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Facts and doubts on the beginning of human life – scientific, legal, philosophical and religious controversies

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Abstract: It is very complicated to give correct answer to the question "How to define human life?" Nowadays dilemmas consider the respect of human life from the birth to death involve not just biology but also other sciences like philosophy, theology, sociology, psychology, law and politics. These sciences evaluate the topic from different points of view. Integration of all of these perspectives could result with a proper definition. The principal purpose of this paper is to try to determine when a human individual begins. If this proves to be too difficult, we might have to settle for a specific stage in the reproductive process before which it would be impossible to say with any plausibility that a human individual exists. It is necessary to return the moral dimension of observation to the science of life. The point is to reconcile the universal ethical principles concerning the absolute value of life with the everyday challenges and dilemmas. It is our deepest conviction that life has an absolute value and that there always remains something indestructible and substantial in life, which may neither be evaluated by anything final, nor completely reduced to the material biological equivalent and the genetic substratum.

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Introduction

Not many papers on the beginning of human life have been published in the last 40 years. In the light of very significant advances of perinatal medicine it is surprising that this hot topic is still very controversial, as it has been pointed out in the papers published from 1980s till recently by investigators from Zagreb and elsewhere [1–14]. In an attempt to review relevant literature and to find is there any innovative idea, we did collaborative study gathering several top experts and presented our common thoughts in this review article.

The principal purpose of this paper is to try to determine when a human individual begins. If this proves to be too difficult, we might have to settle for a specific stage in the reproductive process before which it would be impossible to say with any plausibility that a human individual exists.

Definition of human life

It is very complicated to give correct answer to the question "How to define human life?" Nowadays dilemmas consider the respect of human life from the birth to death involve not just biology but also other sciences like philosophy, theology, sociology, psychology, law and politics. These sciences evaluate the topic from different points of view. Integration of all of these perspectives could result with a proper definition.

Some authors argue that life as such does not exist since no one has ever seen it. Szent-Gyorgy says that the noun "life" has no significance because there is no such thing as "life." Le Dantez holds that the expression "to live" is too general and that it is better to say a dog "dogs" or a fish "fishes" than a dog or a fish lives [2]. The fact is also that the "truth," *veritas* no one has ever seen, but still it exists.

The same is valid to variety of our abstract terms, which as a result of our common human culture, exist as we agree on their meaning.

In an attempt to define life, we should not consider only life as it is today but also as it might have been in its primordial form, as well as it will be in the future. Or we could accept that the definition of life is modifiable as the human culture evolves.

No single form of life seems to be something completely new. Then, life is transferred in each new generation, not conceived. Moreover, for approximately 3.5 billion years, phenomenon of life existed on Earth. Therefore, we can conclude that although the genome of a new embryo is quite unique, the make-up of embryo is not new. If we observe life through the cell then we can consider every life, including human as well, as a continuum. Since the first man appeared, human cells and the mankind existed on Earth continuously. However, statement that "human life is a continuum" cannot be accepted if the definition refers to the single human being or present population [15].

In a true sense of word, life begins when chemical matter, in a specific way, gives rise to autonomous, self-regulating and self-reproducing system. Life is connected with a living being, and it creates its own system as an indivisible whole – it forms its individuality. Reproduction (the creation of new individuals) is one of the most important characteristics of living beings. It is a way of creating new life transferring forms of old one into newly formed being. Consequently, human beings are characterized by variability, individual development, and uniqueness of every human individual. The essential characteristic of human being, creating new life as a human life form (characterized by fenotype, behavior, capability to recognize, capability to adapt) is the ability of humans to live in a harmony. This togetherness resulted with something so complex to be referred as human civilization.

While we should remember that in the same way today's research is tomorrow's benefit [16], when we discuss human life, we should not treat conclusions one-sidedly and from one perspective. We should regard this reality in all its fullness – embryo gives to any type of expert as well to any citizen a substance for consideration. However, because we are speaking about beginning of human life, philosophical-anthropological consideration is necessary as well as biology, genetics, theology or social sciences. We must also include ethics and law in the debate.

The definition of life is substantially related to its intrinsic or absolute value. The prevailing view in most cultures is that life is something sacred and inviolable. Grief and sorrow with which death is experienced as something defective and evil suggest the conclusion about its indubitable worth. Faced with the deepest ethical doubts about life and death, abortion and euthanasia, posed by technically perfected medicine and science, the distinguished American philosopher Ronald Dworkin considered life as an intrinsic value. His fundamental conviction is "that human life, in any form, has inherent, sacred value, and that whatever choices we have about birth or death should be made, so far as possible, to respect and not dishonour that profound value" [17]. He claimed that we are on the edge of a new age of religion. However, the contemporary age differs significantly from previous periods in that, after the Enlightenment, the sphere of religion has been separated from politics.

