

I. And to Think a Sheep Started It All: An Introduction

In the field of science and technology, “the only thing permanent is change”.¹ This is especially true when the two merge to form one of today’s hottest and most controversial areas of biotechnology, cloning. To most of the world, cloning was simply a work of science fiction in the time before Dolly.² However, after Dolly, cloning has become a topic of household conversation. It is an area of science that changes daily. Advances are constantly being made in the field of cloning. This has caused great controversy in the United States and across the world. Whether cloning should be applied to humans has caused quite the stir. The issue has raised religious, ethical, technical and legal concerns.

Many religious groups³ have condemned cloning. Others, such as the Raelians,⁴ support human cloning and have even alleged to have successfully cloned a human.⁵ The cloning of humans also raises ethical concerns on issues such as: the social well being of the potential cloned child, destruction of human embryos, and human experimentation. Likewise, cloning of animals raises ethical concerns such as: who “owns” the clones, what “purposes” are acceptable to justify the cloning, etc.⁶

¹ Heraclitus, pre-Socratic Greek philosopher.

² Dolly was the first animal successfully cloned from an adult cell. Dolly will be discussed in detail later in this paper.

³ The Roman Catholic Church has stated that “every possible act of cloning humans is intrinsically evil” and can never be justified. *Human Cloning: Is Making People Wrong?*, BBC ONLINE at <http://www.bbc.co.uk/religion/ethics/cloning/clones.shtml> (last visited Oct. 25, 2003).

⁴ A religious group that believes space aliens created life on Earth. Tim Friend. *The Real Face of Cloning. What Will the World Look Like If Renegade Scientists Persist In Their Experiments to Clone a Human? Experts Say It Won't Be Pretty – and That the Era of Human Cloning Might Not Last Long* (n.d.), available at USA TODAY: <http://www.usatoday.com/educate/college/healthscience/articles/20030126.htm> (last visited Oct. 25, 2003).

⁵ On December 26, 2002, the Raelians shocked the world with news that they had helped bring the first human clone into the world. The claim was unproven and considered by most experts to be a sham. *Id.*

Can a human even be cloned? It is not certain if human cloning is even technically possible. However, the history of animal cloning has shown there are grave dangers involved in this rapidly advancing technology that potentially outweigh the benefits. Safety issues, including the health and well-being of the clone and its mother, should be of overarching concern when discussing the future of cloning human beings. The experience and results of cloning experiments on non-human animals has shown that any attempt to clone a human is inherently unrealistic at the present time.⁷

Finally, there are legal concerns involving human cloning. This is a complex area and should be handled with the utmost of care. Cloning could potentially have great benefits or disastrous effects. Lawmakers have been careful to make certain that the legislation passed is comprehensive and useful for regulation of the ever-changing field of cloning. From debates on whether reproductive or therapeutic cloning should be permitted or banned, to concerns as to whom has jurisdiction over cloning, the battle to develop cloning legislation has been difficult.

The United States has yet to enact a Federal law governing cloning and the individual states have been slow to enact state law on the issue. The past two United States Presidents issued opinions on the subject. The Food and Drug Administration (“FDA”) claims to have jurisdiction over human cloning. The American Medical Association (“AMA”) supports therapeutic cloning. However, the final step to comprehensive legislation in the United States either approving or banning cloning has been slow.

⁶ Bernard E. Rollin, *The Frankenstein Syndrome* 207-218 (Cambridge Univ. Press 1995). Although the discussion is related to transgenic animals the same issues apply to clones

⁷ Susan M. Rhind, et al., *Human Cloning: Can It Be Made Safe*, NATURE REVIEWS GENETICS Vol. 4, No. 11, at 855 (2003), available at http://www.nature.com/cgi-taf/DynaPage.taf?file=/nrg/journal/v4/n11/full/nrg1205_fs.html (last visited Nov. 5, 2003).

A ban on reproductive human cloning has been passed in the United Kingdom. There is also a push for international guidelines governing cloning. The United Nations has yet to enact a resolution or draft a treaty on human cloning. The World Health Organization (“WHO”) has banned reproductive cloning but supports therapeutic cloning.

In order to fully understand the cloning debate, it is necessary to understand that there are two different types of cloning: reproductive and therapeutic. Reproductive cloning is cloning of a human embryo for the purpose of initiating a pregnancy. Therapeutic cloning involves the creation of embryos for research and disease treatment. Therapeutic cloning provides access to embryos for stem cell research. The major difference between therapeutic and reproductive cloning is the intended use of the embryos. Reproductive cloning is highly controversial. Likewise, therapeutic cloning has raised controversy. However, the controversy raised by therapeutic cloning has been tempered by the hope it has provided.

Part one of this paper will be a review of the history of the science of cloning and the history of animal cloning. Part two will be a discussion of the risks and benefits of cloning. Part three will address ethical and religious concerns surrounding human cloning. Part four will be a discussion of legislative responses to the possibility of human cloning in the United States and the United Kingdom, as well as a discussion of international responses of organizations such as the AMA, the United Nations, the WHO (which is an agency of the United Nations), and the United Nations Educational, Scientific and Cultural Organization (“UNESCO”).

II. From the Impossible to the Possible: The History of Animal Cloning

Cloning research has been underway since the 1890s.⁸ The first animal cloning research was an attempt to produce identical organisms by splitting animal embryos at early stages of

development.⁹ Work continued in the field of animal cloning and in 1952 the nuclear transfer procedure was invented.¹⁰ Work with nuclear transfer resulted in the successful cloning of many species from embryonic nuclei.¹¹ In the 1980's, nuclear transfer was used to clone cattle and sheep using cells taken directly from early embryos.¹² In 1995, living lambs, named Megan and Morag, were created for the first time from cultured cells.¹³ However, prior to 1997 the word "clone" conjured up images of creatures from Jurassic Park¹⁴ or other works of science fiction in the minds of most people.

In July of 1996, Scottish scientists¹⁵ created the first animal cloned from an adult cell. On July 5, 1996, Dolly¹⁶ the sheep was born at the Roslin Institute in Edinburgh Scotland. The

⁸ Stacy J. Ratner, Note, *Baa, Baa, Cloned Sheep, Have You Any Law? Legislative Responses to Animal Cloning in the European Union and United States*, 22B.C. INT'L & COMP. L. REV. 141, 142 (1999).

⁹ *Id.*

¹⁰ *Id.* at 142. Nuclear transfer involves transferring the nucleus from a diploid cell (an adult body cell) to an unfertilized egg cell from which the maternal nucleus has been removed. The nucleus itself can be transferred or the intact cell can be injected into the egg cell. Roslin Institute, at <http://www.roslin.ac.uk/public/cloning.html> (last visited Oct. 25, 2003).

¹¹ Ratner, *supra* note 8, at 142.

¹² Roslin Institute, at <http://www.roslin.ac.uk/public/cloning.html> (last visited Oct. 25, 2003).

¹³ Ian Wilmut, Keith Campbell and other scientists at the Roslin Institute successfully created Megan and Moran from embryo derived cells that had been cultured in the laboratory for several weeks. This was the first time live animals had been derived from cultured cells. Their success opened up the possibility of introducing much more precise genetic modifications into farm animals. Roslin Institute, *supra* note 10.

¹⁴ The movie was about an amusement park with DNA-cloned live dinosaurs as the main attraction. Jurassic Park (Universal Studios 1993).

¹⁵ Ian Wilmut of the Roslin Institute in Edinburgh, Scotland along with PPL Therapeutics created the first animal cloned from the cell of an adult animal. The Roslin Institute is one of the world's leading centers for genetic research on farm and other animals. Roslin Institute, at <http://www.roslin.ac.uk/>. PPL Therapeutics is one of the world's leading companies in the application of transgenic technology for the production of human proteins for therapeutic use. PPL Therapeutics, *Who We Are*, at http://www.ppl-therapeutics.co.uk/who/who_1_content.html (last visited Oct. 25, 2003). The introduction of Dolly in February 1997 established PPL Therapeutics as the global leader, along with the Roslin Institute, in the development of transgenetic livestock technology. PPL Therapeutics research has been conducted in both the United States and the United Kingdom. PPL Therapeutics, *Who We Are*, at http://www.ppl-therapeutics.co.uk/who/who_2_content.html (last visited Nov. 3, 2003). Nuclear transfer technology has been patented by PPL and PPL follows guidelines set out by the US Food and Drug Administration

announcement of her birth in early 1997 shocked the scientific community and stirred debate over the possibility of cloning humans. A process known as cell nuclear replacement¹⁷ created Dolly by transferring a mammary cell of a six-year-old white Welsh Mountain sheep into the egg cell of a Scottish Blackface ewe.¹⁸ Since Dolly's birth, several other species have successfully been cloned including: mice, cattle, sheep, pigs, goats, rabbits¹⁹ and a cat.²⁰ This past spring saw more advancements in the field of animal cloning. Idaho Gem,²¹ the first member of the horse family to be successfully cloned, was born on May 4, 2003.²² Since the birth of Idaho Gem, another member of the horse family was successfully cloned. In August of 2003, the birth²³ of

Center for Biologics Evaluation and Research and the European Committee for Proprietary Medicinal Products. PPL Therapeutics, *What We Do: Nuclear Transfer*" (2003), PPL Therapeutics, at http://www.ppl-therapeutics.co.uk/what/what_2_content.html (last visited Oct. 25, 2003).

¹⁶ Dolly's name came about during the latter stages of labor. Stockmen involved in the delivery named her after Dolly Parton, as the cell used to create her came from a mammary gland. *Dolly the Sheep Clone Dies Young*, BBC NEWS ONLINE, at <http://news.bbc.co.uk/1/hi/sci/tech/2764039.stm> (last visited Oct. 25, 2003).

¹⁷ Cellular nuclear replacement (CNR) is essentially the same process as Nuclear Transfer.

¹⁸ John Garvish, *The Clone Wars: The Growing Debate Over Federal Cloning Legislation*, 2001 DUKE L. & TECH REV. 22 (2001), ¶ 2, available at <http://www.law.duke.edu/journals/dltr/> (last visited Nov. 2, 2003).

¹⁹ Rabbits were a difficult species to clone. In order to successfully clone a rabbit, Jean-Paul Renard of the French Institut National de la Recherche Agronomique in Jouy-en-Josas modified the method used to clone sheep, pigs and mice. Adjustments were made based on information about early embryonic development in rabbits and the proper timing for transferring embryos into foster mothers; the process produced several fertile and healthy clones with an efficiency rate comparable to that of other mammals. Edward R. Winstead, *Modified Cloning Strategy Succeeds With Rabbits*, GENOME NEWS NETWORK ONLINE (2002), at http://gnn.tirg.org/articles/04_02/modified_cloning.shtml (last visited Oct. 25, 2003).

²⁰ Roslin Institute, *supra* note 10.

²¹ Idaho Gem was produced by a research team composed of Gordon Woods, a professor of animal and veterinary science at the University of Idaho, Kenneth L. White, a professor of animal science at the Utah State University, and Dirk Vanderwall, an assistant professor of animal and veterinary science at the University of Idaho. *University of Idaho, Utah State University Team First To Clone Equine*, SCIENCE DAILY ONLINE (2003), at <http://www.sciencedaily.com/releases/2003/05/030530081416.htm> (last visited Oct. 25, 2003).

²² Mules are sterile animals and thus cannot reproduce on their own. Mules are bred by mating a male donkey with a female horse. Idaho Gem was cloned using a cell from a mule fetus and an egg from a horse. Associated Press, *Scientists Clone First Member of Horse Family*, THE FORUM (Fargo, N.D.), May 30, 2003, at A6.

Prometea²⁴ was announced. Prometea was the first animal to be carried and birthed by the mother from which she was cloned.²⁵ The most recent animal to be successfully cloned is a rat.²⁶ Researchers from China and France created several cloned rats, both male²⁷ and female.

III. Do the Benefits Outweigh the Dangers?: The Dangers and Benefits of Cloning

A. Cloning's Horror Stories: The Dangers and Risks That Accompany Cloning

It is clear that there are potentially great benefits resulting from the concept of cloning, such as development of identical animals for biomedical research or for production of human proteins. However, there are also serious risks that come with the process. Despite the success in the production of Dolly, animal cloning has a high rate of failure. On average, only one to two percent of the reconstructed eggs lead to live births.²⁸ Prior to the successful birth of Dolly,

²³ Prometea was born May 28, 2003. Associated Press, *Italians Say First Horse Cloned*, CBS NEWS ONLINE, available at <http://www.cbsnews.com/stories/2003/5/29/tech/main556123.shtml> (last visited Nov. 9, 2003).

²⁴ Prometea is a Haflinger horse, a breed of work horse. Named Prometea after Prometheus, the character in Greek mythology who stole fire from the gods and gave it to humans. Rick Callahan, *Scientists Say They've Cloned a Horse*, YAHOO NEWS, at http://story.news.yahoo.com/news?tmpl=story&cid=624&ncid=624&e=2&u=/ap/20030806/ap_on_sc/cloned_horse (last visited Oct. 25, 2003).

²⁵ Taking an adult skin cell and fusing it into an empty egg created the cloned foal. The successful cloning, which resulted in Prometea, opens the door to more advances in cloning, leading researchers to believe that human cloning may be a real possibility in the not so distant future. This belief is based on the similarity and complexity of the reproductive systems of horses and humans. It is believed that the technique used to clone the horse could give insight into the technique needed to successfully clone a human. Dwayne Hunter, *Horse Cloning Makes Human More Likely*, AMERICAN JOURNAL OF BIOETHICS ONLINE (2003), at <http://www.betterhumans.com/News.news.aspx?article ID=2003-08-08-2> (last visited Oct. 25, 2003).

²⁶ The rat has been especially difficult to clone because of difficulty in controlling the development of its eggs in the early stages of the cloning process. Researchers discovered that the use of a chemical at a key moment can lead to successful embryos that will implant in the surrogate mother. The failure rate with the rat was very high. *Rat is Latest Clone*, BBC ONLINE, at <http://news.bbc.co.uk/2/hi/science/nature/3136776.stm> (last visited Oct. 25, 2003).

