

CLONING: EXPOSING FLAWS IN THE PREEMBRYO-EMBRYO DISTINCTION AND REDEFINING WHEN LIFE BEGINS

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Cloning is a technological breakthrough that adds a new dimension to reproductive technology as well as new insight into the long-standing debate regarding fetal interests. The startling idea of reproducing humans by this technology has ethicists, policymakers, and religious leaders struggling with the unsettling implications of this research. Their alarm is exacerbated by indications that time is of the essence. For example, Dr. Lee Silver, a mouse geneticist and reproductive biologist at Princeton University, predicts that this giant step in technology will lead to "in vitro fertilization clinics adding human cloning to their repertoires within five to ten years."¹ Advancing that prediction, Dr. Richard Seed, a Chicago physicist, renowned for founding a company 20 years ago to transfer embryos from healthy women to those with fertility problems, announced in January of 1998 that he is pursuing the opening of a human cloning clinic.² This presents an immediate need to formulate policy to regulate the use of this technology in human reproduction. To date, the efforts of policymakers, federal agencies, and even religious leaders have failed to create any such policy.³

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¹ Gerald L. Zelizer, *Religious Leaders Rush Too Quickly To Ban Cloning*, USA TODAY, July 27, 1998, at 15A [hereinafter Zelizer].

² Caroline Daniel, *Conflicting Aims Leave Ban on Human Cloning in Limbo*, WASH. POST, July 26, 1998, at A08 [hereinafter Daniel].

³ See generally NATIONAL BIOETHICS ADVISORY COMM'N, *Cloning Human Beings: Report And Recommendations of the National Bioethics Advisory Commission* (1997) [hereinafter NBAC Report]. In the Spring of 1997, Scottish scientist Ian Wilmut of the Roslin Institute announced that he and his team of scientists had successfully cloned a sheep. They named the cloned sheep Dolly. After the news of Dolly's birth was announced, President Clinton banned the use of federal funding for human cloning research and asked the recently appointed National Bioethics Advisory Committee to examine the issue. This provided an opportunity for initiating analysis of the many dimensions of human cloning research. The report produced included careful consideration of the potential risks and benefits related to serious safety concerns, individuality, family integrity, and treating children as objects. The conclusion was a recommendation that the current moratorium continue on "the use of federal funding in support of any attempt to create a child by somatic cell nuclear transfer." *Id.* at iii. See also *Bill Summary and Status for the 105th Congress*, (visited Sept. 10, 1998) <<http://www.congress.gov/cgi-lis/bdquery>> (listing several bills that have been proposed for consideration by the 105th Congress to enact legislation intended to regulate the use of cloning technology. Proposed legislation is sufficiently dis-

tant that, despite the public hysteria and alarm at the unexpected pace at which this technology appears to be advancing, no federal legislation on the subject of human cloning has currently been passed. Daniel, *supra* note 2, at A08. Some of the proposed bills go only so far as to prohibit the expenditure of federal funds for research regarding the cloning of a human individual. See H.R. 922, 105th Cong. (1997); S. 368, 105th Cong. (1997). Others focus on prohibiting human cloning entirely, providing civil money penalties for violations. H.R. 923, 105th Cong. (1997). Still others propose prohibitions on human cloning that include criminal penalties up to 10 years in prison, fines, or both, for violations using human somatic cell nuclear transfer technology. S. 1599, 105th Cong. (1997); S. 1601, 105th Cong. (1997).

There is a consensus that attempting to clone a human being with our current understanding and "mastery" of the technology is unacceptably dangerous and morally unacceptable. For example, there were 277 failed attempts required for the successful creation of Dolly. NBAC Report, *supra* this note at 61; I. Wilmut et. al., *Viable Offspring Derived from Fetal and Adult Mammalian Cells*, 385 NATURE 810-13 (1997). To date, these concerns are arguably outweighed by the dangers of imprecisely crafted legislation. See *U.S. House of Representatives Committee on Science regarding H.R. 922, the Human Cloning Research Prohibition Act*, H.R. Rep. No. 105-239(l) (1997) (statement of Rep. Morella) (citing particular concern over legislation that is overly restrictive, holding the potential to impede new avenues of research).

In light of such debates and the current lack of federal legislation, federal agencies like the Food and Drug Administration (FDA) have attempted to intervene and draw the line regarding human cloning. *U.S.: FDA Says No Human Cloning Without FDA Approval*, Jan. 20, 1998, available in Dow Jones Int'l News Serv. See also Daniel, *supra* note 2, at A08. Critics of the FDA stance respond with questions about the agency's authority regarding medical products versus a new variant of fertility treatment. See generally 21 C.F.R. §§ 200-1299 (1998).

Similarly, the Patent Trademark Office (PTO) drew a line in the sand when, as a direct result of the recent breakthroughs in cloning technology, a patent application was filed on a method for making creatures that are part human and part animal. Rick Weiss, *Patent Sought on Making Of Part-Human Creatures; Scientist Seeks to Touch Off Ethics Debate*, WASH. POST, Apr., 2, 1998 at A12 (describing the PTO response to the application filed on Dec. 18, 1998 for a technique that would mix human embryo cells with "cells from a monkey, ape, or other animal" to form a single embryo for implantation into the womb of a surrogate mother—either human or animal).

In response, the PTO announced that, based on an 1817 court decision, inventions directed to human/nonhuman chimeras may not be patentable if they fail to meet certain unspecified "public policy and morality aspects" criteria. Mays, *Biotech Incites Outcry*, NAT'L L.J., at C1 June 22, 1998 (quoting *'Morality' Aspect of Utility Requirement Can Bar Patent for Part-Human Inventions*, 55 PATENT, TRADEMARK & COPYRIGHT JOURNAL 555-557 (1998) (citing *Lowell v. Lewis*, 15 F. Cas. 1018, No. 8568 (C.C.D. Mass. 1817))). For a comprehensive review of PTO policy regarding biotechnology see *The National Law Journal In Focus: Patent Law*, § C, June 22, 1998; and Russel H. Walker, *Patent Law – Should Genetically Engineered Human Beings Be Patentable?*, 22 U. MEM. L. REV. 101 (1991). Moreover, the patent office has a policy of not granting patents on human beings. This "is based on the 13th Amendment to the U.S. Constitution, which blocks slavery." Rick Weiss, *Patent Sought on Making Of Part-Human Creatures; Scientist Seeks to Touch Off Ethics Debate*, WASH. POST, Apr. 2, 1998, at A12. Working against the PTO stand is an 18-year history of allowing patents on living creatures, "including several on mice, rats, and rabbits, and one each for an engineered bird, fish, pig, guinea pig, sheep, and abalone. More than 1,800 patents have also been granted for genes and lines of cultured cells, including human ones . . ." *Id.*

This current failure of the legislature and/or federal agencies to formulate policy regarding cloning technology and human reproduction is consistent with the evolution of policy concerning reproductive technology generally, which has taken place predominantly in the courts.⁴ With this in mind, this essay examines the case law and science that will likely shape policy concerning cloning technology in human reproduction. Specific attention is given to the Tennessee Supreme Court case of *Davis v. Davis*.⁵ In this case, a flawed understanding of both the science and the law has created a policy that allows for the destruction of countless human embryos created through advancements in reproductive technology, including human cloning.⁶