As a liberal proponent of personal freedom regarding the intrinsic value and sanctity of life, Dworkin relied on the European tradition of rationalist philosophy. This tradition was essentially founded by the famous philosopher Aristotle. It is significant to mention that Aristotle comes from a distinguished family of physicians in several generations on both sides, on his father's and mother's lines. He based his ethics on the concept of life that belongs to good as such. For him, life by its definition belongs to the nature of the good: "Life is among the things that are good and pleasant in themselves, since it is determinate and the determinate is of the nature of the good" [18]. Therefore, the intrinsic value of life in this ethical and metaphysical horizon is founded on its belonging to the absolute good. Proof of the value of life is derived from the conventional opinion according to which life is something everyone yearns for and tries to sustain: "Life itself is good and pleasant (which it seems to be, from the very fact that all men desire it … ; and perceiving that one lives is one of the things that are pleasant in themselves) for life is by nature good, and to perceive what is good present in oneself is pleasant" [19].

In spite of the changes experienced by the destruction of the traditional metaphysics in the modern-age philosophy, the absolute value of life remained the generally accepted idea. Ethical theories of life base its sanctity on a moral determinant and freedom. The dignity of persons and the absolute value of life in a moral environment make it possible to judge acts according to the principle of morality and the principle of purposefulness which is not given with the organisms themselves. Life, by its ethical dimension, surpasses the mere organic and the natural. Immanuel Kant critically strengthened the border between nature and freedom in a paradigmatic way, as a

demarcation line between the given and the established aim. Furthermore, nature itself is observed in the dimension of the absolute value of the established aim of life.

Scientific approach

Biology characterizes any living being (including the humans) by dynamics of the system and its self – control (homeostasis), excitability (response to stimuli of different nature and origins) self-reproducibility, the heredity of the characters, and the evolutive trend [20].

For biologists it is of importance to specify which form of life phenomena – cell, organism population or species – we are referring to. The cell is the basic level of organization and it is the simplest form of life. Biologically speaking – human cellular life never stops and is passed on from generation to generation. If it did stop, it would result in extinction of the human species. Human individual (as and example of a life of the organism) is specified within its life cycle. It has a beginning and the end – it is temporary limited [21]. In human, two essential cells included in creating of human life are spermatozoa and oocyte. Is it not evident that the most qualified to provide judgement on this matter are biologists? Otherwise, if biologist would not have the life before their eyes, other scientist would have nothing to do in explaining what "life" really means. This leads to the expectation that the definitive resolution should be provided by understanding of beginning of human life and the development of embryo/fetus. Indeed, the recent possibilities of imaging methods enabled visualization of early human development virtually from the conception, making perinatologists those who by study, practice, training and research are singularly qualified [22].

However, the science provides the data about physical development of the human being, but does not provide information about its personality and personalhood.

Human embryogenesis

Answering the question when does life cycle of human individual start is possible only by proper understanding of the process of human embryogenesis. Therefore, we are going to briefly describe the main steps of human developmental process, primarily during the first 15 days after fertilization.

As stressed before, a human being originates from two living cells – the oocyte and the spermatozoon transmitting the torch of life to the next generation.

The oocyte is a cell approximately 110–120 μm in diameter with thick envelope, known as the zona pellucida. The spermatozoon can move using the flagellum or tail, and the total length of the spermatozoon (including the tail) is 60 μm [23].

After syngamy, the zygote, as it moves down the fallopian tube toward the uterus, undergoes mitotic cell division. A series of mitotic divisions leads to the development of the morula, a group of cells called blastomeres. Blastomeres are still undifferentiated and totipotent, retaining the capacity to develop independently into normal embryo. At this stage everything is possible, the morula can divide in two creating the monozygotic twins, or can loose some cells (as during preimplantation diagnostics when these cells are used for genetical analysis) without any harm for the future being. Subsequently the morula will develop into the blastocyst, which already has two distinct populations, inner cell mass destined to form a body of the embryo and the trophoblast to be involved in the implantation. The implantation is the process of attaching to the mother, as the trophectoderm invades the uterine wall and erodes blood vessels and glands. The implantation is completed when the blastocyst is fully embedded in the endometrial linging of the uterus several days later.

