

CHAPTER 2

BIOETHICS AND THE NEW EMBRYOLOGY



Philosophical, Theological, and Scientific Arguments

The question of when a human life begins underlies nearly all the other ethical questions considered in this book. People have thought about and asked this question throughout history. It has been expounded upon and argued by countless theologians, philosophers, doctors, lawyers, and politicians. Recent advances in science and medicine have led some people to look to biologists and other research scientists for answers—and their answers turn out to be as varied as those of any other group of thinking people.

The issue of life's starting point has become inextricably coupled with the issue of abortion. Like the question of when life begins, abortion has been a constant throughout human history. Whether a given society has condemned or condoned it, whether it has been legal or illegal, whether the procedure is medically safe or extremely dangerous, abortion has been a fact of human existence, and is likely to remain so. Today the moral acceptance of abortion extends from the question as to whether the procedure is manslaughter or simply the destruction of tissue.

"When does life begin?" may not be a new question, but modern scientific knowledge and recently developed new medical and technological abilities have made it an extremely prominent one. In this discussion, we will be looking specifically at individual "personhood." In the proper biological sense, "life" does not begin anew with each generation. The sperm and the egg are moving, metabolizing cells and are in fact biologically alive (although they will die unless they unite to form a zygote).

Cultural and Historical Perspectives

Prior to the twentieth century, it was not uncommon for newborn infants to die shortly after birth. Even in many contemporary societies, infant mortality remains extremely high. Thus, in many cultures, “personhood” is not accorded until a certain critical period after birth. In rural Japan, personhood is obtained when an infant utters its first cry. Among some tribes of northern Ghana, a child is said to acquire humanness 7 days after birth. For some Ayatal aborigines, personhood is not obtained until the child is named—and naming occurs 2 or 3 *years* after birth. For several Native American tribes in the Mojave Desert, human life begins for children who live long enough to be put to the mother’s breast (Morowitz and Trefil 1992).

In reviewing some of the historical views that have shaped our sense of personhood, it is important to see them in the context of the scientific knowledge available *at the time*. Early human societies had no concept of the stages of development outlined in Chapter 1; the fact that a birth occurred approximately 288 days—or even 9 months—after an act of intercourse wasn’t grasped by many, even in classical times (i.e., ancient Greece and Rome). Even when the male’s role was understood, details were sketchy. Nobody knew sperm existed in the semen until the advent of microscopy in the 1600s. After the discovery of sperm, many people believed that each sperm contained a tiny, pre-formed human (a “homunculus”), and that the woman merely provided a nutrient-rich “soil” into which the seed (*sperma* is Greek for seed) was planted and grew.

It was not until the 1870s that scientists became certain conception was the union of the sperm and egg (see Pinto-Correia 1997). And it was not until the 1900s that the relationship between menstruation and the time of conception was fully understood. In fact, the absence of menses in a pregnant woman suggested to many that the embryo was formed from a woman’s menstrual material, and that the man’s semen somehow molded this material into an embryo.

Perspectives from history

The desire to raise strong males for battle led the ancient Spartans to frown upon abortion, although it was completely acceptable to most ancient Greeks to leave a sickly, weak, or deformed child on a hillside to die of exposure. Similarly, laws in the cities of the ancient Middle East discouraged abortion in favor of raising able-bodied men for the military. According to Assyrian laws, the penalty given a woman who induced her own abortion was impalement on stakes without burial (Rogerson 1985). It seems likely that the primary aim of these societies was not to protect unborn human life, but to ensure that the society did not lack military manpower (Buss 1967).

Among the ancient Greeks, the mathematician and philosopher Pythagoras (ca. 570–475 BCE) and his followers held a minority position in their disapproval of abortion (Tribe 1990). Although he is best remembered today for his studies in pure mathematics and geometry, Pythagoras led a colony dedicated to mathematics and the mystical union of the soul with the divine One. The Pythagoreans were vegetarians who believed in reincarnation and were opposed to both suicide and abortion.*

The wider Greek view was that of the philosopher Plato (ca. 472–347 BCE) who expounded the concept of **duality**: the idea that the soul and the body are separate entities. Plato appears to have been of the opinion that a human life begins at the point when a human soul enters the body, or the point of **ensoulment**. The concept of duality remains widely held today; however, the many differing opinions as to exactly when a human body becomes ensouled essentially can render it identical to the question “When does human life begin?” Plato appears to have believed that ensoulment occurs at birth.

