1997 CALIFORNIA LEGISLATIVE SERVICE 688 (WEST) - HUMAN CLONING

By Kenton Abel

Dolly the Sheep was born July 5, 1996, in Edinburgh, Scotland.[1] Seven months later, it was announced that Dolly was the first delayed genetic twin of an adult mammal.[2] In other words, Dolly is a clone. Because the technique used to clone one mammal might be used to clone another mammal,[3] Dolly's arrival created a great deal of public discussion about the possibility of cloning humans.[4] This possibility aroused a wide mix of reactions, ranging from fascination and hope to alarm and horror.[5] Within weeks of the Dolly announcement, legislation banning human cloning was proposed at both the federal[6] and state levels.[7] However, much of the public speculation and concern seemingly waned by Decem-

1. *See* Ian Wilmut et al., *Viable Offspring Derived from Fetal and Adult Mammalian Cells*, 385 NATURE 810 (1997).

2. *See id.* at 812.

3. *See* Robert Winston, *The Promise of Cloning for Human Medicine: Not a Moral Threat but an Exciting Challenge*, 314 BRIT. MED. J. 913 (1997).

4. For example, a search of the world wide web on Mar. 3, 1998 using AltaVista with the key words "human cloning" resulted in 68,132 documents. For a sample of articles discussing human cloning, see NATIONAL BIOETHICS ADVISORY COMMISSION - CLONING HUMAN BEINGS 90 n.10 (1997) [hereinafter NBAC].

5. *See* Tristanne Walliser, *Emerging Technologies, Emerging Debates - Clones: Not How, But When* (visited Mar. 6, 1998) <http://www.abcnews.com/sections/living/cloning1205/index.html>.

6. Federal bills introduced in the wake of the Dolly announcement include S.B. 368, 105th Cong. (1997); H.R. 922, 105th Cong. (1997); H.R. 923, 105th Cong. (1997).

7. State bills introduced include: S.B. 511, 1997 Leg., Reg. Sess. (Ala. 1997); A.B. 1082, 1997 Leg., Reg. Sess. (Ala. 1997); S.J.R. 14, 1997-98 Leg., 1st Sess. (Cal. 1997); S.C.R. 39, 1997-98 Leg., 1st Sess. (Cal. 1997); S.B. 1344, 1997-98 Leg., 1st Sess. (Cal. 1997) (enacted); A.B. 1251, 1997-98 Leg., 1st Sess. (Cal. 1997); H.B. 1237, 1997-98 Leg., 1st Sess. (Fla. 1997); H.B. 2235, 90th Leg., 1st Sess. (Ill. 1997); H.B. 1829, 90th Leg., 1st Sess. (Ill. 1997); S.B. 134, 118th Leg., 1st Sess. (Me. 1997); H.J.R. 28, 1997-98 Leg., 1st Sess. (Md. 1997); H.B. 4846, 89th Leg., 1st Sess. (Mich. 1997); H.B. 4962, 89th Leg., 1st Sess. (Mich. 1997); H.B. 824, 89th Leg., 1st Sess. (Mo. 1997); A.B. 2849, 207th Leg., Reg. Sess. (N.J. 1997); S.B. 2877, 220th Leg., Reg. Sess. (N.Y. 1997); A.B. 5383, 220th Leg., Reg. Sess. (N.Y. 1997); S.B. 782, 1997-98 Leg., 1st Sess. (N.C. 1997); S.B. 1017, 69th Leg., 1st Sess. (Or. 1997); H.B. 3617, 112th Leg., 1st Sess. (S.C. 1997); S.B. 410, 73rd Leg., 1st Sess. (W.Va. 1997).

ber 1997.[8] For some people, the first human clone became a matter of when, not if.[9] Like the genie, the science of cloning was out of the bottle and not likely to be put back in again. Emphasizing this fact, Chicago physicist Richard Seed announced in January 1998, that he was ready to open a human cloning clinic.[10] Once again, human cloning became headline news[11] and a new flurry of legislation to ban human cloning was proposed at both the federal[12] and state levels.[13]

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8. *See* Gina Kolata, *On Cloning Humans, 'Never' Turns Swiftly into 'Why Not'*, N.Y. TIMES, Dec. 2, 1997, at A1.