However, at this time, the inner cell mass is not yet totally differentiated in terms of their determination to specific cells of the organs of the embryo. The actual body plan will be set during the 3rd week after fertilization, by a process of gastrulation. The appearance of the primitive streak indicates the position of the main axes of the embryo and starts the creation of three germ layers being necessary for the interactions during organogenesis. The embryo stage continues until the end of 8 weeks after fertilization, when the body plan is completed and organogenesis already results with notable differences between sexes and ossification process [24]. The embryo is then called fetus.

Before gastrulation, as there is no body plan, the embryo retains the flexibility to rearrange, exemplified by possibility to divide into monozygotic (identical) twins. However, when the body plan was set by the visible primitive streak, this flexibility is lost. Subsequently, it was suggested that before setting the body plan, i.e., before gastrulation the embryo would be referred as pre-embryo, and upon the onset of the primitive streak and body plan upgraded to the embryo. Pre-embryo is the structure that exists from the fertilization until the appearance of a single primitive streak. Pre-embryo is capable of dividing into multiple entities until implantation's completion. Moreover, in rare occasions the pre-embryo can transform in the entity without body plan, i.e., hydatidiform mole, which needs to be removed from the mother's body.

Therefore, during the pre-embryonic period it has not yet been determined with certainty that a biological individual will result, or would it be one or more (identical twins forming), so that the assignment of full rights of a human person is inconsistent with biological reality.

We can conclude that the pre-embryo requires the establishment of special rules in the society. It cannot claim absolute protection based on claims of personhood. Although meriting respect, it does not have the same moral value that a human person has [9]. Only after gastrulation and body plan establishing (which is about 3 weeks after fertilization), genetic uniqueness and singleness coincide. Until that period, zygote and its sequelae are in a fluid process, they are not physical individual. The facts would talk about possible person in the future.

It is well known that high percentages of oocytes that have been fertilized never proceed on to further development, and that many oocytes that do are thwarted so early in their development that their presence is not even recognized. It is suggested that 30% of conceptions detected by positive reactions to human chorionic gonadotropin (HCG) tests abort spontaneously before these pregnancies are clinically verified.

The newly conceived pre-embryo presents itself as a biologically defined reality. However, its status as an individual stays still a great mystery. In the actual scientific scene and especially accompanied with the progress of ultrasound technologies, prenatal psychology and therapeutics have opened a window into prenatal life of embryo and fetus confirming the evidence that the embryo and subsequent fetus is a true subject in itself [25].

Basic controversies on the beginning of human life

"To those of average curiosity about the wonders of nature, it is likely that two great mysteries have stirred the imagination; and each concerns a birth. Who has not gazed into the heavens on the starlit night and wondered about the birth of the universe? And who has not been stimulated by the sight of the newly born baby to the marvel at the unseen events within the mother 's uterus that have led to the birth of such a perfect creation?" [16] These words written by the Professor Sir Graham (Mont) Liggins open Pandora's box of questions, dilemmas, doubts and controversies about human life and its beginning offering everybody lifelong challenge to solve mystery of life.

Entering this field scientists have been remiss in failing to translate science into the terms that allow mankind to share their excitement of discovering life before birth. Life before birth still remains big secret although remarkable scientific development, curiosity, and speculations dating back to Hippocrates happened. Attempting to contribute to the solution of this human life puzzle many different kinds of intellectuals engaged themselves. They are guided by the idea that each newborn child will only reach its full potential if its development in uterus is free from any adverse influence, supplying the best possible environment for the embryo/fetus. Regarding embryo/fetus, we should always keep in mind amazing aspect of these segments of human life when the mother and the embryo/fetus, although locked in the most intimate relationships, are two separate people at ALL TIMES. Accepting embryo/fetus as the person opened new set of questions about its personality and human rights. Synthesis between scientific data and hypotheses, philosophical thought, and issues in the humanities, today has become a pressing necessity in order to deal with ethical, juridical and social problems arising from man's interference in many aspects and stages of life [20]. Looking backwards from the point of view of an adult person who was a healthy newborn, it should be taken in mind that the status of each person depends not only on the intrauterine development, but on the circumstances during life too.

Most of the papers published are dealing with question When does Life begin? Even in this small field there are strong controversial statements. Those who believe that the life starts with fertilization must be aware that eggs, sperm, even individual cells, could all the said to be human and alive.

It is advisable to concentrate on the question: When human life becomes morally and legally important. In particular, when we do have to ensure that human embryos are given the full protection of the law. In his remarkable book Norman Ford insists on rising the question When does an individual human being come into existence. But he is determined that the answer to such questions must be based on the knowledge that embryology now gives us. His answer to the question When did I begin is: "15 or so days from fertilization." Any scientist involved in this hot topic must search out and pursue the truth. His principle is that we must find out, as far as possible, where the truth lies, and then make moral science of what we find [26]. In other words, we must find out the objective (biological) truth and then build the value system devoid of ideology, interests, religious aims or personal desires or preferences. Of course, how to reach a truth and how to perceive it, is one of the most disputable questions in philosophy.