The notion that ensoulment occurred at the time of birth was written into the laws of the Roman Republic. Although abortion was not openly endorsed by most Romans, it was not considered a serious offense (Buss 1967; Tribe 1990). In general, the Roman position was that the fetus was a part of the women’s body during the duration of pregnancy and was ensouled only at birth. Indeed, in the years immediately following the birth of Jesus, the Roman philosopher Seneca (ca. 4 BCE–66 CE) disapprovingly stated that it was common practice for a woman to induce abortion in order to maintain the beauty of her figure.

The Aristotelian view

The most widely accepted and influential classical viewpoint was that of Plato’s student Aristotle (384–322 BCE), who was both a scientist and a philosopher. Aristotle’s position, which influenced Western thought (including that of the Catholic Church) for centuries, retained the tenet of the Spartans and other Greeks that deformed children should not be raised, although he objected to the practice of exposing healthy children merely for the purpose of population control (or because they were unwanted females;

*Hippocrates, the “Father of Medicine” (ca. 460–380 BCE), is sometimes portrayed as being against abortion, since the Hippocratic Oath expressly forbids giving a woman “an instrument to produce abortion.” However, modern scholarship indicates that the Oath was not actually written by Hippocrates, but by a colony of Pythagoreans in the third century BCE (Edelstein 1967). Writings ascribed to Hippocrates himself do in fact mention means of abortion. Although a few modern medical schools still administer a form of the Hippocratic Oath to graduating medical students, virtually none uses the ancient version. As well as forbidding abortion, the original oath invokes the pagan gods, advocates the teaching of medical arts to men but not to women, and forbids physicians from “using the knife” (which was considered a skill separate from that of the physician).

see Chapter 6). He believed, rather, that the state should fix the number of children allowed to each couple, and that pregnancies in excess of this limit should be terminated before the point of “animation” (*Politics* 7:16, 1335b; see Bonner 1985).

According to Aristotle, animation was the point of ensoulment, the point at which an individual was created and subsequently possessed the form and rational power of a man (*History of Animals* Book 7, Part 3; see O’Donovan 1975). Because Aristotle believed in the physical and intellectual inferiority of females, and believed that this inferiority was due to their slower development in the womb, he concluded that animation occurred on the fortieth day after conception of male embryos and on the ninetieth day after conception of female embryos (Bonner 1985).

The importance of the “day 40” mark is that it is the time when the embryo begins to “look human” (see Figure 1.4). It is the time when the eyes come from the two sides to the front of the head, the external ears and nose become prominent, and the embryo assumes the “fetal position.” Most Roman Catholic theologians prior to the nineteenth century—including St. Thomas Aquinas, St. Augustine of Hippo, and St. Jerome—espoused the view that the fetus is ensouled at around day 40.

English common law

The foundations of the modern legal systems of Great Britain and much of its Commonwealth, the United States, and Canada were laid in England in the middle ages. This body of “common law”—the source of, among many other things, the concept of trial by jury—has its origins in the twelfth-century reigns of Henry II and Richard Lionheart. Refined and expounded upon by English legal scholars over centuries, English common law has influenced the judicial systems of most Western societies.

English common law located the beginning of human life at **quickening**, the point at which the fetus can be felt moving within the uterus. Quickening occurs at approximately 120 days (4 months) of gestation. The 1973 decision of the U.S. Supreme Court in *Roe v. Wade* cited this precedent of common law in legalizing abortion in the United States.

Religious Viewpoints

Whether we see it as a strength or a weakness, moral certainty is the province of religion, not science. Certainly all the world’s major religions have addressed, in some form or another, the question of when life begins. That there is disagreement among religious doctrines (as there is among scientists), and that religions have been known to change their views should be taken into consideration when one contemplates these questions.

Traditional Jewish views

The Jewish interpretation of when human life begins is extracted from three sources: the Torah, Talmudic law, and rabbinical writings.* Modern Judaism is far from monolithic, however, and includes a number of denominations that interpret the classical texts differently.