²⁷ Historically most clones have been female. The first male clone was a mouse named Fibro. Unlike Dolly and numerous other clones, Fibro was created from cells taken from an adult male. Fibro was also unique from previous clones because he was created from "ordinary" cells instead of cells taken from various parts of the reproductive system. In the attempt to create Fibro, 274 embryos were implanted. Three survived to full term and only Fibro survived to become a fertile adult male. Sara Abdulla, *First Male Clone*, NATURE SCIENCE UPDATE, at <http://www.nature.com/nsu/990603/990603-2.html> (last visited Oct. 25, 2003).

²⁸ Roslin Institute, *supra* note 10.

researchers at the Roslin Institute produced over 200 cloned sheep embryos.²⁹ For every successful clone that is born, many other cloned animals die of mysterious causes.³⁰ The unpredictability of cloning seems to lie in unstable genes.³¹ Researchers in Scotland³² believe a possible cause for the failures associated with cloning may be the result of the clone's DNA missing a few carbon atoms. When sheep embryos are manipulated, they can lose some of the methyl groups attached to their genes. This change, termed "imprinting," alters how actively the genes produce proteins that are key to survival.³³ Researchers at the Massachusetts Institute of Technology looked at six imprinted genes of cloned mice.³⁴ They found no cloned mouse that had all six genes functioning normally.³⁵ The genetic instability appears to be a random process and the developmental abnormalities are the result of many malfunctions.³⁶

Less than ten percent of cloned embryos survive.³⁷ Many of the cloned offspring die during the late stages of pregnancy or soon after birth.³⁸ Those that do survive are prone to

²⁹ Philip Cohen, *Bad Copies: Do Some Clones Lose Something Vital During Their Creation?*, NEW SCIENTIST, Vol. 169 No. 2276, Feb. 3, 2001, at 7.

³⁰ *Id.*

³¹ John Whitfield, *Imprinting Marks Clones For Death*, NATURE SCIENCE UPDATE, at <http://www.nature.com/nsu/010712/010712-1.html> (last visited Oct. 25, 2003).

³² The chief researcher is Lorraine Young of the Roslin Institute in Edinburgh. Cohen, *supra* note 29 at 7.

³³ *Id.*

³⁴ The research was led by Rudolf Jaenisch. Whitfield, *supra* note 31.

³⁵ There are between 100 and 2000 imprinted genes in the genome (the genome probably contains 30,000-40,000 genes in total). The failure of researchers to find a single mouse in which the six selected genes were all functioning normally indicated to researchers that even if clones appear healthy they might have abnormal gene expression. *Id.*

³⁶ *Id.*

³⁷ Nancy Touchette, *Cloned Mice Have Genetic Flaws*, GENOME NEWS NETWORK ONLINE, at http://gnn.tigr.org/articles/09_02/cloned.shtml (last visited Oct. 25, 2003).

³⁸ The cause of death is often respiratory or cardiovascular dysfunction. Roslin Institute, *supra* note 10.

health problems. In the early experiments at the Roslin Institute, 42 percent of the cloned lambs died within a few days of birth.³⁹ Many of the cloned cattle and sheep that survive to birth are born much larger in size than normal offspring.⁴⁰ One of a pair of cloned bantengs⁴¹ had to be euthanized because it was abnormally large.⁴² The calf weighed almost twice as much as a normal banteng calf. Despite its size, the calf appeared healthy at first. The veterinarians at the San Diego Zoo decided to euthanize it for humane reasons.⁴³ Additionally, many clones have abnormally large placentas.⁴⁴ Cloned mice tend to be obese.⁴⁵ Clones may also be less intelligent than their naturally conceived counterparts. It has been claimed that cloned mice learn slower than normal mice.⁴⁶ Newborn cow clones scored lower on average than non-clones on tests of attentiveness and intelligence.⁴⁷ Other problems that clones may suffer include: low blood oxygen levels, high carbon dioxide levels, enlarged tongues, enlarged hearts, squashed faces, subfunctional kidneys, intestinal defects, diabetes, and shortened tendons that disfigure the

³⁹ Ian Wilmut, *Developmental Plasticity in Mammals: Implications For Biology and Medicine*, Roslin Institute, at <http://roslin.ac.uk/publications/9900annrep/plasticity.html> (last visited Oct. 25, 2003).

⁴⁰ Roslin Institute, *supra* note 9. This condition is referred to as “large offspring syndrome”. Researchers at the Roslin Institute have found that often the animals suffering from large offspring syndrome lacked all of the methyl groups on the gene protein IGF2R and produced 30 to 60 percent less of the protein than normal. IGF2R is responsible for helping to keep the fetus from growing too large. Cohen, *supra* note 29.

⁴¹ *Bos javanicus*, a rare species of Southeast Asian oxen. The banteng is listed as an endangered species by the World Conservation Union.

⁴² Reuters, *One of Cloned Bantengs Euthanized*, MSNBC ONLINE, at <http://www.msnbc.com/news/897115.asp> (last visited Oct. 25, 2003).

⁴³ The abnormal size can lead to fatal heart conditions and failure of other organs. *Id.*

⁴⁴ Touchette, *supra* note 37.

⁴⁵ Harry Griffin, *Should Assistance Dogs Be Cloned?* Roslin Institute, at <http://www.roslin.ac.uk/public/12-08-02-cd.html> (last visited Oct. 25, 2003).

⁴⁶ *Id.*

⁴⁷ Philip Cohen and David Concar, *The Awful Truth*, NEW SCIENTIST, Vol. 170 No. 2291, May 19, 2001, at 14, available at <http://www.newscientist.com/hottopics/cloning/cloning.jsp?id=22911700> (last visited Oct. 25, 2003).

animal's feet and make them useless.⁴⁸ The clones are not the only ones in danger. In a single study, four in twelve surrogate mothers died from pregnancy complications.⁴⁹

The most famous of all clones, Dolly, also suffered from health problems. Early in her life she was overweight. In 1999, it was discovered that her telomeres⁵⁰ were twenty percent shorter than normal for a sheep of her age.⁵¹ This led to speculation that her biological age might equal the combined age of her and her mother.⁵² She was diagnosed with arthritis in January of 2002.⁵³ At six and a half years of age, Dolly was euthanized.⁵⁴ Dolly was suffering from lung cancer⁵⁵ caused by a virus.⁵⁶ Dolly's early death⁵⁷ sparked controversy, raising questions as to what could properly be judged as her true age⁵⁸ and the risks of premature ageing in clones.⁵⁹ After the completion of her necropsy,⁶⁰ Dolly was preserved and placed on display

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ Caps at chromosome ends that get shorter each time a cell divides.

⁵¹ John Whitfield, *Obituary: Dolly the Sheep*, NATURE SCIENCE UPDATE (2003) at <http://www.nature.com/nsu/030210/030210-15.htm> (last visited Oct. 25, 2003).

⁵² *Id.*

⁵³ *Dolly the Sheep Clone Dies Young*, *supra* note 16.

⁵⁴ Veterinarians at the Roslin Institute euthanized Dolly on February 14, 2003. Whitfield, *supra* note 51.

⁵⁵ Dolly suffered from sheep pulmonary adenomatosis. *Cause of Death*, Dolly the Sheep, 1996-2003, SCIENCE MUSEUM ONLINE (2003), at <http://www.sciencemuseum.org/uk/antenna/dolly/134.asp> (last visited Oct. 25, 2003).

⁵⁶ Preliminary post-mortem results showed that apart from the cancer and arthritis, Dolly was relatively normal and showed no other signs of premature aging. Whitfield, *supra* note 51.

⁵⁷ Dolly was relatively young. Her breed, the Finn Dorset, can live to 11 or 12 years. *Id.*

⁵⁸ Questions have always been asked about Dolly's true age because her genetic material came from a six year old donor sheep. *Old Before Her Time?*, Dolly the Sheep, 1996-2003, SCIENCE MUSEUM ONLINE (2003), at <http://www.sciencemuseum.org/uk/antenna/dolly/133.asp> (last visited Oct. 25, 2003).

⁵⁹ *Dolly the Sheep Clone Dies Young*, *supra* note 16.

in the National Museum of Scotland in Edinburgh.⁶¹ Though Dolly's early death fueled the debate about the long-term health of clones, there is no proof that cloning caused her death.⁶²

Attempts to clone primates have been unsuccessful to date.⁶³ Cloned monkey cells have shown abnormal division.⁶⁴ Cloned monkey cells have not been capable of replicating their genetic material accurately.⁶⁵ The chromosomes do not split properly and from the first cell division the cells develop inappropriately.⁶⁶ The resulting monkey embryos do not have the correct number of chromosomes and are lacking essential proteins.⁶⁷ Despite the failure to clone primates so far, it is believed that at some point in the future they will be cloned.⁶⁸

B. Cloning's Immense Potential: The Likely Benefits of Cloning

Despite all of its problems, cloning holds great potential for benefit. Among the possible benefits of cloning are: cures for deadly diseases, new medications, organ transplantation, salvation of endangered species, revival of extinct species, and duplication of prize animals. The technique that produced Dolly could potentially be used to create bone marrow or skin grafts.⁶⁹

⁶⁰ An autopsy performed on a non-human animal.

⁶¹ Reuters, *Dolly, Now Stuffed, Goes on Display*, MSNBC ONLINE (2003), at <http://www.msnbc.com/news/897776.asp> (last visited Oct. 25, 2003).

⁶² *An Early Death?*, Dolly the Sheep, 1996-2003, SCIENCE MUSEUM ONLINE (2003), at <http://www.sciencemuseum.org/uk/antenna/dolly/132.asp> (last visited Oct. 25, 2003).

⁶³ The failures of non-human primate cloning have raised serious questions as to feasibility of human cloning. Anna Salleh, *Cloning Humans, Primates May Be Impossible*, ABC ONLINE, at <http://www.abc.net.au/science/news/stories/s830381.htm> (last visited Oct. 25, 2003).

⁶⁴ *Id.*

⁶⁵ This has been shown by Gerald Schatten of the University of Pittsburgh. *Id.*

⁶⁶ *Id.*

⁶⁷ *Id.*

⁶⁸ Susan M. Rhind, *supra* note 7.

One of the most significant advances in the field of cloning has been the creation of genetically modified animals. These animals, predominately cows and sheep, have been genetically engineered with human DNA. In 1997, the Roslin Institute produced two lambs containing human genes.⁷⁰ The lambs, named Molly and Polly, were cloned with a human gene so that their milk would contain a blood-clotting protein. This protein can be extracted and used in the treatment of human hemophilia.⁷¹ The research that created Molly and Polly could lead to new treatments for cystic fibrosis and emphysema, as well as hemophilia.⁷² Hematech, LLC., a South Dakota based company, created cows that carry a section of human genes. The gene section is one that controls the production of many different antibodies.⁷³ The antibody proteins⁷⁴ that are being produced in the cows hold the potential to treat illnesses ranging from ear infections to anthrax.⁷⁵ Advanced Cell Technologies⁷⁶ has made advances in growing embryonic stem cells

⁶⁹ Healthy cells could be harvested from a patient with leukemia or a burn victim and then the nucleus of each cell could be transferred into an unfertilized egg with the nucleus removed. These embryonic clones would be placed in culture dishes and begin to divide. Growth factors could ensure that the clones develop only into specialized cells and tissue. These cloned cells could provide fresh bone marrow for leukemia patients or grafts of skin for the burn patient. Patients would be spared the need to take powerful drugs to suppress their immune systems. J. Madeleine Nash, *The Case for Cloning*, TIME, February 9, 1998, at 81.

⁷⁰ *First There Was Dolly...*, BBC ONLINE, at <http://news.bbc.co.uk/a/hi/sci/tech/40806.stm> (last visited Oct. 25, 2003).

⁷¹ *Id.*

⁷² Farmers could also benefit from the technique by making identical copies of animals that produce exceptional quantities of milk or meat. Cloning could potentially be used to produce herds of animals that are genetically protected against mad cow disease. *Id.*

⁷³ Reuters, *Cloned Cows Make Human Antibodies*, MSNBC NEWS ONLINE, at <http://www.msnbc.com/news/793119.asp> (last visited Oct. 25, 2003).

⁷⁴ These disease-fighting proteins, called immunoglobins (the scientific term for antibodies) cannot be grown in laboratories and factories and as a result are only available from human donors. Often, it is not even possible to get specific antibodies from human donors. The only way to obtain anthrax fighting immunoglobins is to infect a human to provoke an immune response. Researchers hope that these purposely-infected cows will solve the problem by producing immunoglobins. *Cloning: Researchers Hope to Use Cow Clones as Medicine Factories*, GENOMICS & GENETICS WEEKLY, Sept. 27, 2002, available at LEXIS, NEWS LIBRARY, MEDICAL & HEALTHCARE, HEALTHCARE NEWS.

using the process of cloning.⁷⁷ The hope for these cells is that they will respond to the body's own signals and produce immune system cells as needed. If this approach works in humans, it could be used to treat cancer and immunodeficiencies as well as "rebooting" the immune system in patients with autoimmune diseases.⁷⁸

Cloning could potentially be used to help grow new organs for humans. Researchers at the University of Pennsylvania have found that stem cells from mouse embryos will transform into oocytes and then into primitive embryos.⁷⁹ Embryonic stem cells can grow into virtually any cell in the body. It has been suggested that they could be used to grow new heart, liver, brain or pancreas cells to revive or repair ailing organs.⁸⁰ To make these new organ cells compatible with a patient, an embryo would have to be cloned using the nucleus from one of the patient's cells. At an early stage in the process, the new stem cells would be removed and grown into the appropriate cell type.⁸¹ If organs are successfully cloned from human embryonic stem

⁷⁵ *Id.*

⁷⁶ Advanced Cell Technologies is a Massachusetts based biotechnology company.

