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C. Ward Kischer

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When Does Human Life Begin? The Final Answer

by

C. Ward Kischer, Ph.D.

The author is an emeritus professor of Cell Biology and Anatomy, specialty in Human Embryology, University of Arizona College of Medicine, chairman of the American Bioethics Advisory Commission and the 1998 recipient of the Linacre Award

Since 1973, when *Roe v. Wade* was adjudicated, there have been many socio-legal issues involving the human embryo. Abortion, partial-birth abortion, in vitro fertilization, fetal tissue research, human embryo research, stem cell research, cloning and genetic engineering are core issues of human embryology. Every one of these issues has been reduced to a question of *when human life begins*. And that question is as prominent in the public media today as it was when first posed in 1973.

For example, Bill O'Reilly, host of the Fox News Cable program "The O'Reilly Factor," three times between July, 2001 and March, 2002, stated on his program: "No one knows when human life begins."

Two years ago, when the public debate centered around culturing early human embryos in a petri dish, Senator Orrin Hatch and former Senator Connie Mack both said "It's not a human life until it is in the uterus."¹

The lead editorial in the *Arizona Daily Star* of 26 January, 2003 states: A bill affirmed by the State Judiciary Committee requiring the gestational age of the unborn child be given to a woman before an abortion, was an "attempt to answer the emotionally charged question of when life begins." It also said "the bill is yet another attempt to convert a private medical issue into a moral and religious one."

USA Today reported on 24 January, 2003 that Amy White, who writes monthly commentaries for the *St. Louis Post-Dispatch*, stated in an article

about the 30th anniversary of *Roe v. Wade*: "... how can we navigate our way through the moral minefields.. when we're still unsure when life begins."

Duncan Hunter, California Congressman, is set to introduce a bill that declares "life begins at conception." Although such a bill has been introduced before, the issue has never come up for a vote.

Some state legislatures are considering similar action, e.g., New Hampshire. State Representative Barbara Hagan introduced her bill stating: "life begins at fertilization." Yet, opposing that bill, Representative Peter Allen, Democrat, declared it is still a matter of semantics as to when life begins. Another opponent, Democratic representative Frances D. Potter, claimed the bill was "grounded in religion."

On 27 February, 2003, the U.S. House of Representatives passed a ban on human cloning. *USA Today* reported the next day on the vote and stated, "Some scientists... argue that tiny cloned embryos... are not the same as a human being. But opponents (to cloning) argue that the tiny cells are an individual life."

Thus, it is very clear that in the past 30 years the question as to when human life begins has not been resolved for much of the general public. It is also very clear that there are legions of pols and pundits who are totally refractive to scientific fact. Further, it is unfortunate, but true, that much of the lay public has little background in basic reproductive biology, and even less in human embryology. As a consequence, this basic information has been rather easily corrupted within the public discourse.

The Science of Human Embryology

Hippocrates (460-377 B.C.) wrote about the development of the chick embryo. Later Aristotle (384-322 B.C.) wrote a treatise on his observations of development of the chick embryo and other embryos. He is generally regarded as the "founder" of embryology. Subsequently, there were many published observations of embryonic and fetal development, including drawings of a dissected pregnant uterus by Leonardo da Vinci (15th century, A.D.), albeit with certain errors.

The invention of hand lenses and the microscope facilitated studies of the chick embryo by Marcello Malpighi (1628-1694), but also gave rise to one of the most profound errors in describing human development, that of the *homunculus*. This was a miniature human believed to have been seen within the head of a human spermatozoon and which presumed to enlarge when deposited in the female. This was the basis of the *preformation* theory and was believed by many well into the 18th century.

Eventually, this theory gave way to that of *epigenesis*, that is, the individual arose incrementally during development by way of "globules"

or tissues developing and growing upon a preexisting "globule" or tissue. The cell theory developed by Schleiden and Schwann in 1839 hastened our knowledge of embryology and provided for the realization that a spermatozoon fuses with an *oocyte* ("egg") and forms a *zygote*, the single celled embryo, which then divides and adds more cells and tissues in defining the developing body.

William Roux, Hans Spemann, winner of the Nobel Prize in 1935, and others continued many experiments in invertebrates and lesser vertebrates and formed the basis for the science of experimental embryology, or, today recognized as developmental biology.