While the Torah does not directly discuss the beginning of human life or voluntary abortion, it does condemn miscarriage that results from violence toward a woman by an unrelated man. Exodus 21: 22–23 states that if a man injures a woman such that she survives but the fetus is lost, the perpetrator is penalized with a fine to compensate the family. If, however, the woman dies as a result of the violence, the attacker must “give life for life” and is executed, but no fine is incurred (Jakobovits 1973). This passage is usually interpreted to mean that killing a fetus is not equivalent to the murder of a human being and that human life does not begin during the fetal stage of development.

Talmudic law is more explicit in describing the point at which a fetus assumes personhood. At the point that the head of a full-term baby appears at birth (see Figure 1.17), the baby is awarded equal status to the mother’s and can no longer be sacrificed to save her (Jakobovits 1973). Before this “crowning” of the head, the fetus has no legal rights as a human being. However, abortion is not usually permitted under traditional Jewish law, although it is considered acceptable if the mother’s life is in danger. In this context, the fetus is viewed as being in “pursuit” of the mother’s life, and may be destroyed as an “aggressor.” Overall, then, the fetus is granted some recognition as a potential human life, but its status does not equal that of its mother’s until its head can be seen coming out of the birth canal.

Although the Talmud gives the full status of humanness to a child at birth, some rabbinical writings have postponed the acquisition of humanness to the thirteenth day *after* birth for full-term infants (Jakobovits 1973). This designation is based on the viability of the infant, so the acquisition of humanness occurs even later for premature infants, because the viability of premature infants may still be questionable after 13 days (Buss 1967). (As mentioned earlier, many traditional cultures have a “waiting period” before a newborn is named or given legal status in the community, since without medical technology it is not uncommon for such infants to die.)

*The Torah, or “The Law,” comprises the first five books (Genesis, Exodus, Leviticus, Numbers, Deuteronomy) of the Hebrew Bible (the Old Testament, or Tanakh). Traditionally believed to be the word of God as handed down to Moses, the Torah is the scriptural basis for Jewish law. The Talmud is rabbinical commentary and legal interpretations of the Torah and was originally an oral tradition (the “oral Torah”). The written Talmud was compiled by scholars from the second through the fifth centuries CE, and includes arguments and commentaries. More recent rabbinical writings are often included in Talmudic studies.

Early Christian views

The teachings of Jesus as articulated in the four Gospels do not specifically address the question of when life begins (although much is said about being “born again”). Likewise the apostle Paul, whose Epistles, along with the Gospels, are the foundation of Christian doctrine (the New Testament), has no definitive instruction on this point.

Early Christian interpretations of the Old Testament led to a distinction between an unformed and a formed (animated) fetus, the latter being con-

Hast thou not poured me out as milk, and curdled me as cheese? Thou hast clothed me with skin and flesh, and hast fenced me with bones and sinews. Thou hast granted me life and favor, and thy visitation hath preserved my spirit.

JOB 10: 10–12

sidered an independent person with full human status (Buss 1967). This interpretation was embodied in the Justinian Code,* and branded as murderers those who caused the miscarriage of a formed fetus (Jakobovits 1973). The distinction between a formed and an unformed fetus raises the question as to how fully the writers of the Old Testament understood human development, and whether they designated a temporal period that marked the formation of a

fetus. Passages in Job 10: 9–12 and Psalm 139: 13–16 hint at the process of fetal formation, though neither refers to a time frame in which it might occur (Rogerson 1985).

Christianity arose among the Jews and maintained a foundation of Hebrew scripture. However, the first century after the death of Jesus saw the new religion grow not so much in Hebrew Palestine, but in the classical Greek and Roman world. The apostle Paul, a Greek-speaking Jewish convert, traveled the Mediterranean preaching and writing epistles (letters) to other converts and would-be converts. By the time of his death around the year 67, Paul had succeeded in sowing the seeds of a religion no longer strictly bound by the laws of the Torah.