⁷⁷ The company took cells from the oldest cattle they could find and cloned them. The clones were not developed into calves but stopped when the embryos were only a few days old and still in the lab dish. They were used as a source of embryonic stem cells. Reuters, *Cloned Cells May Boost Immunity*, MSNBC ONLINE, at <http://www.msnbc.com/news/843712.asp> (last visited Oct. 25, 2003).

⁷⁸ There are over 40 known autoimmune diseases, including multiple sclerosis, rheumatoid arthritis, juvenile diabetes, lupus, and inflammatory bowel disease. *Id.*

⁷⁹ Most scientists had previously thought that it was impossible to grow gametes from stem cells outside the body. The spontaneous embryos could not be used to reproduce mice but could probably be used for cloning. Associated Press, *Mouse Stem Cells Can Become Eggs*, MSNBC NEWS ONLINE, at <http://msnbc.com/news/907939.asp> (last visited Oct. 25, 2003).

⁸⁰ *Id.*

⁸¹ This process raises concerns, as there would be need for a large supply of human eggs, which are only available from female donors who have to undergo a painful process to harvest the eggs. *Id.* Recent developments in cloning have provided alternatives to the need for human eggs. Recently there have been successes in rabbit-human hybrids. Dr. Huizhen Sheng, a Chinese medical researcher, has created human embryonic stem cells using eggs harvested from rabbits and human skin cells. Elaine Kurtzbach, *Rabbit Eggs Used to Grow Human Stem Cells*, YAHOO NEWS,

cells, the need for organ donation could be significantly reduced.⁸² However, many challenges must still be overcome before cloned organ transplants are a reality.⁸³

One of the most exciting advances in cloning came in September of 2003. Scientists at the Memorial Sloan-Kettering Cancer Center in New York used cloned embryonic stem cells to treat a mouse suffering from Parkinsonism.⁸⁴ The embryonic stem cells⁸⁵ were cloned from the mouse they were used to treat. The cells were grown into new tissue and implanted into the mouse's brain. After the implantation, the mouse's symptoms disappeared. The advantage of using a cloned embryo is that the cells would be a perfect genetic match for the recipient.⁸⁶ This technique holds potential for treating not only Parkinson's disease but also many other diseases.⁸⁷ Recent reports, however, indicate that stem cells obtained from adults may have the potential to provide all of the benefits of embryonic stem cells.⁸⁸ If this proves to be true, the use of stem cells derived from embryos may be moot.

at http://story.news.yahoo.com/news?tmpl=story&u=/ap/20030922/ap_on_he_me/china_stem_cells_1 (last visited Oct. 25, 2003).

⁸² Currently in the United States about 63 people receive an organ transplant each day, but another 16 people on the waiting list die because not enough organs are available. Department of Health and Human Services, *Organ Donation*, at <http://organdonor.gov/> (last visited Oct. 25, 2003).

⁸³ Techniques for creating human embryos, harvesting stem cells and producing organs from stem cells are currently ineffective and need more development. Human Genome Project Information, *Cloning Fact Sheet*, at http://www.ornl.gov/TechResources/Human_Genome/elsi/cloning.html (last visited Oct. 25, 2003).

⁸⁴ A disease similar to Parkinson's disease in humans. *Mouse Cloned to Cure Parkinson's*, BBC NEWS ONLINE (2003), at <http://news.bbc.co.uk/2/hi/health/3123978.stm> (last visited Oct. 25, 2003).

⁸⁵ The original cells used for cloning were taken from the tail of the mouse and then cloned. *Id.*

⁸⁶ This will remove the need for extra treatments to suppress the immune system. *Id.*

⁸⁷ However, the application of this technique to humans is still a long way from reality. There is some research that indicates that it may be impossible to perform the technique on a human. *Id.*

⁸⁸ Researchers at the University of Minnesota Stem Cell Institute (SCI) provided evidence that adult bone marrow derived cells can differentiate into cells of all three embryonic germ layers. Experiments have been done with mouse and rat bone marrow. The research has resulted in animals that are 40 percent derived from the bone marrow stem cells. This indicates that the cells contribute functionally to a number of organs. These results are what would

Xenotransplantation⁸⁹ may offer some of the greatest benefits that can be achieved from cloning. However, xenotransplantation itself is highly controversial.⁹⁰ On December 25, 2001, five genetically modified pig clones⁹¹ were born in the United States.⁹² The pigs lack a specific gene and are a major step towards using animal organs for human transplants, as they are the first to be engineered in a way that should help prevent the human body from rejecting their tissues.⁹³ Researchers removed a crucial gene that makes a special sugar called alpha1, 3 galactose⁹⁴ from the pigs' DNA. Pigs are thought to be the most suitable animals for human transplants.⁹⁵

Serious concern was raised over the safety of transplanting pig organs into humans in August of 2003 with the death of three cloned pigs. The pigs died from heart attacks.⁹⁶ The sudden heart failure of the pigs suggests that organs from cloned pigs could be unreliable.⁹⁷

be expected of embryo stem cells. University of Minnesota Press Release, *Adult Stem Cells Differentiate like Embryo Stem Cells*, available at http://www1.umn.edu/stemcell/sci/page/pressRelease/frst-p_r.htm (last visited Nov. 14, 2003); Yuehua Jiang, et al., Pluripotency of Mesenchymal Stem Cells Derived From Adult Marrow, *NATURE*, Vol. 418, July 4, 2002, at 41,48.

⁸⁹ Transplantation of an organ from a non-human animal to a human.

⁹⁰ The Nuffield Council on Bioethics published a Report, which gave cautious approval to xenotransplantation recommending that development of animal-to-human transplants should continue, subject to rigorous regulation. Nuffield Council on Bioethics 2001, *Animal-to-Human Transplants: The Ethics of Xenotransplantation*, Online at <http://www.nuffieldbioethics.org/xenotransplantation/index.asp>. The Nuffield Council on Bioethics, in London, was established by the Trustees of the Nuffield Foundation in 1991 to identify, examine and report on the ethical questions raised by recent advances in biological and medical research. Nuffield Council on Bioethics 2001, *About Us*, at <http://www.nuffieldbioethics.org/aboutus/index.asp> (last visited Oct. 25, 2003).

⁹¹ The pigs were named Noel, Angel, Star, Joy, and Mary. *New Pig Clones Born*, BBC NEWS ONLINE, at <http://news.bbc.co.uk/1/hi/sci/tech/173870.stm> (last visited Oct. 25, 2003).

⁹² The pigs were created by PPL Therapeutics. *Id.*

⁹³ PPL says that it intends to use pigs as part of its program to seek a cure for human diabetes. *Id.*

⁹⁴ This sugar is a major cause as to why the human immune system rejects tissue from pigs. Richard Black, *Cloned Pigs Raise Transplant Hopes*, BBC NEWS ONLINE, at <http://news.bbc.co.uk/1/hi/sci/tech/2210306.stm> (last visited Oct. 25, 2003).

⁹⁵ A pig's heart is about the same size as a human heart and has about the same power output. *Id.*

Scientists have found success in growing new kidneys for cows. In February of 2002, Advanced Cell Technologies announced that it had used cells taken from cloned cow embryos to grow kidney-like organs. The organs function properly⁹⁸ and were not rejected⁹⁹ when implanted into adult cows. This success shows that therapeutic cloning really does work and has great potential.¹⁰⁰

Animal cloning holds great potential not only for disease treatments and organ transplantation but also for potentially saving endangered species and bringing back extinct species. In January of 2001, an ordinary Iowa milk cow gave birth to an endangered guar¹⁰¹ calf named Noah.¹⁰² Noah was the first successful interspecies clone.¹⁰³ However, his story did not have a happy ending. Noah died within 48 hours of birth.¹⁰⁴ In October of 2001, scientists in

⁹⁶ Dwayne Hunter, *Sudden Death of Pig Clones Raises Concerns*, BETTER HUMANS ONLINE, at <http://www.betterhumans.com/News/news.aspx?article ID=2003-08-28-4> (last visited Oct. 25, 2003).

⁹⁷ It is believed that therapeutic cloning to grow replacement human tissue should still be safe. *Id.*

⁹⁸ The kidneys function properly, at least to the extent that they can remove toxins from the body and produce urine. It is not known whether they can perform all of the other jobs the kidney is responsible for. Scott Gottlieb, *Building Brand New Kidneys*, THE SCIENTIST ONLINE, at <http://www.biomedcentral.com/news/20020213/04/> (last visited Oct. 25, 2003).

⁹⁹ The kidneys showed no signs of rejection after three months. John Travis, *Transplant Triumph: Cloned Cow Kidneys Thrive for Months*, SCIENCE NEWS, Vol. 161, June 8, 2002, at 356, 357.

¹⁰⁰ *Id.* at 356.

¹⁰¹ A guar (*Bos gaurus*) is a large oxen native to Nepal, India, Indochina and Southeast Asia. Guars are rare and only 36,000 animals are thought to remain in the wild. Guars are listed as an endangered species by the World Conservation Union. Robert P. Lanza, et al., *Cloning Noah's Ark*, SCIENTIFIC AMERICAN ONLINE (2000), at <http://www.sciam.com/article.cfm?articleID=0002AB9E-F4AA-1C72-9B81809EC588EF21> (last visited Oct. 25, 2003).

¹⁰² Stephen Mihm, *Cloning Endangered Species*, N.Y. TIMES, Dec. 9, 2001, § 6 (Magazine), at 60.

¹⁰³ *Id.* Noah was created from skin cells of a male guar, which had died eight years earlier, and fused into egg cells of common cows. 692 cloned eggs were created and Noah was the only live clone produced. *Endangered Animal Clone Dies*, BBC ONLINE, at <http://news/bbc.co.uk/1/hi/sci/tech/1113719.stm> (last visited Oct. 25, 2003).

¹⁰⁴ Noah's cause of death was common dysentery and researchers say that the problem was unlikely to be related to the cloning itself. *Id.*

Italy revealed the existence of a seven-month-old mouflon¹⁰⁵ clone. The mouflon was created out of the DNA of two female mouflons that died in a Sardinian wildlife refuge.¹⁰⁶ She is the first clone of an endangered mammal to survive past infancy.¹⁰⁷ In early 2004, Jahava¹⁰⁸, the first cloned animal, made his debut at the San Diego Zoo.¹⁰⁹ Scientists in China are hopeful that they will be able to successfully clone a giant panda. In 1999, they produced an embryo clone from the genetic material of a dead female panda and the egg cells of a white rabbit. The embryo was cultured for over ten months before an attempt at implantation.¹¹⁰ To date, a successful panda cloning has not been reported.

Whereas some people support the idea of cloning endangered species, others oppose it. The arguments against cloning to save a species range from lack of genetic diversity¹¹¹ to concerns that the animal will not be able to fit back into the ecosystem.¹¹²

In addition to the salvation of endangered species, there have been talks of cloning extinct animals. Advanced Cell Technologies announced in 2000 that it would clone the extinct

¹⁰⁵ A mouflon is an endangered wild sheep found on the islands of Sardinia, Corsica and Cyprus. Edward R. Winstead, *Endangered Wild Sheep Clone Reported to be Healthy*, GENOME NEWS NETWORK ONLINE, at http://gnn.tigr.org/articles/10_01/cloned_sheep.shtml (last visited Oct. 25, 2003).

¹⁰⁶ Her birth mother is a domestic ewe.

¹⁰⁷ *Id.*

¹⁰⁸ An 8-month old banteng cloned from skin cells of a male banteng. Associated Press, *Zoo to Take 1st Cloned Endangered Animal*, YAHOO NEWS ONLINE, at http://story.news.yahoo.com/news?tmpl=story&u=/ap/20040122/ap_on_sc/zoo_cloned_banteng_4 (last visited Feb. 1, 2004).

¹⁰⁹ *Id.*

¹¹⁰ *Panda Clone Could Save Species*, BBC NEWS ONLINE, at <http://news.bbc.co.uk/1/hi/sci/tech/374616.stm> (last visited Oct. 25, 2003).

¹¹¹ By producing a lot of animals that are identical inbreeding will eventually occur. Andy Coghlan, *Raising the Dead: Extinction Needn't Be the End of the Line*, NEW SCIENTIST, Vol. 168 No. 2260, Oct. 14, 2000, at 5.

¹¹² Mihm, *supra* note 102.

bucardo mountain goat.¹¹³ Even more unbelievable was the announcement by Russian and Japanese scientists that they planned to clone a mammoth.¹¹⁴ The scientists believe that they can resurrect extinct animals such as the mammoth and woolly rhinoceros.¹¹⁵ Whether an extinct creature, such as the mammoth or dinosaur,¹¹⁶ can actually be cloned is yet to be seen.

The advances in the technology of animal cloning were bound to lead to people wanting to clone their pets or prize animals. Since the announcement of Dolly's birth, people have been calling Texas A&M's College of Veterinary Medicine with hopes of duplicating their cats, dogs, horses, and cattle.¹¹⁷ In December of 2001, Texas A&M's College of Veterinary Medicine successfully produced a cloned cat named CC.¹¹⁸ CC was born as a result of a pet cloning project called Missyplicity.¹¹⁹ The birth of the first successful horse clone raised hopes that champion horses could be cloned.¹²⁰ Others have suggested that guide dogs should be cloned. However,

¹¹³ The burcardo mountain goat is native to Spain. The last surviving female was killed in January of 2000 when a tree fell on her. Coghlan, *supra* note 109.

¹¹⁴ Scientists have bone marrow, skin and muscle specimens from a mammoth that was discovered in 2002 in Russia's northern Yakutsk region. However, scientists say that because the DNA is 200,000 – 300,000 years old it may be damaged and not good enough for cloning. *Scientists 'to Clone Mammoth'*, BBC NEWS ONLINE, at <http://news.bbc.co.uk/2/hi/asia-pacific/3075381.stm> (last visited Oct. 25, 2003).