Those interested in studying these topics would need to become acquainted with both philosophy and science. Few philosophers would be acquainted with early human

embryology and few scientists would feel at home with philosophy.

Problems are raised early in the book, even in the Preface, to acquaint the reader with the issues but not to solve them immediately.

Government reports touching on human embryos have been unable to resolve when the human individual or person begins. Linguistic usage of terms such as human life, human being, conception, embryo, etc., have to be analyzed to understand their original pre-scientific meaning, as well as their contemporary employment in ordinary discourse. It is the role of philosophy to provide theories and conclusions that fit and explain the facts.

For about two thousand years the opinions of Aristotle, the great Greek philosopher and naturalist, on the beginning of the human being were commonly held.

He argued that the male semen had a special power residing in it, *pneuma*, to transform the menstrual blood, first into a living being with a vegetative soul after seven days, and subsequently into one with a sensitive soul 40 days after contact with the male semen.

Aquinas adopted Aristotle's theory but specified that rational ensoulment took place through the creative act of God to transform the living creature into a human being once it had acquired a sensitive soul. The first conception took place over seven days, while the second conception of complete formation of the living individual with a complete human nature lasted 40 days.

In short, the rational soul enables matter to become a human being, an animated body, an embodied soul, a human person.

Harvey's experiments with deer in 1,633 proved Aristotle's theory of human reproduction wrong, without himself finding a satisfactory explanation of human conception.

After modern scientists discovered the process of fertilization most people took for granted that the human being, complete with a rational soul, began once fertilization had taken place. The Catholic Church in particular, not finding any positive answers to this question in the Bible, over the centuries has always adopted the commonly accepted opinion of the day. Her main concern in this regard is ever to teach and promote the respect and protection morally due to human life from its outset, whether it is already personal or not.

What a human person is and when one begins

It is not a question of finding out when a human individual begins to have personal experiences of his or her worth. Moreover, it is clear that the human being begins to be a moral agent long before attaining the age of reason. If it would be simply a matter of establishing when each one's genetic individuality begin, then this is well known to occur at fertilization.

An ontological individual is a distinct being that is not an aggregate of smaller things nor merely a part of a greater whole. Although the millions of cells in our bodies are genetically identical, each one is not an ontological individual or separate entity. There is only one human individual that really exists in the primary sense of actual existence, though there are many cells that share in the existence of that single living ontological individual. A human person is a distinct living ontological individual with a truly human nature. According to Boetius definition of a person, he or she is a being in himself *(ens in se)*, by itself *(ens per se)*, integral *(integralis)*, rational *(rationalis)*, free *(libera)* and responsible *(responsabilis)* [27].

In this sense we judge that the adult is the same ontological individual as the child, the infant and even the fetus prior to birth.

It is already presented the case for the commonly held view that the human individual begins when the zygote is formed at fertilization. However, we should not *a priori* and uncritically accept that because human genetic individuality is established from the zygote stage onwards, the zygote itself is a human individual.

If the zygote is a person, which of the two identical daughter cells is the original person when twinning occurs at that stage? Human twins that are genetically identical are nevertheless different ontological individuals.

All during the morula stage and prior to the early blastocyst stage the developing cells have not yet differentiated sufficiently to determine which cell will form the extraembryonic membranes (e.g., placenta) and those which will form the inner cell mass, from which will develop the embryo proper and fetus. Similarly, it could be argued that a human individual cannot be present before it is actually formed, i.e., before establishing the own body plan.

A potential human individual cannot be an actual human individual. There can be no person before the actual formation of a human individual, beginning as an on-going distinct individual embryonic human body.

Indeed, the early embryonic human cells could not constitute an actual human individual. Instead, they would have the potency to form one or more human individuals. It seems that the biological evidence leads to the philosophical conclusion that a human individual, our youngest neighbor and member of the human community, begins at the primitive streak stage and not prior to it.

Another critical point indicating the individuality is when the human embryo's primitive cardiovascular system is already functioning, and blood is circulating.

Religious perspective on the beginning of human life

From time immemorial, people have been fascinated about the origin of the human race. Ancient myths abound, The Genesis story of Adam and Eve is known well enough. That is how the Bible represents the beginning of the human race through the direct creative intervention of God.