However, paraphrasing Pierre Charron (1541-1603), *the proper study of mankind is man*. The father of human embryology is generally regarded as Wilhelm His (1831-1904). He developed the method of reconstruction, that is, putting together descriptive drawings from sectioned human embryos to show a three dimensional structure.

Although the case for fertilization of the human oocyte by the human spermatozoon was made intuitively by observing the process in mammals more than 100 years ago, direct observation of the process in the human was made in about 1968. The significance of this was resolved experimentally with subsequent growth of the new individual and successful implantation with completion of development to birth. This was accomplished with the birth of baby Louise Brown in England in July, 1978. Other successes soon followed.

The Continuum of Life

The facts above, along with the constancy of the time of gestation, approximately 38 weeks, reasonably declare that the life of the new individual human being begins with fertilization. Virtually every human embryologist and every major textbook of human embryology states that ***fertilization marks the beginning of the life of the new individual human being.***

The reason why this is true is that, from the moment when the sperm makes contact with the oocyte, under conditions we have come to understand and describe as normal, all subsequent development to birth of a living newborn is a *fait accompli*. That is to say, after that initial contact of spermatozoon and oocyte there is no subsequent moment or stage which is held in arbitration or abeyance by the mother, or the embryo or fetus. Nor is a second contribution, a signal or trigger, needed from the male in order to continue and complete development to birth. Human development is a ***continuum*** in which so-called stages overlap and blend, one into another. Indeed all of life is contained within a time continuum. Thus, the beginning

of a new life is exacted by the beginning of fertilization, the reproductive event which is the *essence* of life.

Herein lies the importance of distinguishing between the science of developmental biology and the science of human embryology. Within the science of human embryology, the continuum of life is more fully appreciated. The fact that development and developmental principles do not cease with birth becomes more fully realized. So, the continuum of human development does not cease until death, whenever that may occur, in utero, or at 100 years of age.

The Basic Terminology

For the layperson it is not important to remember embryological terms, or to study their Greek origins, for two reasons: 1) It is the **continuum of life** which is important as a biological fact, and 2) even human embryologists continue to discourse and refine our language. The terminology of human embryology is important only in the taxonomic sense. This terminology enables human embryologists to talk to one another. It is also important in the same way to some obstetricians and pediatricians. However, for the record, the following terms have virtually all been abused in media articles and the public discourse of the many socio-legal issues, including Congressional hearings. So, a quick review is necessary to identify those terms so abused.

When the sperm fuses with the secondary oocyte, *fertilization* takes place. The fusion is referred to as a *zygote*, a single cell, but with two *pronuclei*, each one containing either the maternal or the paternal chromosomes. The former are provided by the oocyte and the latter by the sperm. These pronuclei come together to reconstitute the proper number of chromosomes for our specie (called *diploid*), which is 46 chromosomes, including two sex chromosomes.

From this coming together, the single cell divides into two cells, and division continues until a cluster or ball of cells is formed called the *morula*. Soon thereafter, the cells in the morula divide and cluster so that a small cavity is formed, above which is a mass of cells. This is called the *blastula*, and when the cavity becomes larger, the embryo is called the *blastocyst* and the mass of cells above it is called the *inner cell mass* or the ICM.

Other events have taken place since fertilization, especially movement of the embryo down the fallopian tube, assuming fertilization has taken place in the upper third of the tube, which is optimal, so that the embryo is positioned properly within the uterus and ready for implantation. This takes five to six days. The outer rim of cells of the embryo has special properties allowing it to "invade" the lining of the uterus. Among the many

simultaneous events occurring are changes in the cells of the embryo, which "regulate" its destiny. Such regulation actually began at probably the first cell division of the embryo when an unusual but significant production of an immunosuppressant takes place, the *early pregnancy factor*. This prevents rejection of the "foreign" embryo by the mother.

In addition, the "regulation" taking place among the cells of the early embryo has to do with communications between the cells, which allow for movement of materials, providing signals or directions to a cell or cells, prompting them to divide or not to divide, or to respond in general or specific ways which can direct their destiny or potentials.

One often hears the rallying cry from pro-choice advocates: "my body, my choice." Certainly, they exercise a choice, but it is not just "my body." There are two (2) bodies, each genetically distinct, and each "foreign" to the other. It should be recognized that the body of the early embryo is very active in its daily rituals of survival.