¹¹⁵ If successful, the plans are to create a prehistoric safari park in northern Siberia. *Id.*

¹¹⁶ It is likely that the DNA of dinosaurs is unsalvageable. Mihm, *supra* note 102.

¹¹⁷ Cathy Booth Thomas, *Copydog, Copycat*, TIME, Feb. 19, 2001, at 57.

¹¹⁸ CC is short for Copy Cat. Ursula Owre Masterson, *Cloning pets: In Search of Fluffy 2.0*, MSNBC NEWS ONLINE, at <http://msnbc.com/news/768368.asp?0cb=-41688446> (last visited Oct. 25, 2003).

¹¹⁹ The Missyplicity project is a multi-million dollar dog-cloning project funded by Genetic Savings and Clone. *Id.* Genetic Savings and Clone offers to freeze pet DNA for \$895 plus \$100 annual storage. Thomas, *supra* note 113.

¹²⁰ *World's Top Horses 'Could Be Cloned'*, BBC NEWS ONLINE, at http://news.bbc.co.uk/sport2/hi/other_sports/horse_racing/3132887.stm (last visited Oct. 25, 2003).

the director of the Roslin Institute states that cloning of assistance dogs is not a recommendable idea.¹²¹

The United Kingdom has very strict rules governing animal experimentation. The use of cloning to replace a dead or dying pet is considered unacceptable.¹²² The United States, on the other hand, leaves a large area of scientific research uncovered with its animal experimentation laws. It appears that in the United States the current animal experimentation laws could potentially govern cloning.¹²³ However, even if the legislation is interpreted to include cloning, most of the animals that are the subjects of cloning experimentations are not protected by current United States legislation.¹²⁴ The Humane Society of the United States has condemned all commercial cloning of companion animals.¹²⁵

IV. The Ultimate Question: Is Human Cloning Acceptable?: The Ethical, Religious, and Safety Issues Surrounding the Cloning Debate

Though animal cloning has shown significant advances and potential since the birth of Dolly in 1996, the ultimate question still remains: Is human cloning acceptable? This is not a question that has a clear answer. It is a debate fueled by ethics and religion.

¹²¹ Due to the costs of cloning, the failure rate and the uncertainty of the normality of cloned animals, cloning assistance dogs is unrealistic. Griffin, *supra* note 45.

¹²² *Id.*

¹²³ 7 U.S.C.S. § 2132 (2003).

¹²⁴ Subsection (g) of 7 U.S.C.S. §2132 defines the term animal. An animal is a “live or dead dog, cat, monkey (nonhuman primate mammal), guinea pig, hamster, rabbit, or such other warm-blooded animal, as the Secretary [Secretary of Agriculture, U.S. Department of Agriculture] may determine is being used, or is intended for use, for research, testing, experimentation, or exhibition purposes, or as a pet...” The definition goes on to state what animals are excluded from the definition of animal under the Act. Included in the exclusion are birds, rats, mice, horses, other farm animals (including sheep, pigs, and cows).

¹²⁵ Pet overpopulation is a significant problem and the Humane Society states that cloning pets has no social value and may lead to increased animal suffering. Masterson, *supra* note 116.

Immediately after Dolly's creation, Americans overwhelmingly disapproved of human cloning and cloning research in polls taken by ABC Nightline.¹²⁶ Opponents of human cloning argue that cloning a human is an innately unethical experiment on a human child.¹²⁷

One of the primary considerations in assessing the ethics of human cloning should be the interest of the potential child.¹²⁸ There are grave psychological concerns involving the cloned child.¹²⁹ It has been suggested that a cloned child would be no different than identical twins, as identical twins share the same genetic makeup. However, unlike identical twins, a clone would be a genetically identical copy of an existing human.¹³⁰ This has potential to make the child feel like it is not unique¹³¹ or pressured to be like the person from whom it was cloned.¹³² There is a concern that if the cloned child saw that it was likely to develop certain diseases or fail at certain tasks the child might be confined in its undertakings by what its clone-parent had done. The child's perception of self might be limited.¹³³

There is a fear that family relationships would be harmed. The traditional family unit might be very different if it included a cloned child. Consider these issues: How would the

¹²⁶ Paul Tully, Comment, *Dollywood Is Not Just a Theme Park in Tennessee Anymore: Unwarranted Prohibitory Human Cloning Legislation and Policy Guidelines For a Regulatory Approach to Cloning*, 31 J. MARSHALL L. REV. 1385, 1392 n. 43 (1998).

¹²⁷ *Id.* at 1393.

¹²⁸ Harry Griffin, *Cloning and Nuclear Transfer – On Proposals to Clone Humans*, Roslin Institute 1998) at <http://www.roslin.au.uk/public/01-10-98-ch.html> (last visited Oct. 25, 2003).

¹²⁹ Tully, *supra* note 124, at 1393.

¹³⁰ Griffin, *supra* note 126.

¹³¹ Tully, *supra* note 124, at 1393.

¹³² Children cloned as replacements for dead children or relatives or as copies of famous persons would have a significant amount of pressure and expectations placed upon them. Griffin, *supra* note 126.

father-daughter relationship work if the mother and daughter were genetically identical? Would the mother-daughter relationship be normal if the daughter were an identical copy of her mother?¹³⁴

Additionally, societal relationships could be changed.¹³⁵ It has been argued that human cloning violates dignity and makes humans into replaceable commodities.¹³⁶ Some people fear that clones will be seen as inferior to “real” people.¹³⁷ Allowing human embryos to be created to produce stem cells and then to be destroyed once their purpose has been served goes against the ethical principle that a human should never be treated as a means to an end.¹³⁸ To some, human cloning is viewed with repugnance because it seems to suggest Nazi-style eugenics. The worst scenario to many is that there is a “master race that is fit to be cloned and underlings who are not.”¹³⁹

Opponents of human cloning argue that cloning goes against the accepted standards for medical research.¹⁴⁰ The accepted standard for medical research is that all human subjects,

¹³³ American Medical Association, *Report of the Council on Ethical and Judicial Affairs of the American Medical Association* (June 1999), AMERICAN MEDICAL ASSOCIATION ONLINE, at <http://www.ama-assn.org/ama/upload/mm/369/report98.pdf> (last visited Oct. 25, 2003).

¹³⁴ *Id.*

¹³⁵ *Human Cloning: Is Making People Wrong?*, *supra* note 3.

¹³⁶ *Id.*

¹³⁷ *Id.*

¹³⁸ Colloquium, *Head-to-Head: Human Cloning*, BBC NEWS ONLINE (2000), at <http://news.bbc.co.uk/1/hi/sci/tech/882790.stm> (last visited Oct. 25, 2003).

¹³⁹ Fabien Novial, *Human Cloning Still Long Way Off: Experts*, ABC NEWS ONLINE (2003), at <http://www.abc.net.au/science/nes/stories/s858310.htm> (last visited Oct. 25, 2003).

¹⁴⁰ Dónal P. O’Mathúna, *What to Call Human Cloning*, EMBO Reports 3, 6, 502-505 (2002), available at EMBO REPORTS ONLINE, at <http://www.nature.com/cgi-taf/DynaPage.taf?file=embor/journal/v3/n6/full/embor136.html> (last visited Oct. 25, 2003).

especially those who cannot speak for themselves, should be treated with their best interests in mind. This standard should apply to unborn humans as well.¹⁴¹

Other arguments are based on the contention that it is ethically impermissible to allow human cloning because of the high risk of deformities.¹⁴² It is well known that animal cloning has had high rates of failure and abnormalities. In all likelihood, human cloning is bound to have similar problems. What will we do with the “mistakes”?¹⁴³ Many cloned animals are euthanized to prevent needless suffering. If cloned human babies suffer from similar abnormalities, would doctors euthanize them as well?

Another fear is the effect human cloning would have on the gene pool. Human cloning has potential to severely alter the gene pool if it was widespread and the cloned humans reproduced.¹⁴⁴ Genetic diversity could eventually decrease. Over time, the decrease in genetic diversity could potentially destroy the disease immunity and variation of talents that have helped the human species survive.¹⁴⁵

Therapeutic cloning raises serious ethical issues. There are some countries, such as Britain, that allow it but others, such as Italy, that do not.¹⁴⁶ One of the most significant points of controversy surrounding therapeutic cloning comes with the creation and destruction of the

¹⁴¹ *Id.*

¹⁴² Tully, *supra* note 124, at 1393.

¹⁴³ Symposium, *Cloning Sheep; Cloning Humans?: A Discussion By Scientists, Lawyers and Ethicists*, 1997 STAN. TECH. L. REV 2 (1997), at ¶ 81, available at <http://str.stanford.edu/STLR/Symposia/Cloning/> (last visited Oct. 25, 2003).

¹⁴⁴ American Medical Association, *Report of the Council on Ethical and Judicial Affairs of the American Medical Association*, June 1999, at <http://www.ama-assn.org/amal/upload/mm/369/report98.pdf> (last visited Oct. 25, 2003).

¹⁴⁵ *Id.*

¹⁴⁶ Alison Abbott, *Researchers Divided Over Ethics of a Ban on Cloning*, NATURE, Vol. 423, No. 6938, May 22, 2003, at 373.

embryo. Some people see human embryos as alive because, if allowed to, they can develop into human beings.¹⁴⁷

At what point, after conception/creation, does the embryo have equal rights with a person? Catholics see this as happening at the moment of conception.¹⁴⁸ Eastern philosophers do not assign the rights until the moment of birth.¹⁴⁹ Most Muslims and Jews also do not consider a fertilized embryo to have full human status.¹⁵⁰ The United States has addressed this issue in the context of abortion. In *Roe v. Wade*,¹⁵¹ the United States Supreme Court refused to directly address the issue of when a fetus has equal rights with a human being. The court stated, “[w]e need not resolve the difficult question of when life begins.”¹⁵² However, the court did address the issue that there has historically been strong support for the view that life begins at birth.¹⁵³ A later United States Supreme Court case, *Thornburgh v. American College of Obstetricians and Gynecologists*,¹⁵⁴ stated that there is a fundamental and well-recognized difference between a fetus and a human.¹⁵⁵

¹⁴⁷ O’Mathúna, *supra* note 138.

¹⁴⁸ Abbott, *supra* note 144.

¹⁴⁹ *Id.*

¹⁵⁰ Bob Sullivan, *Religions Reveal Little Consensus on Cloning*, MSNBC ONLINE, at <http://www.msnbc.com/news/768367.asp?0cb=-51688446> (last visited Oct. 25, 2003).

¹⁵¹ 410 U.S. 113 (1973).

¹⁵² *Id.* at 159.

¹⁵³ *Id.* at 160.

¹⁵⁴ 476 U.S. 747 (1986).

¹⁵⁵ *Id.* at 778-779

Pro-life organizations, such as the American Life League, are opposed to any form of cloning. Likewise, the Catholic Church is opposed to any form of cloning.¹⁵⁶ Other faiths have found room for therapeutic cloning.¹⁵⁷ Jewish law supports medical research that has the potential to save and preserve life. As a result, Jewish scholars support therapeutic cloning.¹⁵⁸ Regarding therapeutic cloning, the American Life League stated that the creation of a cloned human embryo and its destruction were two separate evils.¹⁵⁹ Religious arguments are supported by the belief that even before birth an embryo is a human life¹⁶⁰ and that harm to the embryo is a sin.¹⁶¹ Many religious concerns center around “playing God.” One of the most fundamental questions on the religious side of the debate is whether cloning meddles with God’s universe in a way that humans should not.¹⁶²

Where to draw the line in deciding to allow human cloning is a tough moral and ethical question. If therapeutic cloning research is completely forbidden, one of the most promising frontiers in medicine is obliterated. If therapeutic cloning is allowed, there is potential to start down a slippery slope leading to the creation of humans.¹⁶³ Most people agree that, on a moral

¹⁵⁶ The church has the position that a human embryo is a human life and that cloning in any form is creating a human life. *Row Over Human Cloning Plans*, BBC NEWS ONLINE (2000), at <http://news.bbc.co.uk/1/hi/sci/tech/858308.stm> (last visited Oct. 25, 2003).

¹⁵⁷ Sullivan, *supra* note 148.

¹⁵⁸ *Id.*

¹⁵⁹ John Cavanaugh-O’Keefe of the American Life League stated that allowing therapeutic cloning was in essence stating, “it is O.K. to clone as long as you kill.” Christine Gorman, *To Ban or Not to Ban?* TIME, June 16, 1997, at 66.

¹⁶⁰ “When I was woven together in the depths of the earth, your eyes saw my unformed body. All the days ordained for me were written in your book before one of them came to be.” *Psalms* 139:15-16.

¹⁶¹ “If men who are fighting hit a pregnant woman and she gives birth prematurely . . . if there is serious injury, you are to take life for life . . .” *Exodus* 21:22-25.

¹⁶² Sullivan, *supra* note 148.

scale, research on adult stem cells is the most acceptable, followed by research on discarded embryos, therapeutic cloning, cloning to destroy, designer babies and finally as the least acceptable, human cloning.¹⁶⁴

Supporters of cloning suggest that, despite the ethical questions that surround cloning, it should be continued. They see cloning as the key to the treatment and eventual cure of many of the ailments suffered in today's society. Therapeutic cloning would not mean that humans were being cloned. Tissue of an embryonic nature would be derived and cell lines that would help human disease would be grown. In therapeutic cloning, there is no intention¹⁶⁵ to clone human embryos.¹⁶⁶ Supporters argue that even if human cloning fails to produce great benefits, it is unlikely to do any serious harm.¹⁶⁷

Reproductive cloning is seen as the door to a new, unusual, but possibly effective treatment for infertility. Cloning would enable those unable to pass on genes to future generations to do so in a manner that is analogous to the familial linkage of twins.¹⁶⁸ Extreme proponents of human cloning have gone as far as to claim that human babies have already been cloned.¹⁶⁹ The alleged first human clone baby, Eve, was born in an undisclosed location on

¹⁶³ Nancy Gibbs, *Cloning: Where Do You Draw The Line?*, TIME, Aug. 13, 2001, at 18, 19.