Part One of this essay traces the evolution of policy through the historical development of reproductive freedom. Part Two compares and contrasts cloning with natural conception. Part Three examines a preembryo-embryo distinction defined by the medical community that resulted in policy sanctioned by the courts.⁷ Part Four exposes flaws in

A shared consensus on reproductive technology and treatment of the lives created does not exist even among religious leaders. See Gerald L. Zelizer, *Religious Leaders Rush Too Quickly To Ban Cloning*, USA TODAY, July 27, 1998, at 15A. On the one hand, it is not difficult to find conservative and religious leaders who condemn the use of this technology for human reproduction. The "Southern Baptist Theological Seminary President Albert Mohler Jr. worries that cloning represents the attempt of the creature to be the creator." *Id.* On the other hand, there are conservatives who think that religious leaders have rushed too quickly to support a ban on human cloning, suggesting that "[t]he Bible's solutions for infertility may not be our 20th century solutions... [and] that the Almighty is grieved over childlessness and seeks solutions within nature and beyond... [and] cloning is one such natural solution which responds to the grief of God himself." *Id.* It is even suggested that cloning technology should be embraced as a means to fulfill "the Biblical mandate given at Eden, 'Be fruitful and multiply.'" *Id.*; *Genesis* 1:28 (NIV). This position, while laudable for its openness toward new advances in technology, gives little thought to the issues raised concerning treatment of the embryos once created. For example, any religious leader who applauds the use of reproductive technology must reconcile the traditional notion that life begins at conception with the current policy that human preembryos are recognized as neither persons nor property but occupy an intermediate status. *Davis v. Davis*, 842 S.W.2d 588, 602 (Tenn. 1992).

⁴ See generally ROBERT BLANK & JANNA C. MERRICK, HUMAN REPRODUCTION, EMERGING TECHNOLOGIES, AND CONFLICTING RIGHTS (1995) (illustrating that the evolution of policy concerning reproductive technology is taking place in courts rather than in regulatory or legislative bodies.).

⁵ 842 S.W.2d 588, 604 (Tenn. 1992) (holding that when a dispute arises regarding frozen embryos, "the party wishing to avoid procreation should prevail, assuming that the other party has a reasonable possibility of achieving parenthood by means other than use of the preembryos in question.").

⁶ *Id.*

⁷ See *Davis*, 842 S.W.2d at 596 relying predominately on a report published by the American Fertility Society in 1990 to define and distinguish an embryo from a preembryo. This distinction then served as the basis for defining the "interest" that the litigants held in the frozen preembryos. *Id.* See also *Kass v. Kass*, 663 N.Y.S.2d 581 (App. Div. 1997)

the preembryo-embryo distinction using cloning technology to redefine when life begins. Part Five concludes that since the preembryo-embryo distinction is flawed, any policy concerning cloning technology and human reproduction established on this premise will be insufficient. Additionally, cloning technology sheds sufficient light on the naturally developing embryo to warrant a reexamination of *Davis* and existing policy concerning embryos.

I. REPRODUCTIVE FREEDOM

In 1915, Margaret Sanger founded the National Birth Control League, which opened the first birth control clinic in 1916.⁸ Since then, the National Birth Control League (renamed Planned Parenthood in 1952) has demonstrated an open-ended commitment to woman's individual control over reproduction. This movement has been advanced largely by both the Court's expanding interpretation of the Constitution to include specifically the right of privacy, and advances in reproductive technology. Recent case law tracks this trend.

In 1965, the United States Supreme Court struck down a state statute that banned contraceptive use, finding that several guarantees of the Bill of Rights protect privacy interests that exist in the relationship between partners in a traditional marriage.⁹ In 1972, the Court struck down remaining legal restrictions on birth control for unmarried people by recognizing that, "whatever the rights of the individual to access to contraceptives may be, the rights must be the same for the unmarried and the married alike."¹⁰ In 1973, the Court held in the landmark decision of *Roe v. Wade* that a woman's right to privacy is a "fundamental" right under the 14th Amendment.¹¹ Therefore, the legislature has only a "limited right to regulate—and may not completely proscribe—abortions."¹² In 1992, *Roe's* "central holding" was strengthened by a "reliance"

(following *Davis*, the court held that the informed consent document and uncontested divorce instrument governed the disposition of frozen embryos); *JB v. MB*, No. FM-04-95-97, slip op. (N.J. Super. Ct. Law Div. 1998) (citing *Davis*, 842 S.W.2d at 588) (ordering the destruction of seven embryos in dispute amid a divorce proceeding).

⁸ Louise B. Tyrer, MD., *Methods of Birth Control*, ENCYCLOPEDIA 1 (Grolier Electronic Publishing, Inc., 1995).

⁹ *Griswold v. Connecticut*, 381 U.S. 479 (1965) (recognizing a right of privacy based on "penumbras, formed by emanations" from the Bill of Rights). See also Planned Parenthood: *Family Planning in America*, <<http://www.plannedparenthood.org/about/narrhistory/fpam-50.html>>.

¹⁰ *Eisenstadt v. Baird*, 405 U.S. 438, 453 (1972) (invalidating on equal protection grounds a statute which did not permit contraceptives to be distributed to the unmarried).

¹¹ *Roe v. Wade*, 410 U.S. 113 (1973) (declaring a right to abortion a constitutionally protected right based on a trimester framework).

¹² *Id.* at 166.

interest in upholding a woman's right to abortion.¹³ The plurality opinion stated that, "[p]eople have organized intimate relationships and made choices . . . in reliance on the availability of abortion in the event that contraception should fail. The ability of women to participate equally in the economic and social life of the Nation has been facilitated by their ability to control their reproductive lives."¹⁴ Among recent lawsuits resulting from the advancement and use of reproductive technologies is a claim by a gay man that he has a right to visitation with the daughter he sired by donating his sperm to a lesbian couple;¹⁵ a personal injury suit by a woman who was undergoing in vitro fertilization when her fertilized egg was mistakenly implanted in another woman;¹⁶ and a case in which a two-year-old girl has six possible parents as a result of an arrangement in which a married couple hired a gestational surrogate to carry to term an embryo created from the egg and sperm of anonymous donors.¹⁷

In 1992, advances in reproductive technology and the Constitution collided in the Tennessee Supreme Court case of *Davis v. Davis*.¹⁸ In *Davis*, a dispute regarding the custody of frozen embryos arose between a husband and wife, who after undergoing an in vitro fertilization procedure could no longer agree on the disposition of their frozen preembryos.¹⁹ To define the "interest" that the litigants held in the preembryos, the Tennessee Supreme Court relied on a report published by the Ethics Committee of the American Fertility Society.²⁰ In this report the Ethics Committee defined a preembryo as distinct from an embryo, based on medical science and legal precedents.²¹ According to the report, the

¹³ *Planned Parenthood of Southeastern Pennsylvania v. Casey*, 505 U.S. 833, 856 (1992).

¹⁴ *Id.*

¹⁵ *Thomas v. Robin Y.*, 209 A.D.2d 298, 298-306 (N.Y. App. Div. 1994) (explaining that after petitioner's paternity had been established by clear and convincing evidence, the court was compelled to enter an order of filiation, and equitable estoppel is not appropriate where the mother's insistence initiated the father's developing relationship with his daughter).

¹⁶ *Creed v. United Hospital*, 190 A.D.2d 489 (N.Y. App. Div. 1993) (holding that a complaint seeking to recover for emotional harm unaccompanied by physical trauma does not state a cause of action).

