed the embryo from the security of the maternal womb and placed it before the challenge of unprecedented bioethical dilemmas and demanding daily life. Thus, the need to escape from empirical knowledge and proceed to a more analytical study of the embryo's nature is imperative. As the knowledge of cellular and clinical embryology uncovers the secrets of the embryo, theology is invited to reveal the magnitude of its «hidden» mystery.

B. The Nature of the Embryo

The first basic question that emerges as we examine the embryo is whether and to what degree it is a human being or a person. Some people consider it to be a tissue of the maternal body; others recently named it –at the preimplantation stage– «genetical material». Some believe that its nature and status changes depending on its age, and finally, others insist that the embryo, from the very first moment of its existence, has a perfect human identity and, therefore, deserves to be respected as a person. The status of the embryo is directly related to the ethics of abortion, reproductive techniques, experiments on the embryos, etc.

The answer to the above question, namely what the exact moment of the beginning of human life is, has a scientific as well as a philosophical and theological dimension.

Scientific data

Contemporary biology, genetics and embryology provide us with significant data, until recently, unknown. However, as our knowledge seems to expand, our ignorance also appears to increase. As a result, our questions multiply, replies vary and confusion becomes greater.

When does human life begin? Does it exist in latent form within our germ cells (spermatozoa or oocytes) before their fusion takes place? Or does it appear when these enter into a dynamics of maturation? or maybe at the moment of fertilization? or when the zygote (fertilized ovum) is formed, or on the 6-8th day, at the moment of the embryo's implantation, or on the 14th day, when the primitive streak is formed, or on the 30th day, when the brain differentiation takes place, etc. Based on a logic that is more suitable than convincing, biologists and legal experts tend to place the beginning of life on the 14th day.

Other researchers claim that the onset of human personality occurs on the day when the mother feels the first movements of the fetus, or when the fetus is viable outside the womb (24th week). Another group identifies the beginning of human life with the moment of the fetus' birth when it can breathe on its own or right after birth, namely when the fetus begins to become autonomous. The truth is, however, that «the more we separate the beginning of human life from the time of fertilization, the greater becomes the «window» for abortion, infanticide and embryo experimentation», and the more we can justify unjustifiable situations and legalise our illegal acts.

Despite the fact that the issue is distinctly a philosophical one, we need certain scientific data in order to approach it.

The primordial germ cells (gonocytes) are separated from the other types of cells and migrate to the region of the genital ridge of the coelomic epithelium (primary kidney [mesonephros]) during the 15th-20th day of the embryo's life.

Sex differentiation, namely morphological differences that allow us to speak about ovaries or testes, occurs during the 6th week of the fetus' life.

The number of germ cells in a 4-month female embryo, namely its oocytes is about 2-3 million and remains stable throughout the entire course of its life. During puberty, the monthly periodical maturation of 10-15 oocytes begins, out of which only one matures fully while the rest degenerate. In total, an average of 400-500 oocytes ovulate throughout a woman's reproductive life, out of which 15-20 at the most, can give life

to a new individual. Approximately, one third of the mature oocytes present early degeneration, but the exact reasons behind this are still unknown.

The basic role of the ova is to assist with the beginning of the new life and to give food and energy to the embryo during its first pre-implantation stages. For this reason, the ovum is the largest in size cell (up to 2000 times larger than other cells) of the human body (150 μm , visible with human eye) as opposed to the spermatozoon (5 μm head, 54 μm tail) that is a great deal smaller.

Corresponding data exist for spermatozoa. However, these are constantly being produced within the male body and in each ejaculation their number varies from 40-320 million in 2-4 ml of sperm. In this case, for unknown reasons too, a mechanism of chromosomal aberration develops which results in the degeneration of a significant percentage of male sperm cells.

Another selective phase follows, since during the process of fertilization and implantation approximately 70% of the embryos are lost for various reasons. Finally, a percentage of 0.5-0.7% of the newborn babies present chromosomal aberration. All of the above indicates a course during which a dynamic selection of the best and more resilient embryos take place.