¹⁶⁴ *Id.* at 18-19.

¹⁶⁵ At the present time, there is also no ability to clone humans.

¹⁶⁶ UK to 'Approve Therapeutic Cloning', BBC NEWS ONLINE (2000) at <http://news.bbc.co.uk/1/hi/sci/tech/699627.stm> (last visited Oct. 25, 2003).

¹⁶⁷ *Human Cloning: Is Making People Wrong?*, *supra* note 3.

¹⁶⁸ Glenn McGee, *Primer on Ethics and Human Cloning*, BIOSCIENCE PRODUCTIONS, INC. ONLINE (2001), at <http://www.actionbioscience.org/biotech/mcgee.html> (last visited Oct. 25, 2003).

¹⁶⁹ CLONAIID was founded in February 1997, by Raël, the leader of the Raelian Movement. CLONAIID claims to have produced the first human clone. CLONAIID.COM (2003), at <http://www.clonaid.com/index.html> (last visited Oct. 25, 2003).

December 26, 2002.¹⁷⁰ However, despite the claims of successful human clone births, no proof or DNA tests have been offered to confirm the claims.¹⁷¹ Panayiotis Zavos, a Kentucky based researcher, has been experimenting with human DNA and cow eggs.¹⁷² Zavos claims a 40 percent success rate and that he successfully created over 200 human-cow embryos.¹⁷³ He claims to have implanted a cloned embryo in a woman's uterus in early 2004.¹⁷⁴

However passionate the debate surrounding religion and ethics is, it should be secondary to the problems surrounding safety and technical aspects of human reproductive cloning. There are practical problems as to why cloning a human would not be easy. The chances of establishing a successful pregnancy from a cloned human embryo are between three and ten fold lower than in sheep.¹⁷⁵ The risk goes beyond the lack of pregnancy. Of the three cloning experiments carried out at the Roslin Institute, several lambs died late in pregnancy or soon after birth. Even if a cloned human baby appeared normal, it may carry a hidden genetic legacy that could result in a shortened lifespan or an increased chance of cancer.¹⁷⁶ In May of 2003, at a conference in Berlin, Germany, science experts stated that human cloning is theoretically

¹⁷⁰ CLONAIID.COM (2003), at <http://www.clonaid.com/english/pages/news.html> (last visited Oct. 25, 2003).

¹⁷¹ Novial, *supra* note 137

¹⁷² Mike Wendling, *Kentucky Doctor Makes New Clone Claim*, CROSSWALK.COM (2003), at <http://www.crosswalk.com/news/1220262.html> (last visited Oct. 25, 2003).

¹⁷³ Putting DNA into the cow eggs is not creating humans; the cow eggs were only used to lead to experiments using human eggs. *Id.*

¹⁷⁴ Associated Press, *US Doctor Claims to Have Implanted Cloned Human Embryo*, YAHOO NEWS ONLINE, at http://story.news.yahoo.com/news?tmpl=story&u=/afp/20040119/hl_afp/britain_us_health_clone_040119205030 (last visited Feb. 1, 2004).

¹⁷⁵ Griffin, *supra* note 126.

¹⁷⁶ *Id.*

possible but is still a long way off.¹⁷⁷ Harry Griffin, of the Roslin Institute, stated, “[i]t has not been proved that a human clone could, at the moment, pass beyond the stage of six cells.”¹⁷⁸

Cloning humans, even if possible, is inherently unsafe. Due to the safety issues, scientists should not condone human reproductive cloning, even without consideration of the serious and important ethical, moral, and religious concerns.¹⁷⁹

In addition to creating public outrage, reproductive human cloning failures could potentially encumber science and genetics. Research in areas such as embryonic stem cells for the repair of organs and tissues could be negatively impacted. Therapeutic cloning has vast potential benefits. Research with reproductive human cloning should not put this in jeopardy.¹⁸⁰

V. The Clone War Has Begun: Legislative Responses in the United States, the United Kingdom, and International Organizations to the Possibility of Human Cloning

A. United States

The United States has been deliberate in the process of developing a legislative response to the possibility of human cloning. The individual states have already begun enacting legislation. The federal government is yet to follow the lead taken by the states. Presidents Clinton and Bush both have made statements and taken action regarding human cloning. As with all controversial issues, there have been questions about the Constitutionality of regulating or banning cloning.

1. Individual States

¹⁷⁷ Novial, *supra* note 137.

¹⁷⁸ *Id.*

¹⁷⁹ Rhind, *supra* note 7.

¹⁸⁰ American Medical Association, *Why We Should Not Clone Humans*, AMERICAN MEDICAL ASSOCIATION ONLINE (2003), at <http://www.ama-assn.org/ama/pub/category/4560.html> (last visited Oct. 25, 2003).

To date, eight states¹⁸¹ have passed legislation pertaining to human cloning.¹⁸² In 1997, California was the first U.S. state to address the issue.¹⁸³ The most recent state to address the issue of human cloning with legislation was North Dakota in 2003.¹⁸⁴ As of July 2003, Louisiana's law expired.¹⁸⁵ Twenty-eight states¹⁸⁶ have laws governing embryonic and fetal research.¹⁸⁷ As of September 2003, sixty-nine bills addressing human cloning have been introduced by the state legislatures of twenty-eight states.¹⁸⁸ The cloning laws of the eight states are all similar to one another; all ban reproductive cloning and impose rather stiff penalties¹⁸⁹ for

¹⁸¹ The states having enacted laws pertaining to human cloning are: Arkansas, California, Iowa, Louisiana, Michigan, North Dakota, Rhode Island and Virginia.

¹⁸² *State Human Cloning Laws*, National Conference of State Legislatures (2003), at <http://www.ncsl.org/programs/health/genetics/rt-shcl.htm> (last visited Oct. 25, 2003).

¹⁸³ *Id.*

¹⁸⁴ *Id.*

¹⁸⁵ *Id.*

¹⁸⁶ The states having enacted legislation regarding embryonic and fetal research are: Arizona, Arkansas, California, Florida, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Dakota, Tennessee, Texas, Utah, Virginia, and Wyoming. *State Embryonic and Fetal Research Laws*, National Conference of State Legislatures (2003), at <http://www.ncsl.org/programs/health/genetics/embfet.htm> (last visited Oct. 25, 2003).

¹⁸⁷ *Id.*

¹⁸⁸ The states having introduced bills are: Alabama, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Missouri, Nebraska, New Jersey, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin. *2003 Legislative Activity Human Cloning*, National Conference of State Legislatures (2003), at <http://www.ncsl.org/programs/health/Genetics/03clone.htm> (last visited Oct. 25, 2003).

¹⁸⁹ Violators of MCLS § 333.26401 – 333.26406 are subject to a civil fine of \$10,000,000.00. MICH. COMP. LAWS §§ 333.26401 – 333.26406 (2003). MCLS § 333.16275 provides penalties for cloning performed by licensees or registrants under the public health code. The penalty is a civil fine of \$10,000,000.00, just as in MCLS § 333.26406. MICH. COMP. LAWS § 333.16275 (2003). In Iowa, violators of subsection 1, paragraph “a” or “b” of § 707B.4 are guilty of a class “C” felony; violators of subsection 1, paragraph “c” or “d” are guilty of an aggravated misdemeanor. Any person who violates § 707B.4 of the Iowa code in a manner that results in a pecuniary gain to the person is subject to a civil penalty in an amount twice the amount of the gross gain. IOWA CODE § 707B.4 (4) (2003). A person who violates Iowa Code § 707B.4 and is licensed pursuant to chapter 148, 150 or 150A is subject

violators. Iowa¹⁹⁰ and Michigan¹⁹¹ have extended the ban on cloning to cover therapeutic cloning as well as reproductive cloning.¹⁹² Arkansas,¹⁹³ California,¹⁹⁴ Louisiana,¹⁹⁵ North Dakota,¹⁹⁶ Rhode Island,¹⁹⁷ and Virginia¹⁹⁸ have limited their bans to reproductive cloning.

to revocation of that person's license. IOWA CODE § 707B.4 (2003). Violators of subdivision (a)(1) or (a)(2) of the Arkansas legislation are guilty of a class C felony. Violators of subdivision (a)(3) or (a)(4) are guilty of a class A misdemeanor. In addition to criminal penalties, any person who violates this legislation is subject to a civil fine of not less than \$250,000.00 or twice the amount of any pecuniary gain, whichever is greater. ARK. CODE ANN. § 20-16-1002 (2003). In California corporations, firms, hospitals, laboratories, or research facilities the maximum penalty is one million dollars or the amount specified under subdivision (c) (if a pecuniary gain is derived, the civil penalty may not exceed the amount of the gross gain multiplied by two). Individuals, employees of the firm, clinic, hospital, laboratory, or research facility acting without authorization are subject to a maximum civil penalty of \$250,000.00 or the amount specified under subdivision (c). CAL. HEALTH & SAFETY CODE § 24187 (2003). Pursuant to the expired Louisiana law, violators were subject to a maximum fine of ten million dollars or imprisonment, with or without hard labor, for a maximum of ten years or both. LA. REV. STAT. ANN. § 40:1299-36.2 (D) (2003). Additionally, administrative penalties may be applied for violation of R.S. 40:1299.36.2. For corporations, firms, hospitals, laboratories, or research facilities the maximum penalty is ten million dollars or the amount specified under Subsection B (if a pecuniary gain is derived from violation of R.S. 40:1299.36.2, the civil penalty may not exceed the amount of the gross gain multiplied by two). If the violator is an individual, the penalty cannot exceed five million dollars or the amount specified under Subsection B. All administrative penalties should be distributed into the state treasury. LA. REV. STAT. ANN. 40:1299-36.3 (2003). R.S. 40:1299.36.4 governs unprofessional conduct. Pursuant to R.S. 40:1299.36.4 human cloning constitutes unprofessional conduct and results in permanent revocation of each license issues pursuant to R.S. 37:1261 *et seq.* The basis for disciplinary action shall be deemed appropriate by the Louisiana State Board of Medical Examiners. LA. REV. STAT. ANN. 40:1299.36.4 (2003). Violators of subdivision a or b of subsection 1 are guilty of a class C felony. Violators of subdivision c or d of subsection 1 are guilty of a class A misdemeanor. N.D. CENT. CODE § 12.1-39-02 (2003). In Rhode Island corporations, firms, hospitals, laboratories, or research facilities the maximum penalty is one million dollars or the amount specified under subdivision (a)(3) (if a pecuniary gain is derived from violation, the civil penalty may not exceed the amount of the gross gain multiplied by two). Individuals, employees of the firm, clinic, hospital, laboratory, or research facility acting without authorization are subject to a maximum civil penalty of \$250,000.00 or the amount specified under subdivision (a)(3). R.I. GEN. LAWS §§ 23-16.4-1- 4-4 (2002). Virginia's penalties are \$50,000.00 for each incident of cloning, in addition to any other penalty provided by law. VA. CODE ANN. § 32.1-162.22 (2003).

¹⁹⁰ Section 707B.2 states "It is the purpose of this chapter to prohibit human cloning for any purpose, whether for reproductive cloning **or** therapeutic cloning" (emphasis added). Human cloning is defined by the Iowa Act in Section 707B.3 as human asexual reproduction that is accomplished by introducing the genetic material of a human somatic cell (a cell having a complete set of chromosomes obtained from a living or deceased human organism at any stage of development) into a fertilized or unfertilized oocyte whose nucleus has been or will be removed or inactivated, in order to produce a living organism with a human or predominately human genetic constitution. The Iowa law prohibits performing or attempting to perform human cloning (§ 707B.4 (1)(a)); participating in performing or in an attempt to perform human cloning (§ 707B.4 (1)(b)); transfer or receipt of a cloned human embryo for **any** purpose (§ 707B.4 (1)(c)); transfer or receipt, in whole or in part, any oocyte, human embryo, fetus or human somatic cell for the purpose of human cloning (§ 707B.4 (1)(d)). (emphasis added). IOWA CODE §§ 707B.1 – 707B.4 (2003).

¹⁹¹ Michigan's *The Human Cloning Funding Prohibition Act* can be found at MCLS §§ 333.26401 – 333.26406. The Act became effective on June 4, 1998. The Act prohibits the use of state funds to engage in or attempt to engage in human cloning. The law does not restrict the use of state funds for scientific research or cell-based therapies not relating to cloning. MICH. COMP. LAWS § 333.16274 (2003) contains the definition of human cloning

2. Federal Government

as used in MCLS §§ 333.26401 – 333.26406. Pursuant to MCLS § 333.16274, human cloning means the use of human somatic cell nuclear transfer technology to produce a human embryo. This statute provides no distinction between cloning for the purpose of reproduction and for therapeutic purposes. MICH. COMP. LAWS §§ 333.26401 – 333.26406 (2003).

¹⁹² *State Human Cloning Laws, supra* note 178.

¹⁹³ Arkansas defines human cloning as “asexual reproduction, accomplished by introducing the genetic material from one (1) or more human somatic cells into a fertilized or unfertilized oocyte whose nuclear material has been removed or inactivated so as to produce a living organism, at any stage of development, that is genetically virtually identical to an existing or previously existing human organism.” The Arkansas law prohibits any person or entity, private or public, from performing or attempting to perform human cloning as well as participation in an attempt to perform human cloning. Further, the law prohibits shipping, transferring or receiving an embryo produced by human cloning or any oocyte, embryo, fetus or human somatic cell for the purpose of human cloning. This law does not restrict research in the use of nuclear transfer or other cloning techniques to produce molecules, DNA, cells other than human embryos, tissues, organs, plants or nonhuman animals. ARK. CODE ANN. § 20-16-1001 (2003).

¹⁹⁴ California has placed its cloning regulations into two different sections of the state code. Two provisions are contained in the Business and Professions Code. CAL BUS. & PROF. CODE § 16004 (2003); CAL BUS. & PROF. CODE § 16105 (2003). The other provisions pertaining to cloning are contained in the Health and Safety Code. CAL. HEALTH & SAFETY CODE § 24185 (2003); CAL. HEALTH & SAFETY CODE § 24187 (2003).