¹⁷ *Jaycee B. v. Superior Court*, 49 Cal. Rptr. 2d 694, 696 (4th Dist. 1996) (holding that intended mother of child born pursuant to a gestational surrogacy contract was entitled to a writ of mandate challenging order of Superior Court which denied her motion for temporary child support from intended father). See also Kathryn D. Katz, *The Clonal Child: Procreative Liberty and Asexual Reproduction*, 8 ALB. L.J. SCI. & TECH. 1 at 52 (1997) [hereinafter Katz].

¹⁸ 842 S.W.2d 588 (Tenn. 1992).

¹⁹ *Id.* at 589.

²⁰ *Id.* at 596-97.

²¹ *Ethical Considerations of the New Reproductive Technologies* – A Report by the Ethics Committee of the American Fertility Society, Vol. 53, No. 6 Fertility and Sterility,

emerging consensus concerning preembryo status is that the preembryo deserves respect greater than that accorded to mere human tissue because of its potential to become a person, but not the respect accorded to actual persons.²² The *Davis* court agreed with the committee report, holding that preembryos “are not, strictly speaking, either ‘persons’ or ‘property’, but occupy an interim category that entitles them to special respect because of their potential for human life.”²³

Additionally, the *Davis* court used the United State Supreme Court’s reproductive freedom cases as the foundation for supporting a “right” to procreational autonomy.²⁴ Specifically, the Tennessee Supreme Court recognized “procreational autonomy [as] composed of two rights of equal significance—the right to procreate and the right to avoid procreation.”²⁵ In this case, the Tennessee Supreme Court applied a balancing test to find that when a dispute arises “the party wishing to avoid procreation should prevail, assuming that the other party has a reasonable possibility of achieving parenthood by means other than use of the preembryos in question.”²⁶ Therefore, “custody” of the frozen embryos was awarded to the husband who was vehemently opposed to fatherhood upon separation from his former wife.²⁷

These cases illustrate a long-standing debate sparked by advances in reproductive technology. This debate has reached new heights, however, with the introduction of cloning by Scottish Scientist Ian Wilmut of the Roslin Institute.²⁸ Dr. Wilmut presented a cloned sheep named Dolly to an astonished world in the Spring of 1997.²⁹ This achievement has provided evidence that it is possible, theoretically if not actually, for a woman to procreate without the help of a man at all.

Although most people recognize cloning as merely another advancement in reproductive technology, it is vastly different from traditional in vitro fertilization (IVF) procedures.³⁰ IVF technology is a means

Supplement 2, June 1990 at 315-65. [hereinafter Committee Report]. Note, the American Fertility Society became the American Society of Reproductive Medicine in 1994. The American Fertility Society, joined by 19 other national organizations, allied in *Davis* as *amicus curiae* to have the court respond to the issue of when human life begins and whether frozen embryos comprising 4-8 cell entities have a legal right to be born. *Davis*, 842 S.W.2d at 594.

²² Committee Report, *supra* note 21, at 34S-35S.

²³ *Davis*, 842 S.W.2d at 597.

²⁴ *Id.* at 598-601.

²⁵ *Id.* at 601.

²⁶ *Id.* at 604.

²⁷ *Id.*

²⁸ NBAC Report, *supra* note 3, at i.

²⁹ Wilmut, *supra* note 3, at 810.

³⁰ NBAC Report, *supra* note 3, at 13-36.

of aspirating an ova from the womb and introducing the sperm to the egg in a test tube for fertilization.³¹ The fertilized embryos are then allowed to mature in the laboratory to a medically accepted point for either implantation or cryopreservation for future implantation.³² In the cloning procedure, scientists remove the DNA from an unfertilized egg, creating what is called an enucleated (empty) egg.³³ The enucleated egg is then either fused with an adult cell of varying origin, or directly injected with the genetic material of another adult cell.³⁴ This forms a clonal embryo. When the clonal embryo matures to a medically acceptable stage, it is implanted into a recipient adult.³⁵

As a result of these legal and medical developments, our understanding of natural as well as noncoital reproduction now includes a preembryo-embryo distinction that has been defined by the medical community and sanctioned by the courts.³⁶ The new techniques for noncoital reproduction include artificial insemination, ovum donation, in vitro fertilization, embryo transfer, surrogate motherhood, and now, cloning.³⁷ Nonetheless, the paramount issue is that of the embryos themselves. The true focus of the ongoing debate about fetal rights should be the possible risks to the clonal embryo and fetus, rather than a controversial preembryo-embryo distinction.³⁸ To illustrate, there is currently no shared understanding about what to do with the thousands of surplus embryos that are being stored in tanks of liquid nitrogen at fertility centers throughout the country.³⁹ The debate is further fueled by a lack of

³¹ Gad Lavy, MD., *In Vitro Fertilization*, ENCYCLOPEDIA 1 (Grolier Electronic Publishing, Inc., 1995).

³² *Id.*

³³ NBAC Report, *supra* note 3, at 13-36.

³⁴ *Id.*

³⁵ *Id.*; Michael D. Lemonick, *Dolly, You're History*, TIME, Aug. 3, 1998, at 64.

³⁶ See *supra* text accompanying note 7.

³⁷ Katz, *supra* note 17, at 24-27. The availability of these techniques presents legal issues regarding the relationship of a child so conceived to the various parties who may be involved. Depending on the facts of the case and the technique used, the parties may include (1) the biological (sperm-supplying) father, (2) the biological father's wife, (3) the biological (ovum-supplying) mother, (4) the biological mother's husband; and (5) the surrogate mother who carries (a) another woman's ovum/fetus/child or (b) her own ovum/fetus/child to term under contract calling for the relinquishment of the child upon birth to one or both of the biological parent(s) and/or to an adoptive parent or parents. *Id.*

³⁸ See generally Emily Marden, *The Revolution Ignored*, 6 N.Y.U. ENV. L.J. 674 (1998) (critiquing the report and recommendations of the National Bioethics Advisory Commission); Andrea L. Bonnicksen, *Creating A Clone In Ninety Days: In Search Of A Cloning Policy*, 38 JURIMETRICS J. 23 (1997) (discussing the politics behind creating a cloning policy).

³⁹ Jennifer Marigliano Dehmel, *To Have or Not to Have; Whose Procreative Rights Prevail in Disputes Over Dispositions of Frozen Embryos?*, 27 CONN. L. REV. 1377, 1380-82 (1995). "[A]s of 1990, approximately 23,468 embryos were in frozen storage, and 350 babies

consensus regarding the treatment and disposal of flawed embryos and induced abortions.⁴⁰ The federal government's only position on the subject, thus far, is to prohibit federal funding for research involving human embryos or fetuses.⁴¹ Many may turn to policy established by the reproductive freedom and frozen embryo cases for answers to these questions concerning clonal embryos.

A problem arises, however, when we attempt to fit human life created by the new technology of cloning into our old understanding of medical science, which was used in deciding the reproductive freedom and frozen embryo cases. To apply existing policy regarding embryos to cloning technology and human reproduction, it must first be determined whether this preembryo-embryo distinction remains valid in the light of cloning technology. Fortunately, the evidence provided by cloning technology should be welcomed by the courts, as Justice Blackmun stated regarding *Roe*, that decisions regarding fundamental rights continue to be decided "as logic and science [compel]."⁴²

had been born from frozen embryos." *Id.* at 1382; Katz, *supra* note 17, at 28 (citing Gina Kolata, *Medicine's Troubling Bonus; Surplus of Human Embryos*, N.Y. TIMES, Mar. 16, 1997, at 1 (maintaining that 50,000 surplus embryos have been put into storage in the last five years)).