9. *See* Tristanne Walliser, *Emerging Technologies, Emerging Debates - Clones: Not How, But When* (visited Mar. 6, 1998) <http://www.abcnews.com/sections/living/cloning1205/index.html>; *see also* Laurence Tribe, *Second Thoughts on Cloning*, N.Y. TIMES, Dec. 5, 1997, at A31; Winston, *supra* note 3, at 913.

10. "God made man in his own image. God intended for man to become one with God. Cloning and the reprogramming of DNA is the first serious step on becoming one with God." *Welcome to the Clone Age!* (visited Mar 9, 1998) <http://www.teleport.com/features/clones/> (quoting Richard Seed on National Public Radio, Jan. 6, 1998). The religious view Dr. Seed espouses contrasts to the view of other religious commentators, discussed *infra* Part IV.

11. President Clinton insisted that science cannot be allowed to trump moral values and urged Congress on January 10, 1998, to stop Chicago physicist Richard Seed from trying to clone a human being. The news that independent scientist Richard Seed would begin work on human cloning is "profoundly troubling," Clinton said in his weekly radio address. "Personally, I believe that human cloning raises deep concerns given our cherished concepts of faith and humanity. Scientific advancement does not occur in a moral vacuum ... We must move with caution, care and deep concern about the impact of our actions." Sandra Sobieraj, *Clinton Urges Ban on Human Cloning* (visited Mar 6, 1998) <http://www.abcnews.com/sections/us/clintonradio0110/index.html>.

12. Federal bills introduced in the wake of Richard Seed's announcement include S.B. 1574, 105th Cong. (1998); S.B. 1599, 105th Cong. (1998); S.B. 1601, 105th Cong. (1998); S.B. 1602, 105th Cong. (1998); S.B. 1611, 105th Cong. (1998); and H.R. 3133, 105th Cong. (1998).

13. State legislative proposals include: S.B. 8, 1998 Leg., Reg. Sess. (Ala. 1998); S.B. 68, 1998 Leg., Reg. Sess. (Ala. 1998); S.J.R. 6, 1998 Leg., Reg. Sess. (Ala. 1998); H.B. 5475, 1998 Leg., Reg. Sess. (Conn. 1998); S.B. 241, 139th Leg., 2nd. Sess. (Del. 1998); H.B. 1508, 144th Leg., 2nd Sess. (Ga. 1998); S.B. 1230, 90th Leg., 2nd Sess. (Ill. 1998); S.B. 1243, 90th Leg., 2nd Sess. (Ill. 1998); S.B. 411, 110th Leg., 2nd Sess. (Ind. 1998); H.B. 3206, 19th Leg., 2nd Sess. (Haw. 1998); H.B. 2846, 77th Leg., 2nd Sess. (Kan. 1998); H.J.R. 11, 1998 Leg., Reg. Sess. (Md. 1998); S.B. 864, 89th Leg., 2nd Sess. (Mich. 1998); H.B. 5475, 89th Leg., 2nd Sess. (Mich. 1998); H.R. 197, 89th Leg., 2nd Sess. (Mich. 1998); H.B. 198, 89th Leg., 2nd Sess. (Mich. 1998); H.C.R. 80, 89th Leg., 2nd Sess. (Mich. 1998); H.B. 2730, 80th Leg., 2nd Sess. (Minn. 1998); S.B. 2423, 80th Leg., 2nd Sess. (Minn. 1998); H.B. 996, 1998 Leg., Reg. Sess. (Miss. 1998); H.B. 1658, 155th Leg., 2nd Sess. (N.H. 1998); A.B. 329, 208th Leg., Reg. Sess. (N.J. 1998); S.B. 5993, 221st Leg., Reg. Sess. (N.Y. 1998); A.B. 9116, 221st Leg., Reg. Sess. (N.Y. 1998); S.B. 218, 122nd Leg., 2nd Sess. (Ohio 1998); H.B. 675, 122nd Leg., 2nd Sess. (Ohio 1998); H.B. 2128, 182nd Leg., 2nd Sess. (Pa. 1998); H.B. 7123, 1997-98 Leg., 2nd Sess.