As Christianity gained converts in the classical world, there was increased friction between the rational, pragmatic philosophies of Graeco-Roman culture on the one hand, and the spiritual doctrines of Christianity on the other. In the second century, several Christian thinkers known as the Apologists,[†] or Defenders, worked to reconcile the teachings of Christianity with classical philosophy and to defend the new religion against rumors of

*The Emperor Justinian ruled from Constantinople (or Byzantium; present-day Istanbul, Turkey), the center of the largely Christian Eastern (Byzantine) Empire that grew in power after Rome fell to invasions by the Goths and other northern Europeans. The reign of the pious Justinian (527–565) was marked by the massive construction of public works and buildings (including many churches) and the codification of the Roman legal tradition into written volumes that still influence legal scholars.

[†]*Apology* is used here in its Greek root meaning of “a formal justification.”

vile mystical practices such as human sacrifice (one such slander held that Christians killed and ate infants during the course of their communion rites). In 197, the Apologist Tertullian wrote denouncing both contraception and abortion, saying that as Christians,

Murder being once for all forbidden, we may not destroy even the foetus in the womb To hinder a birth is merely a speedier murder; nor does it matter whether you take away a life that is born, or destroy one that is coming to the birth. That is a man which is going to be one; you have the fruit already in its seed.

This may be one of the earliest clear statements of the premise that life begins at the moment of conception. Tertullian did, however, recognize the need for abortions when necessary to save the life of the mother (Buss 1967; Bonner 1985).

In more recent times, some Christian theologians have argued that there is no point in distinguishing between a formed and an unformed fetus, because embryonic development is a divine process that should not be terminated by human intervention (Buss 1967; Rogerson 1985). Others argue that humanness is acquired on a continuum, and the state of humanness is reached through the acts of birth and baptism. It has been argued that, while degradation of a potential life should be avoided, true acquisition of humanness cannot be obtained until after birth, and miscarried fetal material is usually not accorded the rituals of baptism and burial with which many Christians note human birth and death (Rogerson 1985).

Positions of the Roman Catholic Church

During its history, the Roman Catholic Church has held varying positions on the beginning of human life. For most of the Church's history, its thinkers viewed immediate ensoulment at conception as impossible. Around 1140, when the monk Gratian compiled the authoritative canon law,* he concluded that "abortion was homicide only when the fetus was formed." Before the time of formation (about 40 days), the conceptus was not considered to be a fully ensouled human. Catholic doctrine as expounded by St. Thomas Aquinas (1225–1274) also followed the Aristotelian interpretation that a male fetus became ensouled at 40 days after conception, while the female fetus became ensouled at 90 days (Tribe 1990). Aquinas believed terminating a pregnancy prior to that time was sinful—a particu-

*Gratian's compilation, usually known as the *Decretum*, collected thousands of authoritative statements by popes, church councils, theologians, and secular authorities, to which Gratian added his own comments. The *Decretum* ("determined to be the case") quickly became the basic canon law textbook in the law schools of Europe and was a valid law book in the Catholic Church until 1917.

larly grave form of birth control—but was not abortion, *per se* (*Commentary on the Sentences III*, Dist. 3, Question 5; *Summa contra Gentiles II*, Chapter 89).

There were Catholic leaders who took exception to Aristotelian thinking. In 1588, Pope Sixtus V mandated that the penalty for abortion or contraception was excommunication from the Church; however, his successor, Pope Gregory IX, returned the Church to the view that abortion of an unformed embryo was not homicide. And in 1758, fear for the souls of those embryos that might die in the uterus caused Monsignor Francesco Cangiarella to publish *Embryologia Sacra*. This book advocated *in utero* baptism using a syringe—a practice that probably led to more than a few accidental abortions.

However, the Aristotelian view of ensoulment remained by and large the official view of the Roman Catholic Church until 1869, when Pope Pius IX again declared the punishment for abortion to be excommunication. Much of the support for his view was based on the idea that, since we cannot know with certainty the time at which human life begins, it should have protection from the earliest possible time, that of conception. Although it might not be ensouled, the fetus “is directed to the forming of men. Therefore its ejection is anticipated homicide.” More recent Catholic theologians argued that the rational human soul in fact begins at the time of conception, because such an infusion must be a divine act. This argument has much earlier roots, having been put forth in 1620 by the physician Thomas Fienus, who claimed that the soul must be present immediately after conception in order to organize the material of the body (DeMarco 1984).