The theory of evolution presented a challenge to science as well as to the imagination when it was a question of explaining exactly how the first humans appeared on earth. A greater challenge was presented to philosophers and theologians when, without prejudice to this belief in the creation of the soul, they had to explain how, in pre-historic times, animal life could have been transformed into human life, a human being, a *Homo*.

In regard to the use of the intra-uterine device (I.U.D.) or the "morning after pill" as contraceptives, it is important to know when a human individual begins if one wishes to avoid the risk of terminating the lives of embryonic human beings by performing acts with possible abortifacient effects.

These cases give rise to more significant moral objections if there is reason to believe that the early human embryo is already a human individual from the time of fertilization.

Morality and the law dictate what ought to be done or omitted in relation to a human individual, but they do not determine what constitutes a human individual. This is presupposed. We can readily identify a child and a dog. Our attitudes towards them differ because we recognize that the child is a personal being that is superior to the dog in nature and dignity. Our attitudes and feelings do not make the child human.

It is possible and proper to treat separately the question of the origin of the human individual without necessarily dealing with the related important legal and moral implications of the answer given.

The Catholic position on when human life begins

From the earliest times the Church has taught the immorality of abortion at any stage after conception. She likewise condemned homicide and sanctioned canonical penalties for it. This naturally led to the question whether every abortion was also homicide or only if performed after a certain stage in the pregnancy. The Catholic Church throughout history has obviously been influenced by the commonly accepted view on the moment of rational ensoulment whenever canonical legislation was being drafted in this regard.

In other words, the Catholic Church once assumed that the embryo did not become a human being until several weeks after conception. Grisez affirms this remained so in practice until 1869 when Pope Pius IX, in the constitution Apostolicae Sedis declared:

> … included among those who incur automatic excommunication "those procuring abortion, if successful," without distinguishing whether the fetus was animated or not. In effect this act endorsed the growing awareness that the old distinction between animated and non-animated fetuses was grounded neither in experimental evidence nor necessary reasons. While this distinction might be maintained theoretically, the arguments of Fienus, Zacchias and others finally had their practical effect [28]. The Second Vatican Council was quite explicit in what it had to say about the value of life from the beginning, even though it was aware that the question when rational ensoulment took place had not been satisfactorily resolved.

Life must be protected with the utmost care from conception: abortion and infanticide are abominable crimes [29].

It is stated more forcefully in the Apostolic See's *Chapter of the Rights of the Family* (October 23, 1983) Art. 4:

> Human life must be respected and protected absolutely from the moment of conception.

It was not until 1974, in the context of condemning abortion that Catholic teaching officially touched on the moment of the origin of the individual human being. This teaching takes for granted the views of the vast majority of ordinary people today that each of us began our lives as individuals at the moment of conception, understood as fertilization. The Church also claimed that modern genetic science supports these views, though she was careful to point out that really this is an issue that should more properly be resolved by philosophers rather than scientists. It is interesting that she did not claim that the moment of the constitution of the individual human being or human person, endowed with a rational soul, is a matter for theology as distinct from philosophy to determine. While she is even intransigent on the moral issue of deliberate abortion, she did not close the door on the theoretical question of the moment of rational ensoulment and, consequently, on the timing of the constitution of the individual human person.

The relevant texts of the 1974 *Declaration on Procured Abortion* in paragraphs 12 and 13 read as follows:

12. In reality respect for human life is called for from the time that the process of generation begins. From the time that the ovum is fertilized, a life is begun which is neither that of the father nor of the mother, it is rather the life of a new human being (= *novi viventis humani*) with his own growth. It would never be made human if it were not human already.

13. This has always been clear, and discussions about the moment of animation have no bearing on it. Modern genetic science offers clear confirmation. It has demonstrated that from the first instant there is established the program of what this living being will be: a man, this individual man with his characteristic aspects already well determined. Right from fertilization the adventure of a human life begins, and each of its capacities requires time – a rather lengthy time – to find its place and to be in a position to act. The least that can be said is that present science, it its most evolved state, does not give any substantial support to those who defend abortion. Moreover, it is not up to biological sciences to make a definitive judgment on questions which are properly philosophical and moral, such as the moment when a human person is constituted or the legitimacy of abortion. From a moral point of view this is certain: even if a doubt existed concerning whether the fruit of conception is already a human person, it is objectively a grave sin to dare to risk murder. "The one who will be a man is already one" [30].

To say that from the first moment of the completion of the process of fertilization the fertilized egg has the genetic program of a man is not the same as asserting that the fertilized egg itself already is a man (*homo*).