While many are calling for an international ban on human cloning,[14] there is still division as to the correct course of action.[15] When attempting to address the new advance of adult mammalian cloning, commentators caution against legislation attempting to ban human cloning with overly broad language which could ban basic medical research.[16] So far, it appears caution has prevailed.[17] As of February 1998, California was the only U.S. jurisdiction to enact legislation placing a moratorium on human

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(R.I. 1998); S.B. 2208, 100th Leg., 2nd Sess. (Tenn. 1998); S.B. 2295, 100th Leg., 2nd Sess. (Tenn. 1998); H.B. 2198, 100th Leg., 2nd Sess. (Tenn. 1998); H.B. 2281 100th Leg., 2nd Sess. (Tenn. 1998); A.B. 769, 93rd Leg., 2nd Sess. (Wis. 1998); H.B. 752, 1998 Leg., Reg. Sess. (Va. 1998).

14. French President Jacques Chirac called for a ban on human cloning when he addressed a European conference of national ethics committees in Paris on January 12, 1998. Likewise, Pope John Paul II called for all countries to ban human cloning shortly after Dolly's announcement. Nineteen of the 40 members of the Council of Europe signed a treaty to ban human cloning less than a week after Seed's announcement. The signing had been planned for months, but Seed's announcement added greater significance for some of the signatory countries. The January 12, 1998 treaty states that cloning is "contrary to human dignity and thus constitutes a misuse of biology and medicine." Countries that signed were Denmark, Estonia, Finland, France, Greece, Iceland, Italy, Latvia, Luxembourg, Macedonia, Moldova, Norway, Portugal, Romania, San Marino, Slovenia, Spain, Sweden and Turkey. *See* Joseph Schuman, *Countries Sign Cloning Ban* (visited Mar. 6, 1998) <http://www.abcnews.com/sections/scitech/cloning0112/index.html>.

15. For example, England and Germany both refused to sign the European agreement, but for opposite reasons. England because the treaty is too strict, Germany because the treaty is not strict enough. *See id.* The difference of opinion is partly because technology advances will often stretch existing laws and challenge traditional legal definitions. *See* Marjorie Shultz, Reproductive Technology and Intent-Based Parenthood: An Opportunity for Gender Neutrality, 1990 WIS. L. REV. 297, 300 (1990) (discussing how advances in reproductive technologies have often challenged existing legal definitions).

16. *See, e.g.*, Lauran Neergard, *No Human Cloning in the Offing* (visited Mar. 6, 1998) <http://www.abcnews.com/sections/scitech/cloning0119/index.html>. "If they are going to do this, come up with legislation that bans cloning but protects research," said Dr. Benjamin Younger of the American Society for Reproductive Medicine. One of scientists' biggest alarms in 1997 came from Florida, where House Bill 1237 proposed making any cloning of human DNA a felony. Cloning human genetic material is standard practice in genetics research, the making of critical medicines, and even police DNA fingerprinting. The bill was withdrawn after its authors "realized this would have stopped biomedical research in Florida in its tracks," said Carl Feldbaum of Biotechnology Industry Organization. *Id.*

17. The concern about over-broad legislation defeated Senate Bill 1601 on Feb. 11, 1998, by a 42 to 54 vote. *See* 144 CONG. REC. S599-05 (1998). This bill would have banned somatic cell nuclear transfer for human cells, a technique used as part of research on: diabetes; leukemia; sickle cell anemia; Alzheimer's disease; Parkinson's disease; multiple sclerosis; spinal cord injuries; liver disease; severe burns; muscular dystrophy; arthritis; and heart disease. *See id.* (statement of Sen. Thurmond).

cloning.[18] This comment will examine the science of cloning, the California moratorium on cloning a human being, some implications of human cloning, and legal challenges to human cloning laws that might arise.