Today, Roman Catholic doctrine maintains the belief that animation or ensoulment is concurrent with the moment of conception. It also departs from the views of Tertullian and Augustine, who accepted the use of abortion when the mother’s life was threatened. The modern Church asserts that “two deaths are better than one murder” (Jakobovits 1973). The Instruction *Donum Vitae* (1987) specifically states that “the human being is to be respected and treated as a person from the moment of conception; and therefore from this same moment his rights as a person must be recognized, among which in the first place is the inviolable right of every innocent being to life.”

Some Protestant viewpoints

The many Protestant denominations of Christianity have taken widely divergent stands on issues such as slavery, homosexuality, and the admission of women into the clergy, so it is not surprising that there would be wide differences of opinion between and within Protestant congregations as to when human life begins. The Evangelical Lutheran Church in America is very open about these differences, acknowledging the diversity of viewpoints among its members. While recognizing that holding different views

can be dangerous to the Church community, the Lutheran Church sees informed conversation about these issues as being beneficial, holding the possibility of clarifying one's beliefs concerning the roles of family and children, and concerning individual freedom and its limitations (www.elca.org/socialstatements/abortion/).

The Presbyterian Church of the United States accepts abortion as a last resort. Their stand appears more concerned with reforming the social environment than with worrying about when human life begins: "The Christian community must be concerned about and address the circumstances that bring a woman to consider abortion as the best available option. Poverty, unjust societal realities, sexism, racism, and inadequate supportive relationships may render a woman virtually powerless to choose freely" (www.pcusa.org/101/101-abortion.htm).

Some Protestant denominations claim authoritative knowledge of what the Bible dictates and will attempt to change laws in accordance with their beliefs. Thus, Resolution Number 7, "On Human Embryonic and Stem Cell Research," adopted at the Southern Baptist Convention in 1999 states that "The Bible teaches that human beings are made in the image and likeness of God (Genesis 1: 27, 9: 6) and protectable human life begins at fertilization." (www.johnstonsarchive.net/baptist/sbcabres.html).

As these three examples demonstrate, Protestant churches span the entire spectrum of positions on the beginnings of human life.

Islamic views

The Islamic tradition has always placed great value on science and medicine. The works of the classical physicians were translated into Arabic, and the Arab world actively sought such scientific knowledge. By the time of the Prophet Muhammed (570–632), Arabic medical practices were the most advanced in the Western world. The Qur'an (Koran), transcribed by the Prophet during this time frame, largely reflects the thoughts of Aristotle and the Graeco-Roman physician Galen about the embryo (Musallam 1990).

Islam appears to espouse a view that strictly forbids abortion after the embryo has acquired a soul, something said to take place any time between 40 and 120 days

Differences hold promise or peril. Our differences are deep and potentially divisive. However, they are also a gift that can lead us into constructive conversation about our faith and its implications for our life in the world.

SOCIAL STATEMENTS OF THE
EVANGELICAL LUTHERAN CHURCH IN AMERICA

Verily We created man from a product of wet earth;
Then placed him as a drop in a safe lodging;
Then fashioned We the drop a clot, then fashioned
We the clot a little lump, then fashioned We the little lump bones, then clothed the bones with flesh, and then produced it as another creation. So blessed be Allah, the Best of creators!

QUR'AN 23: 12–14

after conception (Tribe 1990). In 1964, the Grand Mufti of Jordan* declared that it is permissible to seek an abortion as long as the embryo is “unformed,” which in his opinion was within 120 days of conception. Islamic law regards the fetus as a possible heir that can have its own heirs, but early abortion is only punishable when it is done without the father’s consent (Buss 1967).

Eastern religious views

Hinduism, as practiced by millions in India, is a religion whose foundations are entrenched in the principle of *ahimsa*, or nonviolence. The practice of nonviolence is intrinsic to the Hindu belief in reincarnation—the repeated re-embodiment of the soul in different individuals and even different species. The *karma* (net cause-and-effect of one’s choices and actions) generated in one’s present life determines whether one’s soul achieves a higher level or descends to a lower state in its next existence. The ultimate goal is to attain a state of bliss and enlightenment such that the soul is released from the cycle of earthly reincarnations and becomes one with Brahma, the Creator.