It is well known that in humans, natural fecundity suggests that the chance of conception per cycle is relatively low (~30%) and two-third of lost pregnancies occur because of implantation failure, while if implantation has been successful, probability for pregnancy loss in uncomplicated pregnancy is 15% [31]. Should all this loss of pregnancy be considered as loss of human life? Another issue taken from stem cell investigation is formation of so called blastoids or blastocyst-like formations to investigate mammalian (human) pre-implantation development [32]. They mimic the blastocyst morphologically and transcriptionally but can progress towards the post-implantation stage in large numbers [32]. Too many questions, hardly any answers.

Pope John Paul II during his visit to Australia rightly said the following at the Mercy Maternity Hospital, in Melbourne, the Australian capital of *in vitro* fertilization and research on human embryos.

In the delicate field of medicine and biotechnology the Catholic Church is in no way opposed to progress. Rather, she rejoices at every victory over sickness and disability. Her concern is that nothing should be done which is against life in the reality of a concrete individual existence, no matter how underdeveloped or how advanced [33].

This is all the more necessary when we see that the teachings of the Bible and the Church give practical guidance and motivation for acting morally in relation to life issues rather than answer explicitly in philosophical terms the question of when a human individual begins. Perhaps we could conclude that according to Catholic Church the human life begins in a moment of conception.

Scientific criteria for being human individual

The question which remains is that of when does a human life start to matter in a moral sense or, to put simply, when does a person begin being?

Is it accurate to state that a fetus holds value for itself or its life?

This is not an issue dealing with facts but with value. How much *should* we value a human life at these very early stages? But to attempt to translate this into an issue about whether or not an embryo is a person seems like an attempt to turn this into a question of facts. It seems like an attempt to discover an acceptable answer by inspecting the embryo and finding out what features it has. That personhood in question, its possession or non-possession, is an issue of value insomuch as is the issue of when human life begins to matter, and this is hard for people to understand. And yet, it is undoubtedly the case.

Personally, we believe that there is a short and true way out of this difficulty: to completely bypass the concept of the person. After all, that concept was only introduced because persons are the legal bearers of rights. Since there seems to be no separately acceptable way of distinguishing between a person and a non-person, apart from this legal concept of possessing rights, it seems easier to avoid this concept and directly ask whether or not a human embryo has rights [34].

They agree, nevertheless, that one doesn't count as a human person simply by being biologically human. There are different concepts whose content needs to be fulfilled in order to clear possible *galimatias*, such as: person, personality, personhood, human being, human person, human individual *(individuum)*, human individuality.Whereas an animal is capable of only *see*ing the green grass, a person can both *see* and *proclaim that* the grass really *is* green.

The human individual prior to birth

Once it is confirmed that the newborn infant is a human being, there is no room for doubt whether the fetus in the

mother's womb is a human individual. The child that is born is the same human individual in the process of development which was in the mother's womb. The act of birth cannot grant either human individuality or natural personhood. This is further exemplified by premature deliveries of infants who are as truly human and almost as viable as full-term gestation babies. The issue of viability inside or outside the mother's womb raises questions of the kind of dependence required for survival but does not influence whether one is a human individual or not. Viability outside the womb cannot be put forward as a true essential measure of being a human individual. The fetus that is only viable within the womb is already a distinct human individual, even if its survival depends on the mother. Regardless, viability outside the womb is by far too random a criterion. For example, a baby of low birth-weight which is delivered in a hospital equipped with a neonatal intensive care unit would most likely survive, while the same baby born in other circumstances without the same advanced facilities and expert care would most likely not survive. All available evidence and logic itself support the notion that a human fetus before birth is a true ontological human individual and accordingly a human person, if not in law, then in fact. Viable simply indicates that it is capable of surviving, a notion which has changed by the development of neonatology. Even just a hundred years ago, 32 gestational week neonate was not considered to be viable, while in some countries today more than half of 22-week babies are capable of surviving without major disability [35, 36]. Also, the artificial uterus project is ongoing and will possibly further decrease the limits of viability toward unimaginable gestations [37].

As Lockwood sees it, the term human being stands for:

> …. Whatever it is that you and I are essentially, what we can neither become nor cease to be, without ceasing to exist [26].

In his view a week-old human embryo is not a human being nor is it a person [26].

According to Lockwood, one cannot begin to be a human being before the appropriate brain structures capable of sustaining awareness are developed. The question is how to measure the capability of sustaining awareness of a newborn baby? Is it a right standard for recognizing a human being as such?