The fact that the physiological mechanisms destroy so many ova, spermatozoa and even embryos, which scientists incorrectly often call pre-embryos, in order to make the final selection of one embryo, makes some people believe that the embryo before implantation is not yet a human being. The question they pose is: is it possible that the destroyed embryos are actually human beings with a soul and a person although they will never be given the right to live in this world?

Another group of scientists believe that the onset of life is connected with the beginning of the functioning of the embryo's senses. It is worth noting that the fetus starts moving during the 6th week, when the formation of the neural synapses in the spinal cord is completed. On the 10th week, the first neuromediators are determined in the neural fibres and the activity of the brain stem is registered. Based on electrophysiologic and immunohistochemical investigations of the central and peripheral nervous system, we could conclude that the fetus begins to feel at the age of 18-25 weeks; however, there is no proof that it can process its perceptions until the 30th week.

We believe that the neurophysiological criterion of the beginning of the human person is not adequate, since we only have a complete development of the cerebral functions two years after birth.

C. The Embryo According to the Orthodox Theology and Tradition

According to older western writers and philosophers (Fienus, professor of Louverin University, 1620) the soul enters the embryo three days after conception, while according to Aristotle, forty days after conception. Georgios Gennadios Scholarios seems to share the same view, because at this time the formation of all of the body's organs is completed. Aristotelian philosophers identify the presence of the soul with the embryo's first movement, which occurs on the 40th day after conception in males and on the 80th day in females. In fact some claim that the «natural» soul is deposited in the body during pregnancy, the «logical» soul at birth and the «cognizant soul» at the early stages of life. Thomas Aquinas believes that God creates souls at the same time when He unites them with the material they will form.

While basically these theories describe the various trends and perceptions on the subject, the Christian Orthodox Church regards man, with consistency and clarity, as created according to the image of God «from the very beginning of conception».

The basic sources from which the Christian Orthodox Church derives her respect towards embryonic life are the Holy Scriptures, Old and New Testament, certain sacred canons and liturgical texts.

Old and New Testament

In the first chapter of the Gospel of Luke, we encounter the Theotokos going «with haste» to Elisabeth (vs. 39), right after the event of the Annunciation, namely right after her conception. During this revealing encounter we see, on the one hand, that the embryo-St. John the Baptist, after «hearing the greeting of Mary» (vs. 41), he «leaps in her womb», in fact, he leaps «with joy» (vs. 44), «filling with the Holy Spirit» his mother (vs. 1). At this point, the evangelist refers to him as «babe». Moreover, the leaping of the Forerunner reflects the recognition of Jesus as the Lord, just when He was a few days old embryo. This is why Elisabeth calls the Theotokos «mother of my Lord» (vs. 43). These elements indicate distinctly that in no way does the embryonic status question or limit the perfect identity of the Forerunner and of the Lord, despite the fact that He is a few days old embryo. The encounter of the Theotokos with Elisabeth and the leaping of the embryo-St. John, after recognizing the embryo-Jesus, refer not only to the embryo's biological mobility, but also to the perfect spiritual expression of its soul.

Respective references in the texts of the Old Testament indicate that the embryonic status constitutes a stage of human evolution during which the grace of God acts upon man. Hence, in the books of Psalms and in the prophetic writings, we come across explicit phrases that confirm the fact that the grace of God is active and His will is expressed during the period of pregnancy. The embryo is not simply a group of cells or a combination of organs or even more so a soulless tissue of the maternal body, but it forms a person upon whom the grace of God acts unhampered as in every other human being.

It is interesting that Isaiah confesses that he has been a perfect person bearing a name, since the time he was in his mother's womb; *«The Lord called me from the womb, from the body of my mother he named my name... And now the Lord says, who formed me from the womb to be his servant»*.