⁴⁰ John A. Robertson, *Procreative Liberty and Human Genetics*, 39 EMORY L.J. 697, 707 (1990) (discussing ethical issues concerning pre-implantation screening and the acceptability of discarding embryos).

⁴¹ June Coleman, Comment, *Playing God or Playing Scientist: A Constitutional Analysis of State Laws Banning Embryological Procedures*, 27 PAC. L.J. 1331, 1349-59 (1996) (examining the constitutionality of state restrictions on embryological research) (citing NAT'L INST. OF HEALTH, DEVELOPMENT OF NIH GUIDELINES GOVERNING RESEARCH INVOLVING HUMAN IN VITRO FERTILIZATION AND THE PREIMPLANTATION EMBRYO 1 (1995)).

⁴² *Webster v. Reproductive Health Services*, 492 U.S. 490, 554 (1989) (Blackmun, J., dissenting). See also *City of Akron v. Akron Center for Reproductive Health*, 462 U.S. 416 (1983) (O'Connor, J. dissenting) (recognizing that, "the State's compelling interest in maternal health changes as medical technology changes . . ."). *Id.* at 454. Additionally, O'Connor notes that,

[T]he lines drawn in [the *Roe*] decision have now been blurred because of what the Court accepts as technological advancements. . . . [and]

Just as improvements in medical technology inevitably will move forward the point at which the State may regulate for reasons of maternal health, different technological improvements will move backward the point of viability at which the State may proscribe abortions except when necessary to preserve the life and health of the mother.

In 1973, viability before 28 weeks was considered unusual. The fourteenth edition of L. Hellman & J. Pritchard, *Williams Obstetrics*, on which the Court relied in *Roe* for its understanding of viability, stated that "[a]ttainment of a [fetal] weight of 1,000 g [or a fetal age of approximately 28 weeks gestation] is . . . widely used as the criterion of viability." However, recent studies have demonstrated increasingly earlier fetal viability. It is certainly reasonable to believe that fetal viability in the first trimester of pregnancy may be possible in the not too distant future.

II. CLONING VERSUS NATURAL CONCEPTION

To examine how cloning technology itself may influence the answers to these questions, we first compare natural conception with cloning technology. This analysis requires a quick review of reproductive science:

The carriers of genetic information, . . . structures called chromosomes [are] contained within the cell nucleus. Every individual [cell] of a given species contains a characteristic number of chromosomes in most nuclei of the [cell] body. Most cells in the body of a normal human being have exactly 46 chromosomes. Chromosomes normally exist in pairs; there are typically two of each kind in the somatic (body) cells of higher plants and animals. Thus, the 46 chromosomes in human cells constitute 23 different pairs.⁴³

Some cells have only half of the 46 chromosomes. For example, a gamete, the cell that functions in sexual reproduction, (e.g., the egg and sperm) have only 23 chromosomes.⁴⁴ In reproduction, the sperm and egg fuse at fertilization. In this instant, each gamete contributes its set of 23 chromosomes. When the egg and sperm combine, they form a cell with 46 chromosomes.⁴⁵ Then, “[s]hortly after fertilization the embryo undergoes a series of rapid divisions, collectively referred to as cleavage.”⁴⁶ Cleavage begins as the one cell embryo undergoes division “to form a two-cell embryo.”⁴⁷ This occurs “about 24 hours after fertilization.”⁴⁸

Then, “each of [these two] cells [divides], bringing the number of cells to four.”⁴⁹ It takes only about five days for the embryo to divide to

Indeed, the Court has explicitly acknowledged that Roe left the point of viability “flexible for anticipated advancements in medical skill.”[Colautti] “[W]e recognized in Roe that viability was a matter of medical judgment, skill, and technical ability, and we preserved the flexibility of the term.”

Id. at 455-58 (quoting *Colautti v. Franklin*, 439 U.S. 379, 387 (1979); *Planned Parenthood of Cent. Mo. v. Danforth*, 428 U.S. 52, 64 (1976)) [hereinafter *Danforth*].

⁴³ CLAUDE A. VILLEE, ET AL., *BIOLOGY* 221-22, 230-31 (2d ed. 1989) [hereinafter *VILLEE*]; BRUCE ALBERTS, ET AL., *MOLECULAR BIOLOGY OF THE CELL* 502, 505, 865 (2d ed. 1989).

⁴⁴ *VILLEE*, *supra* note 43, at 231. (describing cells containing half of the 46 chromosomes contained in most adult cells as haploid).

⁴⁵ *Id.* at 1201 (This is only one of the functions of fertilization. Two other functions of fertilization include determination of the sex of the offspring and stimulation necessary to initiate the reactions in the egg that permit development to take place.).

Fertilization involves four steps. First, the sperm must contact the egg and recognition must occur. Second, the sperm enters the egg. Third, the sperm and egg nuclei fuse. Finally, the egg is activated and development of the newly formed embryo begins.

Id.

⁴⁶ *Id.* at 1204.

⁴⁷ *Id.*

⁴⁸ *Id.* at 1216.

⁴⁹ *Id.*

the 32 cell stage.⁵⁰ "Repeated divisions occur as the embryo is pushed along the uterine tube by ciliary action and muscular contraction" until it reaches the uterus.⁵¹ The embryo begins to implant itself into the uterus "[o]n about the seventh day of development."⁵² "Implantation is completed by the ninth day of development."⁵³

"Occasionally, the cells of the two-cell embryo may separate, and each may develop separately into [an adult]."⁵⁴ "Since these cells will have identical sets of genes, the individuals formed are exactly alike [genetically identical]—identical twins."⁵⁵ This process is appropriately called twinning. Cloning can be understood in the context of twinning with one very noticeable distinction: cloning circumvents the need for sperm and egg to unite.

In the process of cloning, the 23 chromosomes of a recipient egg are removed. Similarly, the DNA or genetic material comprising 46 chromosomes is removed from a selected adult cell.⁵⁶ The 46 chromosomes of the adult cell are introduced into the now empty egg. Alternatively, the adult cell is fused with the egg to introduce the 46 chromosomes into it.⁵⁷ The egg then contains the 46 chromosomes of the adult cell, and will use the information encoded in the DNA to create a clone of the donor.

The 46 chromosomes introduced into the egg are identical to the genetic material contained by all the other adult cells of the donor that contain 46 chromosomes. The genetic material taken from the donor was originally determined (presumably years earlier) when an egg and sperm each donated their original 23 chromosomes at the point of conception. In natural conception, 23 chromosomes of the sperm and egg unite to create a single cell containing 46 chromosomes of the adult cells. Therefore, the moment that 46 chromosomes are introduced into the empty egg is equivalent to the natural point of conception. In cloning, the life created will be genetically identical to the donor, as though it were an identical twin of the donor.⁵⁸

During development, in both the naturally conceived and the clonal embryos, repeated divisions of the embryo continue to increase the num-

⁵⁰ *Id.*

⁵¹ *Id.*

⁵² *Id.* at 1216.