I. THE SCIENCE OF CLONING

The word "clone" in the context of biotechnology has many meanings. One definition of a "clone" is an exact copy of a molecule, gene, cell, plant, animal, or human being.[19] For many years scientists have cloned molecules, genes, cells, plants, and, in limited circumstances, animals.[20] The advance that Dolly so vividly demonstrates is that a fully developed animal can be produced from the somatic cell of an adult, something never achieved before.[21] The technique used to create Dolly is called somatic cell nuclear transfer. In that technique, the haploid nucleus of an egg cell is replaced with the diploid nucleus of a somatic cell.[22] While there are differences between species in the success of nuclear transfer,[23] the technique used to create Dolly might be successful in creating a human being. Even though Dolly was the only live birth from 277 nuclear transfers, Ian Wilmut's lab has already reported more than a three-times greater success rate in the live births after implantation in the womb.[24] If this trend continues, cloning may soon have as high a success rate as other reproductive techniques. Another advance in cloning technology, reported by Neal First in January 1998, was the use of enucleated cow eggs to produce

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18. 1997 Cal. Legis. Serv. 688 (West) was signed on Oct. 4, 1997, by Governor Wilson.

19. It is beyond the scope of this comment to review in detail the science which lead to Dolly. For a more complete explanation of the science of cloning, see NBAC, *supra* note 4, at 13-38 and Appendix A.

20. *See* J. Gurdon et al., *The Developmental Capacity of Nuclei Transplanted from Keratinized Skin Cells of Adult Frogs*, 34 J EMBRYOL. EXP. MORPH. 93-112 (1975); *see also* R. Prather et al., *Nuclear Transplantation in Early Pig Embryos*, 41 BIOL. REPROD. 414-18 (1989).

21. *See* Wilmut, *supra* note 1, at 810.

22. *See id.*

23. *See* NBAC, *supra* note 4, at 17-21.

24. Dolly was the only live birth out of 29 embryos implanted, a 3.4% success rate. *See* Wilmut, *supra* note 1, at 810. The same group reported the creation of transgenic sheep, with seven live births out of 67 implanted embryos, a 10.4% success rate. The seven live births were out of 14 embryos to develop into fetuses. *See* Angelika Schnieke et al., *Human Factor IX Transgenic Sheep Produced by Transfer of Nuclei from Transfected Fetal Fibroblasts*, 278 SCIENCE 2130 (1997). As the title points out, these Factor IX transgenic sheep are from fetal cells and not adult cells. *Id.*

preimplantion-state embryos with DNA from sheep, pigs, and monkeys.[25] This advance creates the possibility of using non-human egg cells for cloning a human being.[26]

The technology involved in cloning somatic cells will almost certainly have a profound impact on the biotechnology and agriculture industries.[27] One advantage of cloning is the production of genetically identical animals for basic scientific research.[28] The use of adult animal cloning may also stimulate commercial interest when applied to livestock breeding.[29] A third advantage is that cloning holds potential for improving the propagation of transgenic livestock.[30] Furthermore, transgenic animals may be valuable for organ transplantation to humans.[31] Fourth, cloning adult animals has potential to aid in generating targeted gene alternations.[32] Fifth, since the basic processes of cellular replication and sequential specialization are not well understood, using cloning technology for basic research

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25. *See* Linda Carroll, *Cow Eggs Used to Clone Other Animals* (visited Mar. 6, 1998) <http://www.msnbc.com/news/137711.asp#BODY>.

26. *See id.*

27. *See* Robert Reno, *Fear of Cloning is Mystifying*, AUSTIN-AMERICAN STATESMAN, Jan. 28, 1998, *available in* 1998 WL 3594692.