¹⁹⁵ Louisiana defines cloning as the practice of creating or attempting to create a human being by transferring the nucleus from any human cell into a denucleated human egg for the purpose of or to implant the resulting product to initiate a pregnancy that could result in the birth of a human being. Louisiana forbids the use of state funds for reproductive cloning. A health facility or agency shall not be used to clone humans for reproductive cloning. The law expired on July 1, 2003. LA. REV. STAT. ANN. § 40:1299:36.1 – 36.6 (2003).

¹⁹⁶ The governor of North Dakota approved the bill on April 7, 2003. Human cloning is defined as human asexual reproduction which is accomplished by introducing the genetic material of a human somatic cell into a fertilized or unfertilized oocyte with the nucleus removed, to produce a living organism with a human or predominately human genetic composition. Performing or attempting to perform human cloning is forbidden, as is participation in human cloning attempts, transfer or receipt of the product of human cloning, and transfer or receipt of any oocyte, human embryo, fetus or somatic cell for the purpose of cloning. North Dakota is not limiting scientific research in the use of nuclear transfer or other cloning techniques to produce molecules, DNA, cells other than human embryos, tissues, organs, plants or nonhuman animals. N.D. CENT. CODE §§ 12.1-39-01 – 12.1-39-02 (2003).

¹⁹⁷ The purpose of the legislation in Rhode Island is to ban the creating of a human through cloning and to protect the citizens of the state from abuse of cloning technologies. The ban does not cover the cloning of human cells, genes, tissues, or organs that would not result in the creation of an entire human being. The law will expire on July 7, 2010. R.I. GEN. LAWS §§ 23-16.4-1 – 4-4 (2002).

¹⁹⁸ Virginia defines human cloning as the creating or attempted creation of a human being by transferring the nucleus of a human cell into an oocyte with the nucleus removed. The law forbids human cloning, implantation or attempted implantation of the product of somatic cell nuclear transfer to initiate pregnancy, possessing the product of human cloning, and shipping or receiving the product for the purpose of implanting to initiate pregnancy. The law does not restrict biomedical research, including: cloning to create molecules, including DNA, cells or tissues, gene therapy, or cloning to create non-human animals. VA. CODE ANN. §§ 32.1-162.21-22 (2003).

As of 2003, no federal legislation has yet been passed regulating human cloning. However, it has been suggested that the federal law that requires clinics using assisted reproductive techniques to be monitored also applies to human cloning.¹⁹⁹ In response to the announcement of Dolly's birth in 1997, President Bill Clinton enacted a ban on the use of federal funds for cloning research.²⁰⁰ President George W. Bush has kept this ban in place. In 1998, the FDA claimed jurisdiction over cloning in the United States. The House of Representatives has passed bills on the subject of human cloning. Two of the most notable House bills are from 2001 and 2003. However, neither bill was passed by the Senate and thus did not become law. The Senate has also introduced cloning bills but has not yet passed such a bill. In 1997, at the request of President Clinton, the National Bioethics Advisory Commission developed a report and recommendations on human cloning in the United States. In 2002, President Bush established the President's Council on Bioethics which produced a report and recommendations.²⁰¹

a. Food and Drug Administration

In January of 1998, the United States Food and Drug Administration announced that it had the authority to regulate human cloning.²⁰² The FDA has the authority to regulate human cloning under the Food, Drug, and Cosmetic Act.²⁰³ The authority of the FDA does not address

¹⁹⁹ National Bioethics Advisory Commission, *Cloning Human Beings* (1997), at p. 88.

²⁰⁰ *Id.* at i.

²⁰¹ The 2002 report and recommendations was titled *Human Cloning and Human Dignity: An Ethical Inquiry*.

²⁰² FDA 'Has The Power to Police Human Cloning Experiments', *NATURE* Vol. 391, No. 6665, Jan. 22, 1998, at 318.

whether reproductive human cloning should be completely prohibited. It does, however, allow the FDA to ensure that human reproductive cloning experimentation does not proceed before basic safety questions are answered.²⁰⁴

In late October of 2003, the FDA addressed the issue of using meat and milk from cloned animals for human consumption. On October 31, 2003, the FDA released a summary of findings on the safety of meat and milk from cloned animals.²⁰⁵ In a draft Executive Summary written on October 21, 2003, the FDA found that meat and milk from cloned animals is “likely to be safe” for human consumption.²⁰⁶ This finding is based on studies that have shown that as cloned animals grow and develop, they appear to become as healthy as non-cloned animals.²⁰⁷ Meat and milk from malformed, diseased, and otherwise unhealthy animals could not enter the food supply. The FDA has little information on the composition of meat and milk from cloned animals. There are very few cow clones that are old enough to have been bred, given birth, and begun lactating. There has been one study that focused on the composition of milk from cow clones. There have been no studies on the composition of meat from cloned animals.²⁰⁸ It does not appear that healthy clones or their offspring pose increased risks to humans due to consumption of food derived from them. However, the FDA noted that additional data on the health status of offspring and the composition of meat and milk from clones and their offspring

²⁰³ 21 U.S.C. 301 et seq.

²⁰⁴ Richard A. Merrill and Bryan J. Rose, *FDA Regulation of Human Cloning: Usurpation or Statesmanship?*, 15 HARV. J. L. & TECH. 85, 99-100 (2001).

²⁰⁵ *US ‘Will Rule Cloned Food Safe’*, BBC NEWS ONLINE, at <http://news.bbc.co.uk/2/hi/americans/3229941.stm> (last visited Nov. 2, 2003).

²⁰⁶ Food and Drug Administration, *Draft Executive Summary: Animal Cloning: A Risk Assessment* (2003), p. 3, available at <http://www.fda.gov/cvm/index/cloning/CLRAES.doc> (last visited Nov. 2, 2003).

²⁰⁷ *Id.* at 5.

²⁰⁸ *Id.* at 6.

would increase the reliability of these conclusions.²⁰⁹ These findings do not mean that cloned animals will be entering the food supply any time soon. A final decision on the consumption of products from cloned animals may take another year. Currently the food industry observes a voluntary moratorium on selling products from cloned animals. This moratorium is expected to stay in place until a final FDA ruling.²¹⁰

b. Human Cloning Prohibition Act of 2001

In 2001, House Resolution 2505 was passed in the United States House of Representatives. This resolution is known as the Human Cloning Prohibition Act of 2001.²¹¹ The Act proposed to add a section at the end of the Federal Food, Drug, and Cosmetic Act. The new section would be entitled Chapter X – Human Cloning.

The proposed amendment would define human somatic cell nuclear transfer technology as the transfer of the nuclear material of a human somatic cell into an egg cell from which the nucleus has been removed or rendered inert.²¹² The general purpose of the Act is to make it unlawful for any person to attempt to use Cell Nuclear Transfer for the purpose of initiating a pregnancy.²¹³

The proposal of House Resolution 2505 does not apply to therapeutic cloning. The resolution expressly states that it may not be construed as applying to “use of somatic cell

²⁰⁹ *Id.* at 11.

²¹⁰ *US ‘Will Rule Cloned Food Safe’, supra* note 202.

²¹¹ H.R. 2505, 107th Cong., 147 CONG. REC. 109 (2001).

²¹² Proposed amendment to 21 U.S.C. 301 § 1001 (2). *Id.*

²¹³ “It shall be unlawful for any person – (A) to use or attempt to use human somatic cell nuclear transfer technology, or the product of such technology, to initiate a pregnancy or with the intent to initiate a pregnancy; or (B) to ship, mail, transport, or receive the product of such technology knowing that the product is intended to be used to initiate a pregnancy.” Proposed amendment to 21 U.S.C. 301 § 1001(1)(A)-(B). *Id.*

nuclear transfer technology to clone molecules, DNA, cells or tissues.”²¹⁴ Further, the proposal does not prohibit the cloning of nonhuman animals.²¹⁵

If this resolution had become law, it would have superseded any state or local law pertaining to human cloning. However, the Senate failed to pass the resolution and thus it did not become law.

c. United States Senate 2001

On December 4, 2001, the United States Senate held a special hearing on the subject of human cloning. This hearing reconfirmed that human cloning was a critical issue and needed to be considered.

Senator Harkin addressed the potential benefits of therapeutic cloning to produce stem cells. He voiced his concern that human cloning and stem cell research were not distinguished from one another.²¹⁶ Senator Harkin announced that he would introduce legislation that would ban human cloning and impose strict civil and criminal penalties for any misuse of cloning for research and cloning to produce a human.²¹⁷

Senator Specter addressed his concern that the name “cloning” has been attached to therapeutic cloning, which holds significant potential. He also stated that there is no doubt that reproductive cloning to create a human being is revolting.²¹⁸ He stated that he felt it was obvious

²¹⁴ Proposed amendment to 21 U.S.C. 301 § 1001 (b)(1). *Id.*

²¹⁵ Proposed amendment to 21 U.S.C. 301 § 1001 (b)(4). *Id.*

²¹⁶ S. Subcommittee on Labor, Health and Human Services, And Education, And Related Agencies *Cloning 2001*, at 1 (2001), available at <http://www.access.gpo.gov/congress/senate> (last visited Oct. 26, 2003).

²¹⁷ *Id.*

²¹⁸ *Id.* at 2.

that legislation banning human reproductive cloning could be passed without also banning therapeutic cloning.

Senator Brownback supports research on stem cells and therapeutic cloning. Further, he stated that the issue of human cloning deserves “considerable pause”.²¹⁹ Senator Brownback proposed a six-month moratorium on cloning so that the Senate could sort through the historic questions concerning humanity and cloning.²²⁰ Mr. Brownback encouraged the Senate to call up House Resolution 2505.

At the end of the 2001 session of the United States Senate, no legislation was enacted governing human cloning.

d. United States Senate 2002

On January 24, 2002 and March 12, 2002, the United States Senate once again held special hearings on the subject of human cloning.²²¹ At the January 24, 2002 hearing, Senator Harkin again emphasized the potential benefits that could come from therapeutic cloning. He announced that he along with Senator Specter and other Senators would introduce legislation to ban human cloning and impose substantial civil and criminal penalties on violators. The proposed legislation would not affect the potentially life-saving medical research of therapeutic cloning.²²²

In both the January 24, 2002 and March 12, 2002 hearings, Senator Specter reemphasized the importance of therapeutic cloning and stem cell research.²²³ He also stated that he felt that

²¹⁹ *Id.* at 4.

²²⁰ *Id.* at 5.

²²¹ S. Subcommittee on Labor, Health and Human Services, And Education, And Related Agencies, *Cloning 2002* (2002), available at <http://www.access.gpo.gov/congress/senate> (last visited Oct. 26, 2003).

²²² *Id.* at 1-2.

Federal funding should be available for stem cell research even if cloning is used as a part of that research.²²⁴

Throughout the hearings, the benefits of stem cell research and therapeutic cloning were discussed, as well as the ethical and scientific concerns surrounding therapeutic cloning. The theme of the hearing was that therapeutic cloning was suffering, as it was not commonly differentiated from reproductive cloning.²²⁵ Additionally, the significant problems entailed by human reproductive cloning were repeatedly mentioned.²²⁶

Yet again, the Senate did not pass any legislation pertaining to human cloning at the close of the 2002 session. Five years after the announcement of the birth of Dolly, the United States still remained without cloning legislation.

e. Human Cloning Prohibition Act of 2003

In 2003, the United States House of Representatives passed House Resolution 534. This resolution was known as the Human Cloning Prohibition Act of 2003. The Resolution was virtually identical to House Resolution 2505 passed by the House of Representatives in 2001. As with H.R. 2505, the act proposed to add a section²²⁷ at the end of the Federal Food, Drug, and Cosmetic Act.²²⁸

²²³ *Id.* at 2.

²²⁴ *Id.* at 3.

²²⁵ *Id.* at 11.

²²⁶ *Id.* at 28.

²²⁷ As in H.R. 2505, this section would be entitled Chapter X – Human Cloning.

Further, the 2003 proposed amendment also would define human somatic cell nuclear transfer technology as the transfer of the nuclear material of a human somatic cell into an egg cell from which the nucleus has been removed or rendered inert.²²⁹ The general purpose of the Act is to make it unlawful for any person to attempt to use CNT for the purpose of initiating a pregnancy.²³⁰

The proposal of House Resolution 534, like House Resolution 2505, does not apply to therapeutic cloning. The resolution expressly states that it may not be construed as applying to “use of somatic cell nuclear transfer technology to clone molecules, DNA, cells or tissues.”²³¹ Further, the proposal does not prohibit the cloning of nonhuman animals.²³²

The Senate received and reviewed House Resolution 534 for the first time in February of 2003. In March of 2003, the resolution was read a second time and placed on the calendar. No further action has been taken on this resolution.²³³

f. Senate Bill 245

In January of 2003, a bill was introduced in the United States Senate that would prohibit human cloning. Senate Bill 245 was very similar to House Resolution 534. The proposed bill

²²⁸ 21 U.S.C. 301 et seq.

²²⁹ Proposed amendment to 21 U.S.C. 301 § 1001 (2). H.R. 534, 108th Cong., 149 CONG. REC. 32 (2003).