Prior to about 14 days post-fertilization the embryo becomes composed of two layers, an upper or *epi-* layer, and a lower, or *hypo-* layer. At 14 days a third layer appears wedged in between the upper and lower layers. At this time, the cells of this third layer are dividing and the direction of movement of those cells is mostly toward the cranial end of the embryo, but also a lesser number and movement toward the caudal end of the embryo. This division and movement of the cells produces a *primitive streak*. Subsequently, the shape and form of the embryo change dramatically. Such phenomena as bending, folding and pleating sculpture the embryo into a more definitive form. This is largely brought about by *differential proliferation*. In other words, some cells, or groups of cells divide faster or slower than others. This changes the appearance and form of the embryo.

Every moment of development blends into the next succeeding moment. But, even common sense tells one that this so-called development does not cease at birth. It continues until death. At any point in time, during the continuum of life, there exists a whole integrated human being. This is because over time, from fertilization to a 100-year-old senior, all of the characteristics of life change, albeit at different rates at different times: size, form, content, function, appearance, etc.

Pregnancy

Human embryologist Bruce Carlson, in his 1994 textbook, *Human Embryology and Developmental Biology*, states in his opening sentence: "Human pregnancy begins with the fusion of the egg and the sperm..."² This is so because the concern of human embryology is the human embryo

whether it be in the fallopian tube, uterus, ectopically placed or in a petri dish. Additionally, for a pregnant woman, the expected time of delivery, fertilization age, time of gestation, or the period of confinement is always calculated so that the time of pregnancy begins at fertilization.

The idea that pregnancy begins at implantation of the embryo in the uterus was generated more than three decades ago. At that time there were concerns about the actions of chemical contraceptives. Albert Rosenfeld wrote in his book, *Second Genesis* (1969):

Because these substances do not prevent the sperm from penetrating and fertilizing the ovum – the classic definition of conception – they are not strictly contraceptives. What they do is prevent the newly fertilized egg from implanting itself in the uterus. Since the interference occurs after conception, some hold that such practice constitutes abortion. *A way around this impasse has been suggested by Dr. A.S. Parkes of Cambridge: Equate conception with the time of implantation rather than the time of fertilization – a difference of only a few days.*³ (Emphasis mine)

Thus, a fact of science gave way to political correctness.

The Corruption of the Science of Human Embryology

How did the basic fact of when human life begins, and other facts about human development become so parsed, changed and corrupted? For the answer to that we have to look at what actually happened within the Supreme Court of the United States.

Roe v. Wade

The modern day assault on human embryology began in 1973 in the oral arguments of *Roe v. Wade*, and in the majority opinion written by Justice Harry Blackmun.⁴ He wrote: “We need not resolve the difficult question of when life begins.” He referred to the “disciplines of medicine, philosophy and theology” as being “unable to arrive at any consensus.” It appeared he was talking about biological life by inferring that “medicine” could define its beginning. But, then, Blackmun said the following: “There has always been strong support for the view that life does not begin until live birth. This was the belief of the Stoics.” This was as if to say that science had not progressed since 300 B.C. Clearly, Blackmun conflated biological life with philosophical life, even though biological life, per se, was never referenced in his decision.

During oral arguments, in the second hearing before the Supreme Court, Robert Flowers, arguing for the appellants, clearly stated the position of the State of Texas: “Human life begins at conception and is

present throughout pregnancy.” However, Justice Blackmun then asked Flowers if that was “a medical *question*?” Flowers then compromised his position by legitimizing Blackmun’s restating Flowers’ statement as a *question*, and said *it* (referring to the now accepted *question* when it was not a question at all) should be decided by “a legislative decision.” In one fell swoop Flowers destroyed the scientific base of his testimony.

Then, Justice Marshall said: “I want you to give me a medical, a recognizable medical writing of any kind that says that at the time of conception the fetus is a *person*.” Flowers responded: “I do not believe I could give that to you without researching through the briefs that have been filed in this case, your honor.”

Clearly, Robert Flowers was not prepared to argue the biological life of the new individual human being, or to force the Justices to be consistent and cogent with their questions and/or statements.