28. The genetic variation between animals can make it difficult to interpret experimental results in animal models, and may at times lead to incorrect conclusions. Inbred mice have been used for many years because they are essentially genetically identical. Inbreeding larger animals is difficult, expensive, and time consuming because of the long gestation times and small number of offspring. Having genetically identical animals will eliminate experimental variations caused by genetic differences in test animals and aid in confirmation of results by other laboratories.

29. Spreading advantageous traits in livestock has a very long historical standing, and cloning will add one more means of accomplishing this. *See* NBAC, *supra* note 4, at 25. A caution involving the cloning prize livestock is that if this technique became wide spread, steps would need to be taken to ensure the genetic pool remains diverse. If a pool of livestock all contain the same genetic weakness against a pathogen, entire herds could be infected and die quickly. A genetically diverse population increases the chances of multiple animals having resistance to a given pathogen.

30. Molly & Polly, transgenic ewes, produce human factor IX in their milk. It will be considerably more cost effective than current methods to use livestock to produce pharmaceutically important proteins, with insulin, factor VIII, and factor IX as just three examples. *See* Schnieke, *supra* note 24, at 2130.

31. For example, it may someday be possible to produce pigs which grow hearts suitable for transplant into humans. *See* NBAC, *supra* note 4, at 26.

32. Gene targeting is an important tool in understanding normal gene function and one use is to better understand human genetic diseases. Somatic cell nuclear transfer may help decrease the time and cost of these experiments. *See* M. Capecchi, *The New Mouse Genetics: Altering the Genome by Gene Targeting*, 5 TRENDS IN GENETICS 70-76, (1989).

in this area may help develop new therapies to treat human diseases.[33] Finally, cloning from adult cells could potentially reverse the extinction of some animal species.[34] Freezing cells from endangered animals will help ensure these animals can be reproduced after they have gone extinct in the wild.[35] With somatic cell nuclear transfer, extinction does not need to be forever.[36]

II. SUMMARY OF THE CALIFORNIA HUMAN CLONING BAN

Out of the flurry of legislation proposed in the wake of Dolly's announcement,[37] California was the only jurisdiction in the United States to adopt a law banning human cloning.[38] The California law banning the cloning of a human being incorporates the major recommendations of the National Bioethics Advisory Commission (NBAC).[39] Section 1 summarizes the purpose of California's cloning law:

> It is the intent of the Legislature to place a five-year moratorium on the cloning of an entire human being in order to evaluate the profound medical, ethical, and social implications that such a possibility raises. It is not the intent of the Legislature that this moratorium apply to the cloning of human cells, human tissue, or human organs that would not result in the replication of an entire human being.[40]

The law implements the moratorium on cloning an entire human being in three ways: first, human cloning constitutes unprofessional conduct; second, business licenses will be revoked for a violation of the morato-

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33. *See* NBAC, *supra* note 4, at 28-29.

34. *See* Winston, *supra* note 3, at 913.

35. If the technique reported by Neal First succeeds, cloning could take place without needing a donor egg from the same species. Thus, a cheetah or perhaps a wooly mammoth could be cloned using an enucleated cow egg. *See* Linda Carroll, *Cow Eggs Used to Clone Other Animals* (visited Mar. 6, 1998) <http://www.msnbc.com/news/137711.asp#BODY>.

36. To bring a species back from extinction requires the preservation of viable nuclei. Thus, the wooly mammoth might be brought back because frozen mammoths have been found. In contrast, dinosaurs could not be produced currently because no surviving cells have been found yet.

37. *See supra* notes 6, 7 and accompanying text.

38. As of February 1998, no other human cloning laws had been enacted within the United States.

39. *See* NBAC, *supra* note 4, at 109. The NBAC is a group of scientists, ethicists and theologians created by President Clinton in order to advise the President on policy issues relating to biotechnology.