Respectively, Jeremiah becomes the recipient of the sacred prophetic calling since his embryonic age: *«Before I formed you in the womb I knew you, and before you were born I consecrated you; I appointed you a prophet to the nations»*.

Actually in the Book of Psalms, David talks about the special providence of God for every human being that begins from conception: *«For thou didst form my inward parts, thou didst knit me together in my mother's womb. I praise thee, for thou art fearful and wonderful. Wonderful are thy works! Thou knowest me right well;»* Moreover, *«Upon thee was I cast from my birth, and since my mother bore me thou hast been my God»*. The fact that the grace of God acts upon the embryo is a strong indication that the embryo possesses a soul (or is a soul).

Apostle Paul moves along the same idea in his Epistle to the Galatians, where he claims that his calling dates back in the period of his gestation: *«But when he who had set me apart before I was born, and had called me through his grace»*.

Therefore, God calls, sanctifies, designates and nominates prophets and apostles ever since their embryonic age. Just as Christ our Lord is found behind the humble *«babe wrapped on swaddling cloths»* man, the perfect image of God, is humbly hidden behind every embryo.

The Orthodox Church underlines her faith in the sacredness and significance of the event of conception by honouring and celebrating the conceptions of the persons involved in the divine economy: at first, on March 25, the secret mystery of the conception of the Lord on the day of the Annunciation of the Theotokos; then on December 9, the conception of the Theotokos and finally, on September 23, the conception of Saint John the Forerunner.

The Holy Canons

On this basis, the Orthodox Church has founded the wording of her holy canons that refer to the induced or involuntary miscarriage. So, for example, Saint Basil the Great writes in his 8th Canon: «*those who give to pregnant woman embryo-killing poisons and those who take them are both killers*». Likewise, canons 63 and 68 of the Synod in Elvira (306 A.D.), as well as canon 21 of the Synod in Ankara (314 A.D.), canonize strictly women who have committed abortion.

We could say that this approach, according to which abortion constitutes a serious sin, similar to homicide, a fact that implies that the embryo is a living soul, prevails in the conscience of the early Church. The tradition of the Church, since the very first centuries, discerns in the embryo the sanctity of God's perfect image, a person who struggles to live eternally in the kingdom of God through his survival in this world.

Based on the above, we could say that fertilization constitutes the most significant stage of man's biological life since during this stage he acquires both his entity and irrevocable identity. All other stages form phases of his development no matter how important they are. No other moment, not even the moment of implantation, or the 14th day, or the day of the formation of the primitive streak, or the completion of organogenesis, or the moment that the embryo acquires human form could be considered as the day of the embryo's ensoulment. The soul is not placed inside the embryonic body at some specific moment, but it is born with it; soul and body are congenital.

Patristic tradition and teachings

The patristic teachings on the embryo are derived basically from texts referring to the bond between body and soul. Actually, Saint Gregory of Nyssa speaks extensively on the simultaneous birth of soul and body, of «*a common and identical beginning of man's components... It is not true to say that the soul exists before the body nor that the body exists without the soul, but both have common beginning*». St. John Damascene has a respective viewpoint when he writes that «*body and soul are created simultaneously*».

The Fathers, without treating the issue with scientific scholasticism, but wishing to refute the theory of Plato and Origen on the pre-existence of souls, proceeded to the writing of the above texts. The belief in the simultaneous birth of the soul and body and the significance of their co-

existence is clearly demonstrated in their writings. In this sense, the biological beginning marks the psychosomatic birth of man. Actually, it is interesting that the Fathers do not associate the embryo's soul with the mother's body but with its own body. This means that the term «conception», is not identified with implantation, namely the organic tie between the embryo and its mother's body, but with fertilization, namely the beginning of human life. This truth is expressed by Athanasios the Great: *«man is known as consisting of noetic soul and physical body; the former not existing apart from the latter... the beginning of being occurs in the womb».*

This belief is generally accepted and is not questioned in the Patristic tradition. Moreover, saint Maximos the Confessor supports that soul and body cannot exist separately, but their relationship is permanent and lasts forever; in fact, it is not optional but mandatory, according to the archetype of the two natures of our Lord. In regards to the relationship between soul and body, he rejects their «pre-existence», or the «existence of the one before the other», but accepts their «coexistence».