In this case, was the behavior of the Supreme Court Justices disingenuous, intellectually dishonest or just plain arrogant? Asking a question like this seems to apply a label of opprobrium; but, if so, it is richly deserved because the facts of science were readily available to the Justices who are staffed with an army of law clerks and assistants who could easily have obtained the vital scientific facts.

Webster v. Reproductive Health Services of Missouri

In the *Webster* case, adjudicated in October, 1988, an *amici curiae* brief of 167 distinguished scientists and physicians, including 11 Nobel Laureates, wrote in their summary of argument: “There is no scientific consensus that a human life begins at conception, at a given stage of fetal development, or at birth!” Not only is such a declaration outrageous, it is tantamount to “The Big Lie.” How were these 167 chosen and who were they? Susan Solomon, a graduate student at the University of Arizona College of Medicine, researched this group and concluded that *not a single one* was a human embryologist.⁵

Stenberg v. Carhart

In *Stenberg v. Carhart*, the Nebraska partial birth abortion case, adjudicated in June, 2000, no less than five (5) Justices used, acknowledged and endorsed the phrase “potential human life” in their written opinions.⁶ This phrase had appeared in Blackmun’s decision of *Roe v. Wade* in 1973. Twenty-seven years later it remained certified.

In simple terms, human life is *never potential*. Life is life. A life that is not living is dead. The conflation continues. The Justices infer a biological quality when they speak about the birthing, or partial birthing of the fetus, but then enjoin that with such quasi-legal terms as “person” and conclude that “life is potential.”

They cannot avoid being compared to a similar decision made in Nazi Germany in the 1930s that some human life was subhuman, *untermenschen; Lebens unwertenleben* – lives unworthy of life.

Clearly, the revision of the science of human embryology began with Blackmun's decision in the *Roe v. Wade* case. In spite of volumes written to correct the errors, Blackmun's declaration has prevailed and given rise to a plethora of other revisions, some of them so egregious as to defy all common sense and recorded fact to the contrary.

The Wrong Scientists are Talking About the Human Embryo

None of the panels commissioned by President Clinton or President Bush have ever included a human embryologist. Recently, two different scientists, each of whom indirectly claimed to be a human embryologist, but who are not, testified before the President's Council on Bioethics. The fact is that no human embryologist has ever been invited to testify before any Presidential Council or Commission.

Lee Silver, Professor of Molecular Biology at Princeton University, authored an article published by the *Washington Post* on 19 August, 2001, entitled "Watch What You Are Calling an Embryo." He declared that the human embryo is not really a human life, that "embryo" and "life" have several meanings.

Michael Gazzaniga, Professor of Neuroscience at Dartmouth College, and a member of the President's Council on Bioethics, authored an article published by the *New York Times* on 25 April, 2002, entitled "Zygotes and People Aren't Quite the Same." He stated that the "initiation of life" by cloning is "a matter of religion and ethics," not of biology (or human embryology). He refers to the early human embryo as "a clump of cells," and as "the size of a dot on [the letter] i." Thus, we now see the value of a human life reduced according to *size*. Does this mean that small people are less significant, or less human, than big people?

Mary Hendrix, Professor of Anatomy at the University of Iowa, testified before Senator Harkins' committee on 18 July, 2001, endorsing the use of "spare" embryos and therapeutic human embryo clones for sources of stem cells for research. She said: "Embryonic stem cells of the inner cell mass cannot form a human being, not even when implanted into a woman's womb." She is wrong and in conflict with every textbook of human embryology and with the factual evidence known from in vitro fertilization laboratories. But what do these senators know? They listen to scientists who are not human embryologists, create their own websites containing false information with a glossary of inaccurate definitions about human development, without ever consulting the facts of human embryology.

The media is complicit with such revisions of the truth of human embryology, as there has yet to be an article published in the mainstream media by a human embryologist revealing the truth of human embryology and how wrong these non-human embryologists have been.

The Preembryo

In 1979 Clifford Grobstein, a frog embryologist, invented the term "preembryo" in his publication in *Scientific American* entitled, "External Human Fertilization."⁷ He boldly admitted that this term was conceived in order to reduce "the status" of the early human embryo. At this time, the Secretary of Health, Education and Welfare, Joseph Califano, Jr., had publicly called for an evaluation of the early human embryo because of the proliferation of in vitro fertilization clinics and laboratories and he was worried about the moral status of what was essentially experimentation on the early human being.