⁵³ *Id.* at 1218.

⁵⁴ *Id.* at 1216.

⁵⁵ *Id.* Alternatively, "[f]raternal twins develop when a woman ovulates two eggs and each is fertilized" to give rise to two embryos, each having its own distinctive genetic makeup. *Id.*

⁵⁶ NBAC Report, *supra* note 3, at Chapter Two: *The Science and Application of Cloning*, at 17.

⁵⁷ *Id.* at 20.

⁵⁸ See Wilmut, *supra* note 3, at 810-13.

ber of cells until they then begin to specialize and organize into an adult.⁵⁹ Specialization during development is called differentiation. Differentiation is of particular interest in development because courts have used it to determine the legal status of the embryo and in defining the "interest" of parties contributing to the process of noncoital reproduction when a dispute over the "custody" of the embryos arises.⁶⁰ Specifically, differentiation is a foundational part of the preembryo-embryo distinction defined by the medical community and sanctioned by the courts.⁶¹

Differentiation is not an instant process, but rather a continual process throughout development. During the many cell divisions required for the fertilized egg or the clonal embryo to develop into the adult, groups of cells will become gradually committed to particular patterns of gene activity. Differentiation does not mean that cells lose genes during development. In fact, "all differentiated adult cells of an individual are genetically (but not necessarily metabolically) identical."⁶² This means that different genes are activated to make proteins as required by the individual cell. For example, the same proteins required by liver cells are not necessarily the same proteins required by hair cells. That is why each cell makes different proteins suited to its needs while the genetic material remains constant in each cell.⁶³ This explains why genetic material can be taken, theoretically, from any cell and injected into the enucleated egg resulting in a clone of the animal or person from whom the cell was taken.⁶⁴ In short, the "magic" occurs whenever a complete set of 46 chromosomes is introduced into an egg, whether by natural conception, IVF, or cloning technology. The question, then, in applying existing policy to the clonal embryo, is whether this preembryo-embryo distinction recognized in natural conception and IVF remains valid in the light of cloning technology. To make such a determination, a closer examination of both *Davis* and the report by the Ethics Committee of the American Fertility Society is warranted.

III. THE PREEMBRYO-EMBRYO DISTINCTION

"On November 7, 1984, the Ethics Committee of The American Fertility Society was charged by Dr. Charles B. Hammond, then President of the Society, to 'take a leadership position in addressing ethical issues in reproduction and providing disseminated knowledge of these posi-

⁵⁹ VILLEE, *supra* note 43, at 384.

⁶⁰ *Davis*, 842 S.W.2d at 596.

⁶¹ NBAC Report, *supra* note 3, at Chapter Two.

⁶² VILLEE, *supra* note 43, at 387.

⁶³ *Id.*

⁶⁴ Wilmut, *supra* note 3, at 810-13.

tions.”⁶⁵ The American Fertility Society is an organization of physicians and scientists who specialize in problems of infertility. Since 1984, the Ethics Committee has reconvened on several occasions “to review and revise its guidelines regarding ethical aspects of the new reproductive technologies”⁶⁶ Similar reports were subsequently published in 1988, 1990, and 1994. A supplement was published in 1997.

The 1990 report was relied on by the Tennessee Supreme Court in *Davis*.⁶⁷ Specifically, the *Davis* court relied on chapter eight, “The biologic characteristics of the preembryo”, and chapter nine, “The moral and legal status of the preembryo.”⁶⁸ According to the report, chapter eight was written in light of the controversial “status” of the human embryo.⁶⁹ “In the sense used here, status refers to the accepted manner in which a given human being is to be treated within a society.”⁷⁰ Specifically, the question presented in chapter eight is, “whether the biologic characteristics of the preembryo are relevant for the treatment to be accorded to the developing human entity between fertilization and birth, when it is undergoing rapid and progressive biologic change.”⁷¹ In writing this report, the committee recognized that, “[s]cientifically and medically, the changes [that transform the fertilized egg into the more complex newborn] comprise a continuous process of becoming.”⁷² Nonetheless, for “convenience” they divided the “process . . . into steps or stages” in order to recognize “some of the transitions between stages [that] may be of sufficient magnitude, either quantitatively or qualitatively, to warrant changes of status.”⁷³ In the midst of their endeavor, the committee recognized that there is “considerable uncertainty in the timing of the individual stages and events In this report, [the timing possibly] represent[s] a range of uncertainty of at least several days.”⁷⁴ Recognizing the imprecision in delineating individual stages, the committee attempted to bolster its position by citing the statistical odds that the preembryo will become an adult. In the final analysis, the report offered the odds of one in three upon implantation that the embryo will reach maturity.⁷⁵

⁶⁵ Committee Report, *supra* note 21, at iii.

⁶⁶ *Id.*

⁶⁷ *Davis*, 842 S.W.2d at 593.

⁶⁸ Committee Report, *supra* note 21, at 31S-36S.

⁶⁹ *Id.* at 31S.

⁷⁰ *Id.*

⁷¹ *Id.*

⁷² *Id.*

⁷³ Committee Report, *supra* note 21, at 31S-36S.

⁷⁴ *Id.*

⁷⁵ *Id.*

The report offered a brief description of the process that transforms the fertilized egg into a multicellular embryo.⁷⁶ The committee then addressed differentiation. In its discussion of differentiation it notes that as cell division continues, populations of inner and outer cells become increasingly different in size, shape and protein content.⁷⁷ It notes that “[t]he change is primarily in the outer population, which is altering rapidly as the [embryo] interacts with and implants into the uterine wall.”⁷⁸ This process of implantation involves an interaction of the embryo with the lining of the uterine wall that results in the free flowing exchange of nutrients between mother and child.⁷⁹ The report concluded that, on the basis of this interaction, “differentiation of the new generation relates to physiologic interaction with the mother, rather than to establishment of the embryo itself. It is for this reason that it is appropriate to refer to the developing entity up to this point as a preembryo, rather than an embryo.”⁸⁰

Differentiation is additionally explained in terms of development of an individual. Development of the individual is correlated at the macro level with visually recognizable structures of the developing embryo, and described in terms related to twinning.⁸¹ Specifically, as the embryo becomes established within the uterine wall, layers of cells begin to organize to comprise a physiological structure known as the embryonic disc.⁸² “This first rudiment of the embryo itself becomes the cite of formation of the embryonic axis.”⁸³ This is indicated by a visually recognizable structure known as the “primitive streak.”⁸⁴ The committee reports that, “[w]ith the appearance of the streak, as far as is now known, the embryonic disc is committed to forming a single being; beyond this point, twinning is not believed to occur, either naturally or experimentally.”⁸⁵

These facts are “based on studies of species with similar, but not identical, developmental history to that of the human species”⁸⁶ Nonetheless, these findings are imputed to the status of the human embryo by the committee, who then concludes that prior to the differentiation that occurs upon uterine implantation and absent specific visibly

⁷⁶ *Id.*; see also *supra* notes 40-45.

⁷⁷ *Id.* at 32S.

⁷⁸ Committee Report, *supra* note 21, at 31S-36S.

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ *Id.*

⁸² *Id.*

⁸³ Committee Report, *supra* note 21, at 31S-36S.