²³⁰ “It shall be unlawful for any person – (A) to use or attempt to use human somatic cell nuclear transfer technology, or the product of such technology, to initiate a pregnancy or with the intent to initiate a pregnancy; or (B) to ship, mail, transport, or receive the product of such technology knowing that the product is intended to be used to initiate a pregnancy.” Proposed amendment to 21 U.S.C. 301 § 1001(1)(A)-(B). *Id.*

²³¹ Proposed amendment to 21 U.S.C. 301 § 1001 (b)(1). *Id.*

²³² Proposed amendment to 21 U.S.C. 301 § 1001 (b)(4). *Id.*

²³³ *Id.*

did not affect therapeutic cloning for scientific research,²³⁴ but banned reproductive human cloning. Human cloning was defined²³⁵ in greater detail in the Senate Bill than in the House Resolution. No action has been taken on this bill since it was introduced January 29, 2003.

g. Senate Bill 303

The Senate introduced Bill 303 in February of 2003. The Bill is known as the Human Cloning Ban and Stem Cell Research Protection Act of 2003. The purpose of Senate Bill 303 is to prohibit human cloning while protecting stem cell research. This bill defines human cloning in a more restrictive manner than Senate Bill 245. Human cloning is defined as “implanting or attempting to implant the product of nuclear transplantation into a uterus or the functional equivalent of a uterus.”²³⁶ The bill lays out ethical requirements for nuclear transplantation research. It implements a fourteen-day, from the first cell division, limit on the use of unfertilized blastocysts.²³⁷

h. National Bioethics Advisory Commission

On February 24, 1997, President Bill Clinton asked the National Bioethics Advisory Commission to formulate a report on the legal and ethical issues associated with the use of cloning technologies and recommendations on possible federal actions to prevent the abuse of

²³⁴ Including research in the use of nuclear transfer or other cloning techniques to produce molecules, DNA, cells other than human embryos, tissues, organs, plants, or nonhuman animals. Proposed amendment to Part H of title IV of 42 U.S.C. 289 et. seq. § 489 (e). S. 245, 108th Cong, *available at* <http://thomas.loc.gov> (last visited Nov. 6, 2003); 149 CONG. REC. 16 (2003).

²³⁵ “[H]uman asexual reproduction, accomplished by introducing nuclear material from one or more human somatic cells into a fertilized or unfertilized oocyte whose nuclear material has been removed or inactivated so as to produce a living organism (at any stage of development) that is genetically virtually identical to an existing or previously existing human organism.” Proposed amendment to Part H of title IV of 42 U.S.C. 289 et. seq. § 489 (a)(1). *Id.*

²³⁶ Proposed amendment to Title 18 of the United States Code to be placed after Chapter 15 § 301 (a)(1). S. 303, 108th Cong, *available at* <http://thomas.loc.gov> (last visited Nov. 6, 2003); 149 CONG. REC. 21 (2003).

²³⁷ Proposed section 499A of 42 U.S.C. 281 et seq. *Id.*

the technology.²³⁸ In reaching its conclusion, the National Bioethics Commission evaluated religious, moral, ethical, scientific, and Constitutional concerns.

The Commission ultimately concluded that at the time of the report it was morally unacceptable for anyone to attempt to create a child using cloning technologies.²³⁹ The Commission recommended that the moratorium on the use of federal funds for cloning research be continued and that scientific and professional societies should make it clear that cloning to produce a child would be irresponsible, unethical, and unprofessional.²⁴⁰ The Commission went on to recommend that a sunset clause of three to five years be placed on any legislation banning human cloning so that reevaluation could occur. The Commission also recommended that no new regulations be implemented regarding the cloning of human DNA or cell lines.²⁴¹

i. President's Council on Bioethics

On November 28, 2001, President George W. Bush created the President's Council on Bioethics.²⁴² The first topic of inquiry of the President's Council on Bioethics was human cloning. On July 10, 2002, the Council presented its report and recommendations on human

²³⁸ Letter from Bill Clinton to Harold Shapiro (included in National Bioethics Advisory Commission, *Cloning Human Beings*, *supra* note 196).

²³⁹ National Bioethics Advisory Commission, *supra* note 196, at 33.

²⁴⁰ *Id.* at 108-109.

²⁴¹ *Id.* at 109.

²⁴² President's Council on Bioethics, *Human Cloning and Human Dignity: An Ethical Inquiry*, at xvii (2002), available at <http://www.bioethics.gov/reports/cloningreport/fullreport.html> (last visited Oct. 26, 2003).

cloning. In reaching its conclusion, the President's Council on Bioethics reviewed the history of cloning and the ethical concerns revolving around the technique.

The Council ultimately concluded that reproductive cloning is unethical and should not be attempted.²⁴³ The Council developed seven public policy options pertaining to human cloning. Policy Option One was self-regulation of the professions involved in cloning research with no legislative action.²⁴⁴ Policy Option Two was a ban on reproductive cloning with neither endorsement nor restriction on therapeutic cloning.²⁴⁵ Policy Option Three entailed a ban on reproductive cloning with regulation of therapeutic cloning.²⁴⁶ Policy Option Four entailed governmental regulation of both reproductive and therapeutic cloning.²⁴⁷ Policy Option Five consisted of a ban on both reproductive and therapeutic cloning.²⁴⁸ Policy Option Six included a ban on reproductive cloning and a moratorium on therapeutic cloning.²⁴⁹ The final option was Policy Option Seven which entailed a moratorium on both reproductive and therapeutic cloning.²⁵⁰ The majority²⁵¹ of the Council members voted to recommend a ban on reproductive cloning and a four-year moratorium on therapeutic cloning.²⁵²

²⁴³ *Id.* at xxix.

²⁴⁴ *Id.* at 187-88.

²⁴⁵ *Id.* at 188-89.

²⁴⁶ *Id.* at 189-92.

²⁴⁷ *Id.* at 192-93.

²⁴⁸ *Id.* at 193-94.

²⁴⁹ *Id.* at 195-96.

²⁵⁰ *Id.* at 196-97.

²⁵¹ The vote was 10-7 in favor of the first proposal (Policy Option Six). *Id.* at 205; *Id.* at 227.

²⁵² *Id.* at 227.

3. Some of the Constitutional Issues

Banning or even regulating cloning may not be realistic. Bans or restrictions on cloning could possibly face Constitutional challenges.²⁵³ A ban on federal funding of human cloning²⁵⁴ does not raise Constitutional questions. The Spending Clause²⁵⁵ permits Congress to spend federal money in whatever way it wishes as long as the general welfare is being promoted.²⁵⁶ The problems may arise if legislation were passed that banned the process of cloning altogether. Several Constitutional provisions may be brought into question.

The Right to Freedom of Speech may possibly be a bar to legislation banning cloning research. Pursuant to the First Amendment, “Congress shall make no law . . . abridging the freedom of speech”²⁵⁷ The First Amendment may be extended to conduct as well as speech. In *Spence v. Washington*,²⁵⁸ the Supreme Court formulated a two-prong test for determining if conduct is expressive enough to be protected by the First Amendment:²⁵⁹ (1) the intent of the conduct must be to convey a specific message and (2) there must be a large likelihood that those who view the conduct would understand the message.²⁶⁰

However, even if the conduct is found to be expressive enough to fall within the First Amendment, it may even still be regulated if regulation would further an important and

²⁵³ Symposium, *supra* note 141 at ¶ 37.

²⁵⁴ Such as the ban on the use of federal funding for human cloning research currently in effect in the United States.

²⁵⁵ U.S. Const. art. I § 8 cl. 1 (“The Congress shall have Power To lay and collect Taxes, Duties, Imposts and Excises . . . for the . . . general welfare”).

²⁵⁶ Elizabeth Price Foley, *The Constitutional Implications of Human Cloning*, 42 AZLR 647, 678 (2000).

²⁵⁷ U.S. Const. Amend. I.

²⁵⁸ 418 U.S. 405, 94 S.Ct. 2727 (1974).

²⁵⁹ Foley, *supra* note 253, at 682.

²⁶⁰ *Id.*, citing *Spence v. Washington*, 418 U.S. 405, 94 S.Ct. 2727 (1974).

substantial governmental interest.²⁶¹ It would appear that human cloning could be expressive conduct as the intent is clearly to convey a specific message and those who view the product or act of cloning would understand the message.²⁶² Even if cloning is expressive conduct and entitled to First Amendment protection, it would most likely be considered non-commercial speech and could not be restricted unless restriction was necessary to further a compelling governmental interest.²⁶³

Would banning cloning violate the right to scientific inquiry? There is no clause in the Constitution that specifically enumerates a right to scientific inquiry. However, it has been argued that support for a right to scientific inquiry can be derived from the First and Fourteenth Amendments.²⁶⁴ Scientific inquiry is of great importance in the United States.

Historically, scientific theories have been protected because of the immense social importance the United States places on knowledge and intellectual freedom.²⁶⁵ The right to scientific inquiry or to research consists of the freedom to pursue knowledge. The strongest arguments in favor of the right to scientific inquiry stem from the First Amendment.²⁶⁶ The United States Supreme Court made an analogy between the information function performed by academic researchers to the information function performed by the press.²⁶⁷ This analogy would

²⁶¹ *Id.*

²⁶² *Id.* at 683.

²⁶³ *Id.* at 687.

²⁶⁴ Lori B. Andrews, *Is There a Right to Clone? Constitutional Challenges to Bans of Human Cloning.*, 11 HARV. J.L. & TECH 643, 661 (1998).

²⁶⁵ *Id.* at 662.

²⁶⁶ *Id.*

²⁶⁷ *Branzburg v. Hayes*, 408 U.S. 665, 705 (1972).

seemingly apply to the gathering and reporting of information by researchers involved in cloning.

Support for the right to scientific inquiry can be found in the Fourteenth Amendment by looking at dicta from the Supreme Court. In *Meyer v. Nebraska*,²⁶⁸ the Supreme Court stated that the Fourteenth Amendment right to liberty included the freedom to acquire useful knowledge.²⁶⁹ It appears that an argument against legislation completely banning cloning based on the right to scientific inquiry may be legitimate.

Other arguments against the regulation of cloning are based on Due Process. These arguments are based on the right of an individual to choose whether to procreate. Based on the Court's holdings in *Griswold v. Connecticut*,²⁷⁰ *Eisenstadt v. Baird*,²⁷¹ *Skinner v. Oklahoma*,²⁷² *Cleveland Board of Education v. LaFleur*,²⁷³ and *Planned Parenthood v. Casey*,²⁷⁴ it appears that the right to procreation is considered to be a fundamental right. It is unclear from current case law whether non-sexual reproduction, such as cloning, would be protected.²⁷⁵ However, because

²⁶⁸ 262 U.S. 390, 43 S.Ct. 625 (1923).

²⁶⁹ *Id.* at 399.

²⁷⁰ Protected a married couple's right to privacy to make decisions regarding procreation. 381 U.S. 479, 85 S.Ct. 1678 (1965).

²⁷¹ Protected an individual's right to privacy to make decisions regarding procreation. 405 U.S. 438 (1972).

²⁷² Protected an individual's right to procreate. 316 U.S. 535, 62 S.Ct. 1110 (1942).

²⁷³ The decision to procreate is a fundamental right. 414 U.S. 632, 94 S.Ct. 791 (1974).

²⁷⁴ In the most recent decision dealing with the fundamental right to privacy, the Court reaffirmed the protection of individuals to make decisions regarding intimate relationships, family, and procreation. 505 U.S. 833, 112 S.Ct. 2791 (1992)

²⁷⁵ Foley, *supra* note 253, at 693-95.

cloning is a form of asexual procreation, it potentially could be found to be as much of a fundamental right as the right of sexual procreation.²⁷⁶

It is unlikely that cloning would be considered a fundamental constitutional right.²⁷⁷ First, cloning is not specifically mentioned anywhere in the Constitution.²⁷⁸ Additionally the majority of Americans do not assume cloning to be a basic right. Cloning is not part of this country's history or tradition. Access to cloning is not essential to liberty.²⁷⁹

Further, courts have held that there is no fundamental right to undertake experiments, especially on fetuses.²⁸⁰ In *Margaret S. v. Edwards*,²⁸¹ a federal court in Louisiana held that a state could regulate experimentation involving the unborn as long as the regulation was rational. The court supported its decision by stating, “[g]iven the dangers of abuse inherent in any rapidly developing field, it is rational for a State to act to protect the health and safety of its citizens.”²⁸² This reasoning is applicable to cloning. Cloning is analogous to embryo research and thus restrictions on cloning likely would not be protected by a right to scientific inquiry.²⁸³ Likewise, given that cloning is not likely to be a fundamental right, it is unlikely to be protected by the Due Process clauses of the Constitution.

²⁷⁶ *Id.* at 695.

²⁷⁷ Cloning is only procreation to the extent that it involves the choice to create a child. National Bioethics Advisory Commission, *supra* note 196 at 95.

²⁷⁸ Many other recognized fundamental rights are also not mentioned in the Constitution.

²⁷⁹ Symposium, *The NBAC Report on Cloning Human Beings: What It Did – and Did Not – Do*, 38 JURIMETICS J. 39, 46 (1997).

²⁸⁰ Andrews, *supra* note 261, at 663.

²⁸¹ 488 F. Supp. 181 (E.D. La. 1980).

²⁸² *Id.* at 220-21.

4. The American Medical Association

In June of 2003, the American Medical Association went against the view of the Bush administration when it announced that it endorsed cloning for research purposes.²⁸⁴ However, the AMA does not endorse reproductive cloning. Pursuant to AMA guidelines, physicians should not participate in human cloning, as further investigation into the harms and benefits of human cloning is needed.²⁸⁵ Pursuant to AMA guidelines, physicians should not participate in human cloning as further investigation into the harms and benefits of human cloning is needed.

B. United Kingdom

The United Kingdom established the Human Fertilisation and Embryology Authority (“HFEA”) in 1990.²⁸⁶ The Authority was established to prohibit certain practices in connection with embryos and gametes.²⁸⁷ In 1997, in response to commentators warning that the 1990 Act²⁸⁸ may not include human cloning, the Government quickly asserted that the 1990 Act prohibited the application of cell nuclear transfer to create human clones.²⁸⁹

²⁸³ Andrews, *supra* note 261, at 663.

²⁸⁴ Associated Press, *AMA Endorses Cloning for Research Uses*, USA TODAY ONLINE (2003), at http://www.usatoday.com/news/health/2003-06-17-ama-cloning_x.htm (last visited Nov. 5, 2003).