Therefore, Grobstein accommodated this concern by presenting the term "preembryo" and declaring it a "pre-person." His justification for these terms was predicated on false human embryology. In the same article, Grobstein also invented the term "individuation" and declared that because the early human embryo could divide into two (or more) "individuals" (identical twins, or what we call monozygotic twins [MZ]) prior to 14 days post-fertilization that "individuation" had not occurred. Therefore, his reasoning was that because the "individual" was not present, ergo, the human being, or as he put it, the "person" was not present. From this torturous reasoning has come the belief by some that not even a human life is present prior to 14 days. The questioning of the arbitrary term "person" (or "personhood") is never specified to be solely a *legal* interpretation, but left to one's imagination that somehow the biological inference is in question.

Grobstein's invention is still being used and published widely even today by many, pols, pundits and even many scientists.

First of all, those who devalue the early human embryo by Grobstein's logic never comment on what actually takes place in human embryology, which is that MZ twinning occurs in only 0.22% of all live births. The likelihood, then, is that 99.78% of the rest of us are, in fact, "individuated"! Whereas Grobstein applied his concept to all human embryos, it is simply not true.

The terms "preembryo" and "individuation" have been totally discredited, not only by all human embryologists, but have also been rejected by the Nomenclature Committee of the American Association of Anatomists for inclusion in the official lexicon of anatomical terminology,

Terminologia Embryologica. These terms are not used in any official textbook of human embryology.

Marker Events

Howard Jones, Jr., representing the Jones Institute of Reproductive Medicine, authored an editorial in the *Journal of Fertility and Sterility*, in April, 2002, entitled: "What Is an Embryo?"⁸ He cited "marker events" as validating the "preembryo" and which reduced the "value" of the early human embryo and then indicated that "individuation" was *the* marker event prior to which should be the acquisition of so-called stem cells for research.

He also cited as another "marker event" the rare occasion of a "hydatidiform mole." This is a genetic defect in which the embryo does not develop. He states that since it could not be predicted when this rare and bizarre anomaly would ever be present, then, according to his logic, a normal pregnancy with a normal embryo could also not be predicted. Therefore, one would have to wait a time, **after** which the "mole" would not be known to occur, in order to declare a normal presentation for the "human being." Again, the logic is torturous and not worthy of common sense reasoning.

If the reasoning by Jones were in the least way acceptable, then one would have to conclude that all of life has so-called "marker events" which then could be used in any capricious and arbitrary way. For example, the thymus gland, so instrumental in providing immunity for the human being, disappears in most adults. Would the time of its disappearance mark the end of value for that person? Another example: growth in the long bones ends at about 25 years of age with closure of the "growth plates." Would this also be a marker event arbitrarily devaluing the human being?

Cloning and Stem Cell Research

Is a clone a human life? In order to answer this question we first must examine what cloning is, its history, what it produces and what is intended for its use.

The word "clone" comes from the Greek *Klon*, which means twig or branch. The implication is self-evident. As the term has been used, and is used today, the common interpretation is that a clone is "an exact copy." This is not exactly true, for if a nucleus from a donor cell, or the chromosomes therein, or its intact DNA, is placed into a host oocyte, to which the nucleus has been removed, and stimulated to divide and develop normally then, in theory, everything in the donor would be duplicated (in theory!); but one would also be contending with mitochondrial DNA (that

within the little organelles called mitochondria found within the cytoplasm of the host cell), which would be different from the donor organism from which the nucleus had been obtained. So, "exact copy" is not wholly true.

The above describes "somatic cell nuclear transfer" or SCNT. But there are other means of cloning, for example, the separation of the cells of the early human embryo, which occurs naturally in 0.22% of all live births and results in identical twins. The fact that this occurs early in development and in the blastocyst ICM cells, reflects a quality of "totipotentiality" of the cells of the early human embryo, that is, each cell is able to form the complete organism.

The famous cloning of "Dolly", a sheep, begs the question as to the value of such a procedure. Recently, in February, 2003, Dolly was put to sleep because she suffered from a series of ailments. Whether her infirmities were the result of being cloned or arose from other sources has not been determined. However, Dolly was cloned through SCNT of a nucleus from an adult cell which had been in culture and which had been chemically "guided" in culture to a specific part of the cell cycle. At that point it was assumed to have been returned to a quasi-pristine state, as in the early embryological state. But, no evidence has ever been presented to prove this, as yet. Theories abound; for example, the DNA is said to have been demethylated. But, is that all that is required? I think not. After all, Dolly was only *one* success out of 277 trials!