Hinduism teaches that abortion at any point is an act of violence, resulting in bad *karma* that will thwart the soul’s progress toward enlightenment. Throughout the Vedas (the classical Hindu religious texts), pejorative references to abortion abound; it is referred to variously as “womb murder” and “the murder of an unborn soul” (see Tribe 1990).

The first of the five precepts of Buddhism is to avoid killing or harming any living being. Because the philosophy diametrically opposes the destruction of any form of life, even abortion to save the life of the mother violates the Buddhist ideal of self-sacrifice (for the mother). Its price is believed to be the woman’s entrapment in the perpetual cycle of birth and rebirth (Tribe 1990).

Current Scientific Views

Science does not offer a hard-and-fast answer to the question of when human life begins, and there is no firm consensus among scientists’ opinions. Indeed, the question “When does a human life begin?” tends to blur the lines between biology and social mores, since inherent within it is the idea of a “person,” which is both a biological and a social category.

Biology might be better able to give information in answer to the question “When in the process of conception and gestation does an organism

*In Sunni Muslim countries, the Grand Mufti is the highest official of religious law. He prepares legal opinions, interpreting Islamic law for private clients or to assist judges in deciding cases. The Grand Mufti sometimes issues legal edicts, or *fatwa*. *Fatwa* are considered binding in civil matters such as divorce and inheritance, but are generally considered only as recommendations in criminal cases.

reach enough individualization to be considered a separate organism?" But even here, there is no clear-cut consensus, and some scientists argue that the process of becoming human is gradual, and that there is no specific point at which a nonhuman entity suddenly becomes human.

There are at least four stages of development that different scientists have claimed as the point where human life begins, including:

1. Fertilization (the acquisition of a novel genome)
2. Gastrulation (the acquisition of an individual physical identity)
3. EEG activation (the acquisition of the human-specific electroencephalogram, or brainwave, pattern)
4. The time of or surrounding birth (the acquisition of independent breathing and viability outside the mother's body)

Pictures and Words: Caveats for Sensitive Issues

Since most of us have neither seen an actual human embryo nor read a medical journal, our knowledge of these entities comes almost exclusively from photographs and magazine articles. These have to be approached with caution, and we offer three caveats to our readers.

The first caveat concerns the images of human embryos currently available in magazines, books, and websites. Several commentators have analyzed the ways in which human embryos and fetuses are often given autonomous status by dissecting them away from the mother and from the uterus, and even hiding the umbilical cord (see Petetchsky 1987; Franklin 1991; Taylor 1992; Stabile 1993; Gilbert and Howes-Mischel 2005). For instance, the cover of the June 9, 2003 *Newsweek* magazine bears the title, "Should a Fetus have Rights? How Science Is Changing the Debate." The cover image editorializes, however: its effect is to answer the question in the affirmative by showing a human fetus floating in space, wrapped only in its amnion. No uterus or mother is seen, and even the umbilical cord has somehow been removed. A person might easily believe this to be a scientifically correct image of the fetus, but it is not.

The second caveat concerns the language describing the embryos. One must remember that science is always done in the context of society, and this is especially true when studying something as socially sensitive as embryology and birth. Even the wording of human development differs from that of other animals. In humans, the term "embryo" refers specifically to the developing organism's first 8 weeks—the time of major organ formation (see Figure 1.4). After that, the organ systems have established their form, and the developing human is designated as a "fetus."

In recent years, there have been attempts to even further subdivide the terminology of human development. These reflect obvious social agendas. On the early end of the gestation period (roughly the first two weeks), one hears about the "pre-embryo." This defines the product of conception that has not individualized yet. It is a mass of cells that can still divide to form identical twins and other multiple siblings. Moreover, there is no certainty that a "pre-embryo" will develop into a fetus or newborn. At this stage of development, more than half of the products of conception die naturally before birth (see page 45). At the other

Pictures and Words: Caveats for Sensitive Issues (continued)

end of gestation (usually from weeks 28–38), one hears about the “unborn fetus.” This is the stage when the organ systems are often sufficiently mature that, if born, the fetus would be likely to survive on its own (i.e., without modern medical support). All of these terms reflect societal and political distinctions placed on the biological processes of human development. They are neither needed nor used when discussing or studying the development of any other animal.