Personality

It is very complicated to define the notion of personality because there is still no clear definition of what personality is. One dictionary states it is "what constitutes an individual as a distinct person," but does not define what the initial "what" really is. Another dictionary declares "the state of existing as a thinking intelligent being." This definition might infer that personality is capable of being increased as intelligence increases, or that some people may completely lack a personality if we accepted Bertrand Russell's pronouncement that "most people would rather die than think and many, in fact, do!" The Manual of Psychiatry by Ken Stallworthy is more helpful, providing the definition that personality is the individual as a whole with everything about him which makes him different from other people "since we can clearly distinguish between individual fetuses and fetuses from other people." But the next sentence – "personality is determined by what is born in the individual in the first place and by everything which subsequently happens to him in the second" – provides the crucial argument [2, 20].

If we accept the maxim that "No insignificant person was ever born" then human beings should be valued from their birth to natural death. But as always in today's world sayings are turned upside down and people are selectively devalued, made irrelevant on the basis of, for example, skin color, religious belief etc. Consequently, it is difficult to establish exact definitions and proper values. This especially becomes obvious when we're considering prenatal life. The maxim stated above broaches an important question: "Is the person – unborn a person in the first place and, if so, is the person – unborn a "significant" person?" [20].

Let us examine further existing controversies. To repeat, there is no doubt that both the embryo and fetus *in utero* are human individuals before birth. The child that is born remains the same developing human individual that was in the mother's womb. Birth alone cannot grant natural personhood or human individuality. This is further exemplified by premature deliveries of infants who are as truly human and almost as viable as full-term gestation babies. Even if human nature of the fetus was not perfect nor its functions quite normal, it would still be considered a human individual. Nobody would question whether a Down's syndrome fetus or child is human. A fetus or child suffering from severe open spina bifida is not any less of a human being. The same goes for the live anencephalic fetus or infant with only brain stem functions. Even if it lacks a whole brain and usually survives only a few hours or a day after birth, it is still a human individual.

Human society invented several standards for defining what is a "person," or a "human being" which are founded on what is familiar and easy recognizable [20]. For example: a human being is characterized by speech, understanding and laughter. However, an absence of any of these characteristics (mutism, autism, and stoicism) does not disqualify

one from being a human. To the contrary, we have found that the characteristics we associate with being a person are not necessarily applicable to every individual person and that they may exist during certain period of time and then disappear. Consequently, we need to establish criteria of determining what constitutes a "person" in society and in a given time. It is worth to mention that there is no human being that is more or less a person, i.e., there is no possibility to be pre-person, post-person or sub-person, respectively a person is or is not a person [38].

Professors in Italy dedicated themselves to care for embryo in such a way, providing the same dignity to every patient and allowing the human conditions to develop and grow, to educate others both inside and outside their medical specialty and perform further research involving all the components of society [25].

Bioethical aspects

The notion that the embryo or fetus are simply a miniaturized version of an infant or adult holds true to the extent that the embryonic/fetal physiologist has to be able to apply knowledge of all physiological systems obtained from those already born, although it remains untrue as it fails to distinguish the numerous ways in which the period of life before birth essentially differs from life after birth [16]. The newly conceived entity presents itself as a reality defined by biology: it is an individual which, although in development, is entirely human and which moment by moment, without any discontinuity, autonomously actualizes its true form in order to, by intrinsic activity, achieve a design that exists in its own genome [25]. The embryo as a patient is best perceived as being the subset of the concept of the fetus as the patient. These two concepts broached a whole set of issues regarding potential ethical problems. The embryo as the patient is fundamentally indivisible from the mother as a patient. However, it is necessary to balance the interests of embryo/fetus and the mother. One direction to understanding the notion of the embryo/fetus as a patient has included efforts to determine whether or not the embryo/fetus possesses independent moral status or personhood [39–43]. Having independent moral status would mean that one or more of the characteristics possessed by the embryo/fetus itself and, therefore, independent of the mother or any other factor, generates and therefore grounds obligations towards the embryo/fetus on the part of the mother and her physician.

For this purpose, a wide scope of inherent characteristics has been considered, e.g., the moment of conception, implantation, development of the central nervous system, quickening, and the moment of birth [41]. Given the inconsistency of characteristics proposed, there are numerous views on when the embryo/fetus does or does not obtain independent moral status. Some hold the view that the embryo/fetus already has independent moral status from the very moment of conception or implantation. Others accept as true that the independent moral status of the embryo/fetus is a matter of degrees, which results in the notion of a "graded" moral status. Other still hold, at least indirectly, that the embryo/fetus is not capable of obtaining independent moral status while it is *in utero* [39]. We tend to reason that moral status of an unborn child as well as the embryo or fetus comes from his philosophical and anthropological personal status as an individual member of *homo sapiens species* having intrinsic dignity.