⁸⁴ *Id.*

⁸⁵ *Id.*

⁸⁶ *Id.*

recognizable structures that indicate an end to the embryo's ability to create a twin, a human embryo is neither a person nor property. Rather, it is a preembryo. The precise definition of the preembryo is given by the committee as, "a product of gametic union from fertilization to the appearance of the embryonic axis. The preembryonic stage is considered to last until 14 days after fertilization."⁸⁷

The committee recognized the great significance of this distinction. It predicted that the, "moral and legal status of the preembryo will determine the limits of actions and omissions of actions regarding preembryos and thus the freedom that physicians and patients have in activities concerning preembryos."⁸⁸ They were right. This preembryo-embryo distinction then served as a pivotal term in determining the disposition of frozen embryos in *Davis* and subsequent court decisions.⁸⁹

To decide the *Davis* case, the Tennessee Supreme Court used the committee report to specifically define the "interest" that the litigants held in the "preembryos."⁹⁰ The court accepted the preembryo distinction as valid:

To [the Court's] way of thinking, the most helpful discussion on this point is found not in the minuscule number of legal opinions that have involved 'frozen embryos,' but in the ethical standards set by the American Fertility Society, as follows.

At one extreme is the view of the preembryo as a human subject after fertilization, which requires that it be accorded the rights of a person. This position entails an obligation to provide an opportunity for implantation to occur and tends to ban any action before transfer that might harm the preembryo or that is not immediately therapeutic, such as freezing and some embryo research.

At the opposite extreme is the view that the pre-embryo has a status no different from any other human tissue. With the consent of those who have decision-making authority over the pre-embryo, no limits should be imposed on actions taken with pre-embryos.

A third view—one that is most widely held—takes an intermediate position between the other two. It holds that the preembryo deserves respect greater than that accorded to human tissue but not the respect accorded to actual persons. The pre-embryo is due greater respect than other human tissue because of its potential to become a person and because of its symbolic meaning for many people. Yet, it should not be treated as a person because it has not yet developed the features of personhood, is not yet established as developmentally individual, and may never realize its biologic potential.⁹¹

⁸⁷ *Id.* at vii.

⁸⁸ *Id.* at 34S.

⁸⁹ See *supra* text accompanying note 7.

⁹⁰ *Davis*, 842 S.W.2d at 596.

⁹¹ *Id.* (quoting Committee Report, *supra* note 21, at 34S-35S).

The committee report concluded that the emerging consensus on preembryo status is the third intermediate view.⁹² In support of their conclusion the committee relied not only on their understanding of reproduction but, ironically, on “legal precedents.”⁹³ Specifically, they stated that the “law does not regard fetuses or embryos as rights-bearing entities”⁹⁴ They continued, saying, “Currently, the preembryo is not a legal subject in its own right and is not protected by laws against homicide or wrongful death.”⁹⁵

As a result of the committee’s understanding of both the science and the law, the Tennessee Supreme Court and others have found that preembryos are neither, strictly speaking, either “persons” nor “property,” but occupy an interim category that entitles them to special respect because of their potential for life.⁹⁶ Unfortunately, the report and the committee have a flawed understanding of both the science and the law.

IV. FLAWS IN THE PREEMBRYO—EMBRYO DISTINCTION

A. Legal Flaws: The Law Regards Fetuses and Embryos as Rights-Bearing Entities

The law regards fetuses and embryos as rights-bearing entities. Fetal rights were first recognized in the U.S. starting in the 19th century in property law.⁹⁷ Specifically, a fetus that is in existence at the time of a testator’s death, and is subsequently born alive, is entitled to inherit property equally with its living siblings.⁹⁸ Additionally, criminal law provides protection for the unborn against homicide: “[t]he common law recognized that a fetus may be the victim of murder if it is born alive and

⁹² Committee Report, *supra* note 21, at 35S.

⁹³ *Id.*

⁹⁴ *Id.* at 34S.

⁹⁵ *Id.* at 35S (citing D. WESTFALL, *Beyond Abortion: The Potential Reach of a Human Life Amendment*, in *DEFINING HUMAN LIFE: MEDICAL, LEGAL AND ETHICAL IMPLICATION 174* (M. Shaw & E. Doudera eds. 1983)).

⁹⁶ *Davis*, 842 S.W.2d at 602.

⁹⁷ *Cowles v. Cowles*, 13 A. 414 (1887) (recognizing conceived but unborn children as heirs in testacy); *Medlock v. Brown*, 136 So. 551, 553 (1927) (Posthumous children inherit in like manner as if they were born in the lifetime of the intestate and had survived him. A child is to be considered as in being, from the time of its conception, where it will be for the benefit of such child to be so considered.).

⁹⁸ *McLain v. Howald*, 79 N.W. 182 (1899) (holding that a bequest of a certain sum to each of the children of testator’s daughter includes children in the mother’s womb). Uniform Probate Code §2-108 (1997) “An individual in gestation at a particular time is treated as living at that time if the individual lives 120 hours or more after birth.” *Id.*

then dies from injuries inflicted upon its mother prior to birth."⁹⁹ Further, "[o]ther states have amended their homicide statutes so as to punish the destruction of a fetus."¹⁰⁰ For example, a Florida statute states that, "[t]he willful killing of an unborn quick child, by any injury to the mother of such child which would be murder if it resulted in the death of such mother, shall be deemed manslaughter, a felony of the second degree, [and] punishable"¹⁰¹ A Michigan statute also provides that "willful killing of an unborn quick child by an injury to the mother of such child, which would be murder if it resulted in the death of such mother, shall be deemed manslaughter."¹⁰² The California penal code states that, "[m]urder is the unlawful killing of a human being, or a fetus, with malice aforethought."¹⁰³

Regarding wrongful death, the embryo and fetus are also protected under tort law. According to Robin Trindel,

[t]o date, most jurisdictions recognize third party tort actions for prenatal injuries. Other jurisdictions have gone further, allowing wrongful death actions to be brought when a third party's actions causes a fetus' stillbirth. Some courts have even allowed children to sue for prenatal injuries where the defendant's negligence occurred prior to the child's conception.¹⁰⁴

⁹⁹ Robin M. Trindel, *Fetal Interests vs. Maternal Rights: Is the State Going Too Far?*, Note, 24 AKRON L. REV. 743, 744 (1991) [hereinafter Trindel]. See also *id.* at n. 10: *Clarke v. State*, 117 Ala. 1, 23 So. 671 (1898) (man charged with second degree murder in the death of his child, who was born alive and subsequently died as a result of a beating inflicted upon its mother while in utero); *Abrams v. Foshee*, 3 Iowa 274 (1856) (recognizing that if a newborn should die from injuries received while in the womb, the person who inflicted those injuries, with the intent to cause a miscarriage, shall be charged with murder); *Morgan v. State*, 256 S.W. 433 (1923) (defendant's murder conviction was reversed where the state failed to prove that the infant was born alive); *State v. Anderson*, 343 A.2d 505 (1975) (defendant charged with two counts of murder in the deaths of his twin infants, who died from injuries they received while in utero), *rev'd on other grounds*, 413 A.2d 611 (1980).

Id.

¹⁰⁰ Trindel, *supra* note 99, at 744 (internal citations omitted).

¹⁰¹ FLA. STAT. ANN. §782.09 (West 1998). Quickening is defined as "the stage of pregnancy when the fetus can be felt to move." THE AMER. HERITAGE ELEC. DICT. (1992).