The language used in discussing abortion should neither ignore the value of unborn life nor the value of the woman and her other relationships. . . . The concern for both the life of the woman and the developing life in her womb expresses a common commitment to life. This requires that we move beyond the usual “pro-life” versus “pro-choice” language in discussing abortion.

SOCIAL STATEMENTS OF THE EVANGELICAL
LUTHERAN CHURCH IN AMERICA

The third caveat involves the language used to frame the debate. “Pro-life” is the belief that fertilization is the beginning of a human life; it has nothing at all to do with the length or quality of a person’s postnatal life. (Indeed, it has often been pointed out that many people who describe themselves as “pro-life” are vehemently in favor of the death penalty.) “Pro-life” could as easily be called “zygote rights.” Similarly, “partial birth abortion” is a highly charged conclusion about ending pregnancy that not everyone would agree with. The medical term for the procedure is “dilation and extraction.”

In a similar vein, medical professionals and the medical literature refer to the natural termination of a pregnancy as a “spontaneous abortion.” This accurate but (to some) offensive term is seldom heard outside of medical circles, where it is replaced by the word “miscarriage.” The statement by the Evangelical Lutheran Church of America sums up well the need for sensitivity and understanding in choosing words that will not stop the possibility of rational debate before it starts.

View 1: You become human at fertilization

In this “genetic” view of human life, a new individual is created at fertilization (conception), when the genes from two parents combine to form a new genome with unique properties. This is a view that can be maintained with or without religious belief, and it is the position held by some scientists.

The “genetic” view is also the position of the Catholic Church, and it is the view held by many highly politicized anti-abortion activists. For instance, the anti-abortion website StandUpGirl (www.standupgirl.com) is very specific about when human life begins, telling us that “Fertilization marks the beginning of a new, individual life. At fertilization, the DNA of a single sperm and ovum merge to create the genetic blueprint for a new human being. Once the DNA has recombined and the single-celled ovum begins to divide, things really begin to roll.”

One philosophical argument used to support the view that fertilization is when human life begins is the separation of “essential” from “accidental” characters. Thus, the religious philosopher Paul Ramsey quotes genetic evidence for the idea that being human is an *essential* property of the organism, and that it is defined by having a human genome. “Genetics,” he writes, “teaches that we were from the very beginning what we essentially are in every cell and in every human attribute” (Ramsey 1970). Few scientists, however, would accept the notion that the genome determines “every human attribute.” (This idea, termed “genetic determinism,” is discussed in Chapter 14.)

Debates in the *New England Journal of Medicine* have focused on the issue of whether having a human genome is in fact the *sine qua non* of being a person. Anderson (2004) writes, “Does not the embryo possess all the genetic stuff of full humanness?” Sandel (2004) replies to this argument, writing that “the same thing can be said of a skin cell. And yet no one would argue that a skin cell is a person or that destroying it is tantamount to murder.”

The entity created by fertilization is indeed a human embryo, and it has the potential to be a human adult. Whether these facts are enough to accord it personhood is a question influenced by opinion, philosophy, and theology rather than by science. Some scientists assert that the early embryo is not even an individual until it undergoes gastrulation.

View 2: You become human at gastrulation

This “embryologic” view proposes that a human receives individual identity around day 14, when the embryo undergoes gastrulation; it is at this point that the embryo can no longer form twins, and it is here that the cells begin the process of differentiation into the specific cell types of the new body. Because it is the point at which an embryo can give rise to only one person, many scientists consider gastrulation to be the point at which an embryo becomes an individual.

The embryologic view is expressed by scientists such as Renfree (1982) and Grobstein (1988), and has been endorsed theologically by Ford (1988), Shannon and Wolter (1990), and McCormick (1991), among others. Shannon and Wolter (1990) also raise the theological issue that, whatever ensoulment may be, it would not happen before day 12–14, since each twin is a distinctly different individual.

The view that a human does not become an individual before gastrulation, around day 14, is particularly crucial in the debate about allowing research on human embryonic stem (ES) cells, which will be covered in depth in Chapters 9 and 10. The embryologic view is consistent with the use of ES cells in biomedical research and has been supported as such by the conclusions of three national commissions: Britain’s Warnock Committee (1984), the Canadian Royal Commission on New Reproductive Tech-

nologies (1993), and the NIH Human Embryo Research Panel in the United States (Parson 2004).