Perhaps in order to determine if a clone is a human we should ask: Was Dolly a sheep? If Dolly walked like a sheep, sounded like a sheep, and looked like a sheep, then it must have been a sheep. Which is to say, it began its life as a SCNT and became a sheep.

Although SCNT is a form of asexual reproduction, once the transfer is made and a stimulus applied to effect the first cell division, that is the moment equivalent to fertilization. So, yes, a human clone is a human being. Even with the prospect of being flawed, as was suspected of Dolly.

There is another aspect to cloning currently being legislated by the U.S. Congress. That is the issue of "therapeutic cloning" vs. "reproductive cloning." Proponents of stem cell research favor the former but publicly are against the latter. One of the major problems they fail to address is the likelihood that the cells of the clone may carry lethal genes or be prone to anomalous development, as was the suspicion about Dolly. If advocates for therapeutic cloning had only looked at the original SCNT cloning experiments done by Robert Briggs and Tom King, in 1952, at the Institute for Cancer Research in Philadelphia, with donor embryonic nuclei, they would have discovered that the data from those experiments demonstrated many early deaths (as happened in the Scottish experiments) and many defects of development.⁹ The advocates also claim the likelihood of many beneficial therapies derived from obtaining the stem cells from human

clones, but almost never address the fact that human beings are being created, and killed, in order to get the stem cells.

But, one person did just that, and he is a past president of the Federation of American Societies for Experimental Biology (FASEB), Robert Rich. He said: "*The creation of a human being by performing nuclear transplantation and then implanting that clone into a woman's womb is morally wrong*" (my emphasis). Rich is in favor of therapeutic cloning, but admits that the same process is used for both "therapeutic" or "reproductive" cloning.

The Beginning of Human Life

It is quite clear that what was known more than 100 years ago, even intuitively before that, is that the fusion of sperm and oocyte begins the life of the new individual human being. In human embryology the terms understood to be integral in the common sense language are: human, being, person, individual, human being, and human life. Unfortunately, every one of those terms has been parsed and corrupted to mean something it is not.

For example, we have already examined the corruption of the term *individual* into *individuation*, but explained how this corruption is seriously flawed. But, there has been another problem created; that is, when the early embryo splits, does the soul also split? And, if until that time there has been no soul, how could there be a person?

First of all, this is a question not for science, but for theology or religion. The science is there and has been there for about 150 years. In fact, it ought to be clear by now that when human life begins has no relationship to religion at all! Sherlock Holmes said it best when addressing Dr. Watson: "It's elementary my dear Watson."

What is the Future for Human Life?

Scientists are going to continue to manipulate life and its elements, virtually all under the guise of beneficial therapies. Most of them fall under the aegis of genetic engineering. There have been and are proposals for gene selection, gene deletion, gene stimulation, and gene insertion. In fact, the first gene therapy was performed in 1990 on a four-year-old with an inherited immune disorder and, in 1999, Jesse Gelsinger underwent a gene therapy experiment at the University of Pennsylvania. He died.

A *chimera* is an organism composed of chromosomes from two different organisms. Already there is a *human-animal* chimera in the form of the SCID mouse.¹⁰ This mouse is an animal born, normally, without an immune system. Hence, it is called SCID for Severe Combined Immunodeficiency. But this mouse received a transplant of immune tissue

from a human fetus. Since the mouse had no immune system the transplant would not normally be rejected.

Are transplants from animal to human likely? They certainly have been proposed and discussed in scientific circles, as have been human-human chimeras. These situations will call for bioethical assessment. The science being involved is clear that what we normally agree to be life is being manipulated. This has caused the bioethicist, Arthur Caplan, to ask if the forms will be a human life or "a genetically misprogrammed embryo, a flawed human being or simply a non-properly formed non-embryo."

More caution is clearly indicated. In Mary Shelley's ghost novel, *Frankenstein* said, "I had worked hard for nearly two years for the sole purpose of infusing life into an inanimate body." But when he witnessed the first signs of life in his creation, "the beauty of the dream vanished, and breathless horror and disgust filled my heart."¹¹

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