If the first element of the Patristic reasoning is the psychosomatic coalescence, the second one is that each man is created in the image of God. The roots of Christian anthropology are found in the true Christology. Thus, all knowledge regarding human nature can be derived by divine revelation that informs us about the human nature of Christ. The Logos of God assumed all human elements except sins, and became «consubstantial» with man as far as human nature is concerned, even if *«his human elements were above all humans»*, according to saint Maximos the Confessor.

According to saint Cyril of Alexandria and the statements of the 3rd and 4th Ecumenical Synods, the incarnated Logos of God assumed the entire human nature *«from womb»* or *«in the womb»*, *«from conception»* or *«from the very beginning of conception»* and *«we confess our Lord Jesus Christ as a perfect human being»* and the Mother of God *«as the Theotokos, for the Logos of God was incarnated, and He united Himself, at the moment of His conception, with the temple (the body) that He received from her».*

D. Scientific Confirmations

In a recent statement of the Vatican, great importance is given to the fact that the presence of the soul in man from the moment of conception is confirmed by modern scientific data. Certainly, scientific research

is not qualified to determine the ontological status of the embryo, i.e. if it is a person, because the concepts of being and person are neither biological concepts, nor are they subjected to empirical testing and verification.

Despite the fact that according to the Christian Orthodox perception, scientific confirmation is not absolutely necessary to support the relevant teachings of the Church, it is interesting that modern scientific discoveries are compatible with them.

Thus, genetics and developmental biology demonstrate that the embryo at all stages of its development is an individual of the human kind at its initial life cycle, and that, after a coordinate, continuous and gradual process, it will become an adult like us, because it is already one of us: *«he who will be a human being is already a human being»* (Tertullian).

With fertilization we have the restructuring of the diploid phase of life, an element that surely attributes to the embryo the characteristics of a human being. Human identity is determined neither by implantation nor by the various anatomical formations; all these constitute phases of the life cycle of the embryo.

The full human nature of the embryo, right from its zygotic stage is verified by contemporary genetics, which *«has demonstrated that from the very first instant there is an established program of what this living being will be»*. Without wishing to become excessively scholastic, we could add that, right after fertilization, the karyotype of the embryo is, in fact, composed of DNA molecules that contain special human polydeoxyribonucleotide sequences, which, since the very first moment, are immediately, yet gradually expressed within the embryonic cells.

Recent studies demonstrate that the initial genomic silence of the embryo is not absolutely correct. Thus, for example the SRY gene, whose position is found in the telometric region of the short arm of human Y chromosome, is expressed and transcribed right from the beginning of embryonic development even before the pronuclear phase.

A significant confirmation of the fact that the formation of the embryo's genetic identity begins with fertilization is the recent research finding that, even from conception, the first moment of the embryo's existence, specific parts of DNA transport information through a biochemical process known as methylation.

Therefore, we could repeat the statement of the Warnock Committee of the Department of Health and Social Security, 1984: *«while, as we have seen, the timing of the different stages of development is critical, once the process has begun, there is no particular part of the development process that is more important than another; all are parts of a conti-*

nuous process and unless each stage takes place properly, at the correct time, and in the correct sequence, further development will cease».

There is a contradiction to all of the above that is basically expressed by three arguments:

a. Some people claim that the embryo, during the first stages of its development (7th-8th day, or up to the 14th day), on the one hand, has a genetic identity and individuality, but on the other it lacks final organismic identity. The question in this case is whether we can specify the moment when it acquires this identity and what exactly this identity is. If the beginning of man is identified with the moment of the formation of the organismic identity, then, evidently, the embryo does not have a clear beginning.

b. The fact that 70% of the embryos are destroyed before implantation is interpreted by some as one more indication that the pre-implantation embryo is not yet a human being. Is it possible that so many human beings die so that only one may survive?