²⁸⁵ American Medical Association, *H-140.930 The Ethics of Human Cloning*, available at http://www.ama-assn.org/apps/pf_online/pf_online?f_n=browse&doc=policyfiles/HOD/H-140.930 (last visited Oct. 25, 2003).

²⁸⁶ Human Fertilisation and Embryology Act, 1990 (UK), available at http://www.hmsa.gov.uk/acts/acts1990/ukpga_19900037_en_1.htm (last visited Oct. 26, 2003).

²⁸⁷ *Id.*

²⁸⁸ The 1990 Act is the Human Fertilisation and Embryology Act 1990. Peter Wood and Janita Good, *Human Reproductive Cloning – Nipped in the Bud?*, N.L.J. 151.7919 at 1760 (2001).

²⁸⁹ *Id.*

In *The Queen on the Application of Bruno Quintavalle on behalf of Pro-Life Alliance v. Secretary of State for Health*,²⁹⁰ a declaration was sought that embryos created by CNR²⁹¹ were not protected by the 1990 Act.²⁹² The central argument of the claimant was that because an organism created by CNR was not produced by fertilization it could not qualify as an embryo. The 1990 Act has several references to fertilization.²⁹³ On November 15, 2001, a judge in the United Kingdom ruled that embryos created by CNR fell outside the scope of protection of the 1990 Act.²⁹⁴ The short-term effect of the ruling was that legislation that has been thought capable of preventing human cloning was replaced with a legal void.²⁹⁵ The Government responded to the ruling by announcing plans for an appeal and enacting emergency legislation that would outlaw all possible forms of human reproductive cloning.²⁹⁶ Ultimately, a higher court held that the Human Fertilisation and Embryology Act covered cloning.²⁹⁷

The Act, known as the Human Reproductive Cloning Act 2001, was given Royal Assent and became law on December 4, 2001.²⁹⁸ The Act states that “[a] person who places in a woman

²⁹⁰ 4 All E.R. 1013 (2001).

²⁹¹ Cell nuclear replacement.

²⁹² Wood and Good, *supra* note 285.

²⁹³ Section 1(1)(b) states “references to an embryo include an egg in the process of fertilisation . . .” Section 1(1) effectively states that once the process of fertilization begins the egg is an embryo. Human Fertilisation and Embryology Act, *supra* note 283.

²⁹⁴ *The Queen on the Application of Bruno Quintavalle on behalf of Pro-Life Alliance v. Secretary of State for Health*, CO/4095/2000 (Q.B. 2001), 4 All E.R. 1013, 1024 (2001).

²⁹⁵ *Id.*

²⁹⁶ *Id.*

²⁹⁷ *The Queen (On the Application of Bruno Quintavalle on behalf of Pro-Life Alliance) v. The Secretary of State for Health*, c/2001/2624, 2 W.L.R. 550, available at 2002 WL 45097 (2002).

a human embryo which has been created otherwise than by fertilisation is guilty of an offence.”²⁹⁹ Any person found guilty of the offence is subject to a maximum of ten years imprisonment, a fine, or both.³⁰⁰

The Act does not hinder therapeutic cloning. In fact, the Government and the House of Lords Select Committee support therapeutic cloning. In 1998, the UK Human Genetics Advisory Commission and the HFEA supported the use of cloning technologies in human embryo research.³⁰¹ The 1998 report published by the UK Human Genetics Advisory Commission and the HFEA suggested that cloning technologies be allowed on human embryos less than fourteen days old.³⁰² The current position of the HFEA and the Government is that embryos created by CNR should be treated as embryos under the 1990 Act and the 2001 regulations and be subject to the same research provisions as embryos created by fertilization with an egg and sperm.³⁰³ In 2003, the House of Lords rejected a challenge to the 2001 regulations allowing human cells to be cloned to develop embryos for stem cell research.³⁰⁴

The Tenth Annual Report and Accounts 2001 of the HFEA provided an update on the status of cloning in the UK. Regulations that came into effect in January 2001 extended the

²⁹⁸ Human Reproductive Cloning Act 2001, 2001 c. 23 (UK), *available at* <http://www.hmso.gov.uk/acts/acts2001/20010023.htm> (last visited Oct. 26, 2003).

²⁹⁹ *Id.* (1)(1)

³⁰⁰ No proceedings for the offence may be instituted in England and Wales without the consent of the Director of Public Prosecutions. In Northern Ireland, no proceeding may be instituted without the consent of the Director of Public Prosecutions for Northern Ireland. *Id.* (1)(3)(a)-(b).

³⁰¹ Natasha Loder, *Allow Cloning in Embryo Research, Says UK Report*, NATURE Vol. 396 No. 6711, Dec. 10, 1998, at 503.

³⁰² *Expert Group to Look at UK Cloning Law*, Nature Vol. 400 No. 6739, July 1, 1999, at 4.

³⁰³ *Is Human Cloning Permitted?*, Biotechnology and Regulatory Analysis, *at* http://www.dti.gov.uk/ibioatlas/textg2_7.html (last visited Oct. 25, 2003).

purposes for which human embryos may be used in cloning research. The additional purposes are: (1) increasing knowledge about the development of embryos, (2) increasing knowledge about serious disease, or (3) enabling any such knowledge to be applied in developing treatments for serious disease.³⁰⁵ The Eleventh Annual Report and Accounts 2002 of the HFEA also contained an update on the status of cloning in the UK. This report discussed the enactment of the Human Reproductive Cloning Act 2001. The HFEA stated that this legislation provided reassurance at a time when there was widespread concern about the implications of human reproductive cloning in the United Kingdom.³⁰⁶

The United Kingdom is among the minority of countries in having passed legislation outlawing cloning. However, the United Kingdom legislation seems comprehensive and to date has withstood challenges. Perhaps the United States and other countries should follow the lead of the United Kingdom in establishing human cloning regulations.

C. International Organizations

1. United Nations

The United Nations has not yet passed a resolution in response to human cloning. However, the United Nations has been in the midst of a debate regarding a human cloning resolution since 2001. In 2001, France and Germany introduced a resolution that sought to ban reproductive cloning but allow research in cloning technology.³⁰⁷ The United Kingdom, Japan,

³⁰⁴ Human Fertilisation and Embryology Authority, *House of Lords Reject Challenge to Therapeutic Cloning*, HFEA ONLINE (2003), at [http://www.hfea.gov.uk/Press Office/Archive/34463231](http://www.hfea.gov.uk/Press%20Office/Archive/34463231) (last visited Oct. 25, 2003).

³⁰⁵ Human Fertilisation and Embryology Authority, *Tenth Annual Report and Accounts 2001*, available at <http://www.hfea.gov.uk/HFEAPublications/AnnualReport> (last visited Oct. 25, 2003).

³⁰⁶ Human Fertilisation and Embryology Authority, *Eleventh Annual Report and Accounts 2002*, available at <http://www.hfea.gov.uk/HFEAPublications/AnnualReport> (last visited Oct. 25, 2003).

China, Brazil, and other countries submitted a proposal similar to the French and German proposal.³⁰⁸ The United States and Spain introduced a competing resolution that sought to ban all forms of cloning.³⁰⁹ The fifty-seventh session of the United Nations ended with the cloning issue as one of two draft decisions not even ready for a vote.³¹⁰ The fifty-eighth session began with two proposals³¹¹ on human cloning in play. The French and German proposal noted that opposition to human reproductive cloning is nearly universal. A treaty focused solely on that application could be completed rather swiftly.³¹² A treaty, such as the United States and Spain proposal, that sought to ban all forms of cloning would probably not even be negotiable due to the division that exist among countries concerning embryo research.³¹³ In October 2003, the Working Group³¹⁴ decided to refer its report to the Sixth Committee for consideration and consideration of the elaboration of a negotiation during the fifty-eighth session. During discussions of the Working Group, a disagreement of viewpoints was seen regarding therapeutic

³⁰⁷ Vikram Sura and Jonas Hagen, *Sixth Committee: Legal Cloning Concerns; The Criminal Court*, UNITED NATIONS CHRONICLE ONLINE EDITION (2003), at <http://www.un.org/Pubs/chronicle/2003/issue1/0103p21.html> (last visited Oct. 25, 2003).

³⁰⁸ Belarus, Belgium, Brazil, China, Czech Republic, Denmark, Finland, Iceland, Japan, Liechtenstein, South Africa, Sweden, Switzerland, and the United Kingdom. *International Convention Against the Reproductive Cloning of Human Beings*, Fifty-eighth session, Sixth Committee, United Nations General Assembly, at <http://www.un.org/law/cloning/> (last visited Oct. 25, 2003).

³⁰⁹ Sura, *supra* note 304.

³¹⁰ *Id.*

³¹¹ France and Germany sponsored one and the other sponsored by the United States and Spain.

³¹² Genetic Crossroads # 25, GENETICS AND SOCIETY ONLINE (2002), at <http://www.genetics-and-society.org/newsletter/archive/25.html#I> (last visited Oct. 25, 2003).

³¹³ *Id.*

³¹⁴ On November 19, 2002, the General Assembly decided that a working group of the Sixth Committee should be convened during the fifty-eighth session in order to continue the work undertaken by the fifty-seventh session. On September 29, 2003, the Working Group was established and held five meetings between September 29 and October 3, 2003. Report of the Working Group, *International Convention Against the Reproductive Cloning of Human Beings*, Fifty-eight session Sixth Committee, United Nations General Assembly, at <http://www.un.org/law/cloning/> (last visited Oct. 25, 2003).

cloning. Concern was also discussed that a ban limited only to reproductive cloning would be confusing, ineffective and impossible to enforce.³¹⁵

In November of 2003, the United Nations reopened the debate on the two competing resolutions on human cloning.³¹⁶ On November 6, 2003, the United Nations announced the outcome of the debates. However, the outcome was not one that answered the question of whether cloning is permissible. Iran introduced a motion on behalf of the 57 Islamic nations to postpone U.N. action on the issue of human cloning.³¹⁷ By a vote of 80-79, with fifteen abstentions, the U.N. voted to delay any consideration of a treaty to ban human cloning until 2005.³¹⁸ In December of 2003, the U.N. addressed the issue once again and voted to discuss the issue in 2004 instead of 2005.³¹⁹ So, as of the end of 2003, the U.N. still has not enacted any resolutions or treaties governing the highly controversial issue of human cloning.

2. World Health Organization

The World Health Organization has condemned the reproductive cloning of humans. WHO stated in resolution WHA51.10 "...cloning for the replication of human individuals is

³¹⁵ *Id.*

³¹⁶ Kirk Semple, *U.N. to Consider Whether to Ban Cloning of Human Embryos*, N.Y. TIMES, available at <http://www.nytimes.com/2003/11/03/international/03NATI.html?ex=1068830356&ei=1&en=c76cb2c8e67db250> (last visited Nov. 3, 2003).

³¹⁷ Associated Press, *U.N. Delays Considering Human Cloning Ban*, N.Y. TIMES, available at <http://www.nytimes.com/aponline/science/AP-UN-Human-Cloning.html> (last visited Nov. 6, 2003).

³¹⁸ *Id.*

³¹⁹ Jim Wurst, *U.N. General Assembly to Consider Human Cloning Ban Next Year*, U.N. WIRE, available at http://www.unwire.org/UNWire/20031210/449_11165.asp (last visited Feb. 1, 2004).

ethically unacceptable and contrary to human dignity and integrity.” In 1999, the WHO again emphasized that the prohibition of reproductive human cloning should continue.³²⁰ With respect to therapeutic cloning, the World Health Organization recognized that major benefits might come from the production of human tissues and organs. WHO emphasizes that research should be undertaken so long as it does not involve reproductive cloning.³²¹

3. UNESCO

On November 11, 1997, at the General Conference of UNESCO, the Universal Declaration on the Human Genome and Human Rights was adopted. The Universal Declaration on the Human Genome and Human Rights is a starting point for international awareness of the need for ethical issues to be addressed in science and technology. Section C on the Declaration addressed research on the human genome. In Article 11, under section C, UNESCO addressed reproductive cloning by stating that practices that are divergent to human dignity, such as reproductive cloning, shall not be permitted.³²²

VI. Science Fiction Comes to Life: A Conclusion

The technology known today as cloning has come a long way since its humble beginnings in the 1890s. Dolly the Sheep may be the most famous of all clones, but she was neither the first nor the last. Cloning holds great promise for the future of both animals and humans. It also holds grave dangers, risks, and fears. Therapeutic cloning could be the key to opening the door to cures for diseases ranging from Alzheimer’s to Parkinson’s. Reproductive cloning could lead to genetic replications of living or previously living humans. It could

³²⁰ World Health Organization, Fifty-Second World Health Assembly, *Cloning in Human Health*, (1999), available at http://www.who.int/gb/EB_WHA/PDF/WHA52/ew12.pdf (last visited Oct. 26, 2003).

³²¹ *Id.*

potentially allow infertile couples to have genetically related children or parents to replace a deceased child. More realistically, it could produce cloned babies that are grossly deformed and possibly less than human.

Individual states and countries, as well as international organizations, have recognized the potential benefits of therapeutic cloning and the dangers of human reproductive cloning and are slowly forming legislation, treaties, and resolutions to address this rapidly changing area.

Though the legal future of human cloning is uncertain, it is inevitable that the technique and process will be changing and advancing on daily basis. Therapeutic cloning has already been recognized as holding great potential and as a necessary part of scientific research. As time progresses, it is likely that therapeutic cloning will become both morally and legally acceptable, which makes appropriate and thoughtful legislation critical. Whether it will ever be accepted to clone a human being for reproductive purposes is yet to be seen. However, one thing is certain, “begun the clone war has.”³²³

³²² U.N.E.S.C.O., Universal Declaration on the Human Genome and Human Rights, 29th Sess., 29C/Res. 16 (1997), available at http://www.unesco.org/shs/human_rights/hrbc.htm (last visited Oct. 25, 2003).

³²³ Star Wars Episode II: Attack of the Clones. (LucasFilm Ltd. 2002).