40. 1997 Cal. Legis. Serv. 688 (West).

rium; and finally, a violator can be held to a fine of $1,000,000 or more. In keeping with the NBAC recommendation, the California law has a five-year sunset clause, so that the law repeals itself on January 1, 2003. This law does not make cloning a human being a criminal act. However, existing law in California regulates medical experimentation on humans,[41] and cloning a human being, or attempting to clone a human being, would most likely be viewed as human experimentation.[42]

Section 5 of the California cloning act adds Chapter 1.4 to Division 20 of the California Health and Safety Code:

> 24185. (a) No person shall clone a human being.
>
> (b) No person shall purchase or sell an ovum, zygote, embryo, or fetus for the purpose of cloning a human being.[43]
>
> (c) For purposes of this section, "clone" means the practice of creating or attempting to create a human being by transferring the nucleus from a human cell from whatever source into a human egg cell [44] from which the nucleus has been removed for the purpose of, or to implant, the resulting product to initiate a pregnancy that could result in the birth of a human being.
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> 24187. For violations in Section 24185, the State Director of Health Services may,[45] after appropriate notice and opportunity for hearing, by order, levy administrative penalties as follows:

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41. S.B. 1344, 1997-98 Leg., 1st Sess. (Cal. 1997) (Preamble); *see also* Nuremberg Code, 1946-49. While the federal government has guidelines on human experimentation in 45 C.F.R. Part 46 (1996), these only apply to federally funded research institutions, voluntarily complying institutions, or to pharmaceuticals or devices that need Food and Drug Administration [hereinafter FDA] approval.

42. In response to Richard Seed's announced plans to open human cloning clinics, the FDA claimed it has jurisdiction over human cloning. As one editorial pointed out, this assertion is "highly dubious, resting on the twisted supposition that anyone trying to clone a person needs what the FDA calls 'Investigative New Drug' authority, really a license to conduct clinical trials of new drugs. But if no new drugs are used, it is hard to see why." Editorial, *Legislate Carefully*, BOSTON HERALD, Jan. 24, 1998, *available in* 1998 WL 7335433.

43. This paragraph extends the jurisdictional reach of this law by making it illegal for anyone in California to buy or sell the needed components of a human cloning experiment to anyone inside or outside California.

44. The specific reference to "human egg cell" may need to be modified to "egg cell" in light of the recent announcements by Neal First of the cloning of mammals using enucleated cow eggs. *See* Linda Carroll, *Cow Eggs Used to Clone Other Animals* (visited Mar. 6, 1998) <http://www.msnbc.com/news/137711.asp#BODY>.

45. The plain reading of the word "may" leaves administrative penalties under the discretion of the Director of Health Services.

> (a) If the violator is a corporation, firm, clinic, hospital, laboratory, or research facility, by a civil penalty of not more than [46] one million dollars ($1,000,000) or the amount applicable amount under subdivision (c), whichever is greater.
>
> (b) If the violator is an individual, by a civil penalty of not more than two hundred fifty thousand dollars ($250,000) or the amount applicable amount under subdivision (c), whichever is greater.
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> (c) If any violator derives pecuniary gain from a violation of this section, the violator may be assessed a civil penalty of not more than an amount equal to the amount of the gross gain multiplied by two.
>
> (d) The administrative penalties shall be paid to the General Fund.

The narrow definition of "clone" in section 24185(c) is important because it means that this law does not target basic medical research that uses cloning technology.[47] The new law only prevents human cloning as applied to assisted reproduction.[48]

Section 2 of the California cloning act modified California Business and Professions Code section 2260.5(a) to read: "A violation Section 24185 of the Health and Safety Code, relating to human cloning, constitutes unprofessional conduct."[49] Sections 3 and 4 were added to California Business and Professions Code sections 16004[50] and 16105.[51] Both sections now read: "Any license issued to a business pursuant to this chapter shall be revoked for a violation of Section 24185 of the Health and

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46. A plain language reading of "not more than" would allow a fine of less than $1 to satisfy this section.