The question, however, is reversible: does the fact that many embryos cannot survive, give us the right to destroy the ones that may ultimately live? Perhaps, some of those which perish could have survived, under better conditions that are still unknown. We should in no way convert the increased probability of someone's death to certainty and simultaneous denial of his identity. Moreover, the fact that we will all die some day –and this is a certainty– does not mean that we are not human beings.

Finally, from the theological viewpoint, we could say that the dynamics detected in the struggle for survival of these embryos is a strong indication that «divine likeness» has already begun to operate within the embryos, even invisibly.

c. A third interesting parameter is the probability of a further division of the embryo during pre-implantation stage that creates monozygotic twinning or, in fewer cases, their reunion, or the creation of chimeric aggregation. This leads to the conclusion that we cannot yet speak about the final formation of the person.

This argument is not theologically strong. On the contrary, it would mean that, since the person exists within the embryo in latent form, by destroying one embryo we could be destroying two persons. In addition, when we deal with life, there is always lack of knowledge of how it will finally develop, a fact that we humbly accept. The viewpoint that a zygote is not a person because it may end up one or two persons or no person at all (if it is destroyed) could also raise the following odd question: does the fact that a human being might eventually be cloned mean that he/she is not a person?

E. Theological Conclusions

A. The embryo is a perfect human being from the moment of fertilization. The distinction between «formed and unformed» made in the Old Testament is rejected by the 2nd Canon of Saint Basil the Great.

Some theologians, based on the description of the creation of man in the book of Genesis, which says that God formed first the body of Adam «*of dust from the ground*», claim that the body is created first and then the soul.

However, although God follows this method in creating Adam, He does something entirely different in the creation of Eve. He does not give her life by breathing, but He gives her life at the moment He creates her out of Adam's rib. It is the making of Eve, which is characterised by the simultaneous creation of soul and body, and not that of Adam, that constitutes the model of human creation. Only Adam was created out of dust from the ground; all other human beings, including Eve, were and are born out of human beings.

B. Based on the aforementioned witness of the Holy Scripture and of the Fathers, the Church insists that the beginning of man is «from the very moment of conception». The psychosomatic nature of man is a theological argument supporting this viewpoint. The soul exists from the very moment that the body begins to be constructed.

All fertilised ova are embryos and, therefore, human beings as per their identity. The same applies for those that were unable to implant. Their relationship with the maternal body does not give them a new identity, but moves them to a different developmental stage. In any case, all have managed to be fertilised, to become human beings. The winner of such a selective struggle is worth our respect.

C. Life constitutes the greatest gift and that is why its duration is of utmost importance. Our Church distinguishes in the mystery of the psychosomatic coalescence a need for prolonging man's life as long as possible, either towards its beginning or towards its eschaton. She cannot and should not interrupt the gift of time in the course of man.

Biological death is placed at the furthest possible limit. In essence, there is no end. Life is eternal; it has a beginning but no end. The beginning of life is the first moment when the new and unique human being is recognised in the zygote. The zygote incorporates the union of the spouses and conceals the new person.

This mentality reflects the need of man for eternity, namely for its liberation from the suffocation of time. Time is too limited to fit man. The desire of man is to prolong his life as much as possible. This does

not only mean to live longer, but also to have been born earlier. The scholastic effort for the exact chronic determination of spiritual realities is foreign to the Orthodox Church places the beginning of every human being at the moment of fertilization, because there is no other moment before this related to his/her existence.