However, possessing independent moral status is not a prerequisite for being a patient [40]. Being a patient simply indicates that one can benefit from the provided clinical skills of the physician. To clarify, a human being is correctly considered a patient even when they do not possess independent moral status if the following conditions are met: that human being is presented to a physician in order to receive clinical treatments which are reliably expected to be effective, in the sense that they are provenly expected to result in a greater balance of good over harm for the future of the human being in question [44]. In short, any individual is regarded as a patient when a physician has beneficence-based ethical obligations towards that individual.

To further clarify the concept of the embryo/fetus as a patient, it is necessary to provide a beneficence-based obligation. The beneficence-based obligations towards the fetus or embryo exist when the fetus can obtain independent moral status in the future [44]. This brings us to the conclusion that the ethical significance of an unborn child exists in a direct correlation with the child to be born – or to put it differently, the child it could become.

However, the technologization of life and the swift growth of the possibility of artificial interventions in life, particularly since the twentieth century, caused an overwhelming relativization of the traditionally unquestionable value. This opens new ethical dilemmas in everyday activities, especially in medical treatment, which are treated differently in specific legislative systems and moral views. From the absolute value life turned into an object about which decisions are made, from its inception to its end.

This also causes a change of the ethical paradigm in the understanding of life. While the deontological ethics of Kantian type or Christian ethics valued life by itself,

contemporary bioethical discourse focuses on the question of life's value according to its quality and the expected results. The motive for action is the relevant standard for the first type of ethics, while life is out of disposal as an absolute moral duty. Contrary to that, the more recent approaches such as, for example, the consequentialist ethics of utilitarianism investigate the pragmatic treatment of moral dilemmas.

Legal status of the embryo

When discussing law, we should always keep in mind that although medicine is universal and international, law is not.

The standing of the human embryo is not legally defined and relies heavily on the current social, religious and political conditions in each individual country. Answering the question about when should a human life be legally protected is difficult. Should it be from the time of conception? The time of implantation? Or from birth? In all countries (except for UK, Ireland and Liechtenstein) legal considerations are founded on the tradition of Roman law. Roman civil law is protecting the fetus in a way to be considered as yet born, when it comes to his interests (*nasciturus pro iam nato habetur si de commodis eius agitur)*. Naturally, at that time there was no idea to protect the unborn child before his birth, but fiction was already being created if it was born.

Very few countries accept the definition of human personality developing at the moment of conception. The majority do not grant any legal status to the human embryo *in vitro* (i.e., during the 14 days after fertilization). However, even without legal rights, there is no doubt that the embryo represents the beginning of human life, a new member of the human family. Thus, whatever the prevailing attitude, every country has to evaluate which practices are well-suited to the necessary respect of that dignity and the future security of human genetic material [45]. Thanks to the progress of biomedicine, the awareness of the beginning of human life is somewhat changing, but the fact is that still no European document explicitly mentions the moment of the beginning of life. As if waiting for the expert's opinion.

Conclusions

"Self-awareness is possibly the most fundamental characteristic of the human species. This characteristic is an evolutionary novelty; the biological species from which mankind is descended only had rudimental self-awareness. However, it brought somber companions in its wake – fear, anxiety and awareness of death" – T. Dobzhansky.

The issue of when does a human life begin and how should it be defined, can only be answered by interconnecting the pathways of history, medical science and philosophy. Determining where this sensitive issue crosses from the competence of science into the field of metaphysics has been hard. The drawing of this line largely depends on one's principal philosophical outlook.

As R. Colombo, a professor from the Vatican Academy pro Life said "Life certainly has a religious value but in no way should that value concern only the believers. The value in question is one which every human being can grasp using the light of reason; thus it necessarily concerns everyone" [20].

Can we, as scientists, based on our knowledge of the process of fertilization, give our legislators a clear-cut definition of the beginning of life? Luigi Mastroianni from San Francisco said: "On the issue of scientifically defining when life begins, we are asking for the impossible. We are dealing with a metaphysical issue and not a scientific one. For us, the statement of the American Fertility Society Public Affairs Committee is quite acceptable: human life is a continuous process, and therefore, the exact moment in which a new person is formed cannot be defined using purely scientific terms. A definition of person necessarily involves metaphysical (religious, philosophical) judgment" [46].

It is necessary to return the moral dimension of observation to the science of life. The point is to reconcile the universal ethical principles concerning the absolute value of life with the everyday challenges and dilemmas in which they are relativised and questioned. It is our deepest conviction that life has an absolute value and that there always remains something indestructible and substantial in life, which may neither be evaluated by anything final, nor completely reduced to the material biological equivalent and the genetic substratum.

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