¹⁰² MICH. COMP. LAWS ANN. §750.322 (West 1998).

¹⁰³ CAL. PENAL CODE §187 (West 1998) (emphasis added). The words "or a fetus" effectively reversed *Keeler v. Superior Court*, 470 P.2d 617 (1970).

¹⁰⁴ Trindel, *supra* note 97, at notes 17-19. The author has cited over 70 references, the following are chosen for illustration of this well documented note:

Wolfe v. Isbell, 280 So. 2d 758, 763 (1973) (holding that an action can be maintained arising from injury to an unborn child independent of viability if the child is subsequently born and dies from injury); *Wilson v. Kaiser Found. Hospitals*, 190 Cal. Rptr. 649, 652-53 (1983) (holding that an arbitration clause in a group health care policy applied to prenatal

Thus, case law and statutory law stand in clear contradiction to the statement made in the committee report that the "law does not regard fetuses or embryos as rights-bearing entities . . ." ¹⁰⁵ Inaccurate generalizations such as this call into question the accuracy and objectivity of the committee report, specifically concerning their representation of the facts used to distinguish the preembryo from the embryo. The committee's bias is evidenced by its own admission that "[t]he moral and legal status of the preembryo will determine the limits of actions and omissions of actions regarding preembryos and thus the freedom that physicians and patients have in activities concerning preembryos." ¹⁰⁶ Its vested interest in the court decision is further evidenced by its request, as an *amicus curiae*, to have the court respond to the issue of when human life begins, and whether frozen embryos comprising 4-8 cell entities have a legal right to be born. ¹⁰⁷ Despite these circumstances and statements, the court, with astonishingly circular reasoning, turns to the committee report itself as the primary source of reference for distinguishing the preembryo from the embryo and the subsequent creation of policy. ¹⁰⁸

The question, then, is whether the committee's reasoning for distinguishing a preembryo from an embryo is flawed. If objective analysis reveals that it is, then the same case law and statutory law that contradicts the committee's statement that the "law does not regard fetuses or embryos as rights-bearing entities" ¹⁰⁹ should also contradict the committee report statement "that currently, the preembryo is not a legal subject in its own right and is not protected by laws against homicide or wrongful death." ¹¹⁰

Scientific analysis of the Court's decision is begun by noting that the three major ethical positions presented by the committee are premised on their previously articulated embryo-preembryo distinction. Their embryo-preembryo distinction is largely based on three rationales: (1) con-

negligence actions); *Eich v. Town of Gulf Shores*, 300 So.2d 354, 358 (1974) (holding that a wrongful death action is proper even though no live birth has taken place); *Renslow v. Mennonite Hosp.*, 367 N.E.2d 1250 (1977) (holding that the infant could maintain a cause of action as a result of a negligent transfusion that occurred several years prior to infant's conception).

Id.

¹⁰⁵ Committee Report, *supra* note 21, at 35S.

¹⁰⁶ *Id.* at 34S.

¹⁰⁷ *Davis v. Davis*, 842 S.W.2d 588, 594.

¹⁰⁸ *Id.* at 596.

¹⁰⁹ Committee Report, *supra* note 21, at 35S.

¹¹⁰ *Id.* (citing D. WESTFALL, *Beyond Abortion: The Potential Reach of a Human Life Amendment*, *DEFINING HUMAN LIFE: MEDICAL, LEGAL AND ETHICAL IMPLICATION* 174 (M. Shaw & E. Doudera eds. 1983)).

venience¹¹¹ and freedom for physicians and patients in activities concerning embryos;¹¹² (2) statistical odds that one in three embryos will reach maturity upon implantation;¹¹³ and (3) differentiation which initially occurs "primarily in the outer population . . . [of the cells that interact with the uterine wall upon implantation and] therefore relates to physiologic interaction with the mother, rather than to the establishment of the embryo itself."¹¹⁴ For these reasons, according to the committee, it is appropriate to refer to the developing entity up to this point as a preembryo, rather than an embryo.¹¹⁵ However, this conclusion fails, as the following analysis of the third rationale will show.¹¹⁶

B. Scientific Flaws: Cloning Technology Redefines When Life Begins

Differentiation, as previously discussed, is the process by which cells specialize during development.¹¹⁷ In sum, the committee explains differentiation in terms of time, development of an individual, and uterine implantation. Each of these explanations will be addressed in order.

According to the official definition given by the committee, "[t]he preembryonic stage is considered to last until 14 days after fertilization."¹¹⁸ Yet, the committee recognizes in a footnote to their report, that, "it should be assumed that references to time are in developmental age and represent a range of uncertainty of at least several days."¹¹⁹ If this uncertainty is conservatively estimated at three days, then an embryo whose age is determined to be 14 days could be as old as 17 days. Additionally, embryos estimated to be as young as 12 days could be as old as 15 days. This means that, in essence, large numbers of embryos are mistakenly being regarded as preembryos based solely on percentages.

It is questionable whether such an imprecise time line should be used to determine the disposition and life status of an embryo. More exact measurements should be required. Clearly, if the science itself is imprecise, then any legal line drawn must also be imprecise. Therefore, it might be wiser to err on the side of caution in drawing any legal distinc-

¹¹¹ *Id.* at 31S.

¹¹² *Id.* at 34S.

¹¹³ *Id.* at 31S.

¹¹⁴ *Id.* at 32S.

¹¹⁵ *Id.*

¹¹⁶ It is outside the scope of this essay and left to the reader to determine whether the first and second rationales regarding convenience and survival statistics ought to determine life status.

¹¹⁷ See *supra* text accompanying notes 55-59.

¹¹⁸ Committee Report, *supra* note 21, at vii (definitions).

¹¹⁹ *Id.* at 31S.

tions or creating policy that determines the status and disposition of an embryo by accepting a more live-protective viewpoint in determining the "interest" that parties have in frozen embryos. One alternative is offered by the committee report, that is, to accept the preembryo as equal to an embryo, *i.e.*, as a human subject after fertilization.¹²⁰ Even if the preembryo were recognized as a human subject after fertilization, the only obligation that the committee suggests is to provide an opportunity for implantation to occur.¹²¹ This hardly seems "extreme," given the recognized error in measurements used to distinguish a preembryo from an embryo.¹²²

Differentiation is additionally explained by the committee in terms of 'development of an individual.'¹²³ Development of the individual is correlated with visually recognizable structures of the developing embryo, and described in terms related to twinning.¹²⁴ Specifically, the committee reports that, "[w]ith the appearance of the [primitive] streak, as far as is now known, the embryonic disc is committed to forming a single being; beyond this point, twinning is not believed to occur, either naturally or experimentally."¹²⁵ There are at least two recognizable flaws in relying on this explanation as a basis for defining the preembryo status.

First, while it is conceded that prior to 14 days, single embryos have the ability to split or be split to effect development of more than one independent adult, each life so created develops in exactly the same manner as the embryo from which it was split. This is the result of being derived from the exact same genetic material. This event merely serves to reset the biological clock of the embryo, forcing it to repeat previously experienced divisions. In humans, this event does not prevent the embryo from attaining eventual personhood. At a minimum, the embryo will develop into at least one life. It is questionable whether the phenomenal ability of the embryo, under some conditions, to produce more than one life should diminish an embryo's life status. Logic would dictate the opposite.