D. The attempt to determine the identity and nature of the embryo is based on the sense of its dynamic dimension, namely on the fact that it is a human being under development. Saint Gregory of Nyssa has elaborated first on this viewpoint and saint Nicodemos the Athonite supports it by commenting on the 2nd Canon of saint Basil the Great: the embryo *«even if it were not a perfect human being then, it intended, however, as per the necessary sequence of the laws of nature, to be perfect»*. The embryo is a perfect human being as per its nature, even if it is imperfect and constantly being perfected as per its phenotypic expression and development.

The embryo is not a «potential human being», as some people claim; it is a human being. The Lord as an embryo was not a «potential theanthropos», but «the Lord» of Elizabeth, and as a babe, He was «Christ the Lord», «Mighty God Everlasting Father, Prince of Peace», the Theanthropos Lord.

Nevertheless, we could say that the embryo is a human being with a potential to become a person; namely, it possesses the divine image but has the potential to live according to the divine likeness. If the divine image is given by God and preserved by man even if he sins, divine likeness presupposes man's free will and his predisposition towards the good. The dynamics of the embryo constitutes the first indication that divine likeness functions inside it and anticipates its completeness. Destruction of the embryo means destruction of the concealed divine image and divine likeness.

The embryo's biological development gives us the image of its psychosomatic growth in its mother's womb. For example, it is proven by embryology that nutrition, exercise, the taking of medicines, and the mother's illnesses affect the embryo's bodily development and health; respectively, the mother's mental state (agony, fears, stress, unrest, etc.) forms the mental environment of its development. At the same time, prayer, spiritual life, participation in the Church's mysteries, the experience of a pilgrimage or of a miraculous event, the offer of a vow for the child's sake, inner peace, etc. facilitate the impact of divine grace upon the integration of the embryo and the activation of divine likeness in it.

The embryo struggles to acquire form, speech, thought and reasoning, volition and free will, the expression of its otherness, all the characteristics of human nature that were honoured by the saints and sanctified by the in-

carnate Lord, who was «born in the likeness of men». The interruption of the expression of divine likeness is a theologically unacceptable act, a mistreatment of the creative work of God and the worst insult.

The embryo whether it is formed or unformed, namely whether it has the form of a human being or not, always constitutes the image of God and always conceals the potential of freely becoming like Him.

Finally, just as the integration of man's body requires a nine-month biological preparation, namely pregnancy, the process of his ensoulment and the manifestation of his soul also require a certain time; it begins with conception and is completed thereafter. The more the process of man's biological integration is completed, the greater the degree of manifestation of the soul's functions. According to saint Gregory the Theologian «as the body grows and become perfect, more and more the wisdom, prudence and virtue of the soul is being unfolded».

E. The sacred character of life and human beings does not allow scholastic arguments on the nature of the embryo and the beginning of life or any doubts, but requires respect. The probability of being disrespectful towards the gift of life that does not belong to us but was given to us by God makes us stand in awe before the uncertainty of facts. We prefer that science finds clear cut pathways, that will not raise ethical dilemmas so as to assist our health, our body, and our life. «The more probability that a human person is involved in experiments would suffice to justify an absolutely clear prohibition of any intervention aimed at killing a human embryo».

The more man's identity is concealed or ambiguous, the more unprotected he is and thus, he requires our great and care. The embryo's struggle to become a person or the effort of seriously ill people (vegetative state or Alzheimer disease) to preserve their personalities should be respected. We'd rather sacrifice our knowledge and capabilities before the sacred unknown; and the health or progress of living humans before the need of unprotected people to live longer. The protection of the other person's life is a great act of respect to life than the selfish improvement of our own life. In the babe of Bethlehem godliness was hidden. Herod's slaying of infants was not an act against the king of Jews but an action against God.

The sacredness of man requires acceptance of solutions that limit doubts as much as possible.

F. Science may prove to us the uniqueness of man. Modern genetics has succeeded in this. The embryo itself is destined to prove its otherness, to reveal its original unique person that is an unprecedented expression of the godly countenance in this world. Therefore, we should allow it to do so.