View 3: The acquisition of the human EEG pattern is when you become human

This “neurological” view of human life looks for symmetry between the ways we define human life and human death. Several countries (including the United States) have defined the end of human life as the loss of the cerebral EEG (electroencephalogram) pattern: death is determined by the “flatlining” of the EEG, even though the patient may have a heartbeat and be breathing. The “neurological” argument proposes that if the *loss* of the human EEG pattern determines the end of life, then its *acquisition* (which takes place at about 24–27 weeks) should be defined as when a human life begins (Morowitz and Trefil 1992).

Cerebral nerve cells accumulate in number and continually differentiate through the end of the second trimester of human pregnancy. However, it is not until the seventh month of gestation that a significant number of connections between the newly amassed neurons begin to take form. It is only after the neurons are linked via these *synaptic connections* that the wave pattern characteristic of active, conscious brain activity emerges. Just as a pile of unconnected microchips cannot function as a computer, the unconnected neurons of the fetal brain lack the capacity for conscious function prior to week 24. If one considers the quality of conscious awareness to define a human individual, this is a legitimate view of the starting point of a person’s life.

View 4: You become human at or near birth

There is also the view that a fetus should be considered human when it can survive on its own. Traditionally, the natural limit of such viability was imposed by the respiratory system—a fetus could not survive outside the womb until its lungs were sufficiently mature, which occurs at about 28 weeks (see pages 26–27). Today, however, technological advances can enable an infant born as prematurely as 25 weeks to survive, although such infants are at high risk for having physical and/or mental disabilities.

Finally, there are those who believe human life begins when an individual has become fully independent of the mother, with its own functioning circulatory, alimentary, nervous, and respiratory systems. This traditional “birthday” is often recognized by seeing the head of the baby emerge or having the umbilical cord cut. One advantage of such moments is that they are well-defined, public, and obvious: the crowning of the head, the cutting of the umbilical cord, the first breath, or the first cry. In the absence of a clear consensus on when life begins, there are people who feel that birth is

the only indisputable moment at which a conceptus becomes a human person (see Tooley 1973).

Biomedical research indicates that, even without including induced abortions, between 50 and 60 percent of all embryos conceived do not survive to birth (Mange and Mange 1999). Most of these embryos miscarry prior to the eighth week of pregnancy, and there is no assurance that any given egg, embryo, or fetus will survive to be born. John Opitz, a professor of pediatrics and human genetics, testified to the President's Council on Bioethics that our society is not prepared to value a fetus as person:

If the embryo loss that accompanies natural procreation were the moral equivalent of infant death, then pregnancy would have to be regarded as a public health crisis of epidemic proportions: Alleviating natural embryo loss would be a more urgent moral cause than abortion, in vitro fertilization, and stem cell research combined.

In Conclusion

The question "When does life begin?" has been pondered by religious, secular, and scientific thinkers since the earliest recorded history. There have always been different opinions and answers, and even with immense knowledge of developmental biology now available, there is no consensus among scientists as to when human life begins. The stages of fertilization, gastrulation, brainwave acquisition, and independent viability each has its supporters. So does the view that there is no point at which one can say an embryo has suddenly become human, and that the whole question of "when does human life begin?" is framed in the religious perspective of "ensoulment" and thus cannot be answered scientifically. As the geneticist Theodosius Dobzhansky (1976) remarked:

The wish felt by many people to pinpoint such a stage probably stems from the belief that a soul, conceived as preternatural entity, descends upon a formerly soulless living stuff, and suddenly transforms the latter into human estate. I hope that modern theologians can accept the idea that the transformation is not sudden, but gradual.

Any or all of these perspectives can be useful for contemplating what a human life is. Individuals will and should reach an answer that is meaningful for them, and most people indeed do so. However, in answering the question for themselves according to their own knowledge, experience, beliefs, and emotions, some people feel that they have also answered the question for everyone else. Such a mindset rejects the idea that there have always been diverse ways of thinking, that new information is constantly emerging, and that we are constantly reinterpreting our traditions as we integrate new knowledge and experiences into them.