Second, evidence that the embryo is destined for a specific life from the moment of conception is actually offered by cloning technology. In cloning technology, the moment that a complete set of 46 chromosomes is introduced into an enucleated egg, the embryo is destined to become a very specific life, identical to the donor of the genetic material. To illustrate, the success of Dolly and various other cloned animals provides un-

¹²⁰ *Id.* at 34S.

¹²¹ *Id.*

¹²² *Id.* at 34S.

¹²³ *Id.* at 32S.

¹²⁴ *Id.*

¹²⁵ *Id.*

deniable evidence that the embryo is set on a predetermined pathway of life from the moment the complete set of chromosomes is introduced into the egg. That is precisely the science and logic that explain how the clonal embryo is capable of duplicating the donor.

The individual cells of the clonal embryo early in cleavage follow the exact same path of development followed by the donor of the genetic material when the donor was only an embryo. In other words, there appear to have been no options for the clonal embryo as a whole in its development. Therefore, we can infer that there were no options for the initial group of cells (the preembryo) that came into existence through cell division in the first few days of life. Recalling that the moment that a complete set of chromosomes is introduced into the egg is equivalent to the point of conception, it is clear that development of the "individual" is encoded in the genetic material itself, and does not require 14 days to be committed to forming an individual being.

Finally, differentiation is also explained by the Committee Report in terms of uterine implantation. The report states that it is the physiologic interaction of the embryo with the mother during implantation that determines the path of differentiation.¹²⁶ Clearly, cloning suggests otherwise. Specifically, the clonal embryo develops in exactly the same manner as the donor, despite the absence of the same available womb. Cloned animals, such as Dolly, were not implanted into the womb of the same mother that birthed the donor of the genetic material originally.¹²⁷ Yet, the clonal embryo was an exact genetic duplicate of the donor. Therefore, it is not the physiologic interaction of the embryo with the mother during implantation that determines the path of differentiation. The fact that information regarding differentiation is clearly encoded within the genetic material introduced into the egg is evidenced by the successful cloning of Dolly. Implantation of the egg in the uterine wall merely provides the nutritive environment necessary for continued growth in relation to the embryo's current stage of life.

The preembryo-embryo distinction aside, there is little substantive support offered by the committee or the court to support the accepted intermediate view that "[t]he preembryo deserves respect greater than that accorded to human tissue but not the respect accorded to actual persons."¹²⁸ The third intermediate view is that the preembryo "should not be treated as a person"¹²⁹ for three reasons: "[(1) It] has not yet developed the features of personhood; [(2) It] is not yet established as developmentally individual; [and (3) It] may never realize its biologic po-

¹²⁶ *Id.*

¹²⁷ Wilmut, *supra* note 3, at 813.

¹²⁸ Committee Report, *supra* note 21, at 35S.

¹²⁹ *Id.* at 35S.

tential.”¹³⁰ The report offers no further explanation of these stated reasons.

According to the committee, the first reason that an embryo at these early stages should not be treated as a person is that the embryo has not yet developed features of personhood. This point is difficult to address, since no list of critical features of personhood is specifically given. Clearly, the physical features that we develop as persons are not static, not in development, and not at any age after birth. The committee does seem to recognize this, stating that the change that transforms the fertilized egg into the “more complex newborn . . . comprises a continuous process of becoming.”¹³¹ For them to then argue against life and/or personhood based on an unnamed list of physical features is at the very least in tension with this statement.

The second reason, according to the report, that an embryo at these early stages should not be treated as a person is that it is not yet established as developmentally individual. This rationale is largely addressed by the earlier analysis regarding differentiation.¹³² Furthermore, explanations concerning time are admittedly imprecise and based on convenience.¹³³ Explanations based on the development of the individual and uterine implantation are countered by the successful cloning of Dolly, which demonstrates that patterns of differentiation and development from its very earliest stages are encoded within the genetic material contained in the clonal or fertilized egg.¹³⁴

The third reason espoused by the committee is that an embryo at these early stages should not be treated as a person is that it may never realize its “biologic potential.”¹³⁵ Since no specific explanation of this reasoning is given, we can only infer that this argument is based on the previously cited statistical odds that the embryo will reach maturity. As previously stated, whether arguments such as this ought to determine the status and value of life goes beyond the scope of this paper because it cannot be addressed in terms relating to cloning technology.

V. CONCLUSION

Policy regarding reproductive technology is being formulated predominantly in the courts. Current policy concerning embryos is largely based on a committee report published by the American Society for Reproductive Medicine (previously the American Fertility Society). The

¹³⁰ *Id.*

¹³¹ *Id.* at 31S.

¹³² *See supra* text accompanying notes 103-12.

¹³³ Committee Report, *supra* note 21, at 31S.

¹³⁴ *See supra* text accompanying notes 103-12.

¹³⁵ Committee Report, *supra* note 21, at 35S.

committee report relies on flawed generalizations about the law that, at the very least, raise suspicion about its objectivity regarding the facts that distinguish a preembryo from an embryo, particularly given the committee's evident vested interest in an outcome that does not recognize embryos under 14 days as persons. With circular reasoning, the courts relied on the committee report more than any other source in making their determination regarding the status and disposition of embryos. The committee report admits imprecision in the estimated time frame that distinguishes a preembryo from an embryo. This makes any legal status based upon such a line unacceptably imprecise. Differentiation is part of a continual process of becoming for the embryo. Interaction of the embryo with the mother's womb, while necessary, is not the determining factor behind differentiation, as proven by the successful cloning of animals like Dolly. The genetic material that is contained within both the natural and clonal embryos solely determines the path of individual and specific destiny for the embryo, even from its earliest stages of development.

With these points in mind, one must recognize that the legal and scientific rationale behind the preembryo-embryo distinction is flawed. Contrary to the emerging consensus announced by the committee report, and followed by the courts, the logic and specific evidence provided by successful cloning experiments indicates strongly that both the clonal embryo and the fertilized egg have been set on the path of life, not a path destined for life, the moment that the complete set of chromosomes exists within the cell. Indeed, if there is a preembryo, then it likely is the egg and the sperm themselves, not the clonal embryo or the fertilized egg. As a result, this analysis suggests that the human embryo, even at the very earliest stages, should be recognized as a life. This requires that it be accorded the rights of a person: according to the committee report, "[t]his position entails an obligation to provide an opportunity for implantation to occur and tends to ban any action before transfer that might harm the pre-embryo or that is not immediately therapeutic" ¹³⁶

There is a need to create a policy regarding cloning technology and human reproduction. Whether policymakers, federal agencies, the judiciary, or religious leaders will be able to reach a consensus regarding policy is uncertain. What is certain is that unless society acknowledges the foundational proofs established by cloning technology, no policy can be satisfactorily established regarding human cloning. In any event, it is illogical to create policy without acknowledging that the preembryo-embryo distinction is flawed in light of cloning technology, and should

¹³⁶ *Id.* at 34S.

not be used to determine the disposition or status of the clonal embryo. This technology sheds sufficient new light on the naturally developing embryo to warrant a reexamination of the *Davis* decision and existing policy concerning embryos derived from that decision.

The preembryo-embryo distinction is invalid under any form of reproduction. Therefore, the sanctity of life should be preserved from the earliest stages of life created under any and all conditions, natural or otherwise. This requires recognition of all fetuses, embryos, and preembryos as persons, and protection for them to the fullest extent of the law.