47. Cloning cells to create a new section of skin for burn victims is not a violation of the law. Cloning a prize bull or a favorite pet is likewise legal. Transgenic animals like Molly & Polly, ewes that produce human factor IX in their milk, are legal. *See generally* Schnieke, *supra* note 24. Research into cloning a new heart or kidney is not a violation. While cloning research for tissue and organ generation may involve the use of somatic cell nuclear transfer, it does not violate the California law because a researcher pursuing these goals would not be using cloning technology to initiate a pregnancy.

48. If Richard Seed tried to clone a person in California, this would be a clear violation of California Health and Safety Code § 24185.

49. According to the Medical Practice Act, unprofessional conduct would cause a violator to go before a review board for discipline. A penalty for unprofessional conduct can range from educational training to revocation of a medical license. *See* CAL. BUS. & PROF. CODE § 2000 (West 1990 & Supp. 1998).

50. Section 16004 authorizes a city to issue an operating license to a business.

51. Section 16105 authorizes a county to issue an operating license to a business.

Safety Code, relating to human cloning."[52] All of these sections contain the sunset clause: "This [section] shall remain in effect only until January 1, 2003, and as of that date, is repealed, unless a later enacted statute, that is enacted before January 1, 2003, deletes or extends that date."

III. MEDICAL IMPLICATIONS OF HUMAN CLONING

As discussed above, cloning technology holds promise for human medicine in several areas: regeneration and repair of diseased or damaged tissue and organs;[53] organ and tissue transplantation;[54] cell-based therapies;[55] and assisted reproduction.[56] In the rush to ban cloning a human being, several legislative proposals could have stopped all of the above—not just assisted reproduction.

While the technology of cloning holds promise, there are several scientific uncertainties involved in attempting to clone humans. First, it is not known yet whether cloning will ever work well in humans.[57] Also, the combination of the genetic imprinting phenomenon and the nuclear transfer technique could potentially increase the rate of cancer and genetic conditions.[58] Dolly shows it is possible for an animal to successfully develop from a somatic cell, yet it remains to be seen if there are any long term problems associated with a possible disruption of the genetic imprint.

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52. In a practical sense, losing the ability to conduct business in California may be more of a deterrent to a company than a one time $1,000,000 fine. While the fines may or may not be levied against any company or person violating the law, the business license and unprofessional conduct clauses are not discretionary.

53. *See* 144 CONG. REC. S599-05 (1998) (statement of Sen. Feinstein).

54. Every 18 minutes in America, a new name is added to the list of those waiting for an organ transplant. Every two hours, someone on that list dies because there was no organ available. Gary Anderson from the University of California, Davis, is using cloning techniques to try to create a pig whose heart can be transplanted into humans. *See* Darragh Johnson, *Another Day, Another Double? Some People See a Time Coming when Cloning No Longer Sparks Controversy*, THE SACRAMENTO BEE, Jan. 28, 1998, *available in* 1998 WL 8806682.

55. *See* 144 CONG. REC. S599-05 (1998) (statement of Sen. Mack).

56. 1997 Cal. Legis. Serv. 688 (West).

57. Nuclear transfer does not work as well in mice as it does in larger domestic animals. While this may be due to the level of effort directed at nuclear transfer in domestic animals, there may be true species differences which could cause the success rate in humans to always remain lower than some other species. *See* NBAC, *supra* note 4, at 23.

58. Genetic imprinting is where genes from the father and genes from the mother are not equivalent in their effects on development. *See* D. Solter, *Differential Imprinting and Expression of Maternal and Paternal Genomes*, 22 ANN. REV. OF GENETICS 127-46 (1988).

Furthermore, cellular aging may affect the age of the donor nuclei and thus the age of all the cells in the new animal. To put it another way, on Dolly's first birthday, it is not yet known if the cells in her body were closer to those of a normal one year old sheep, those of a normal seven year old sheep, or somewhere in between.[59] In light of the above uncertainties, the NBAC unanimously agreed that there is no scientific justification at this time for attempting to produce a human child using somatic cell nuclear transfer.[60]

IV. ETHICAL AND SOCIAL IMPLICATIONS OF HUMAN CLONING

As one might expect, there is no clear moral consensus regarding human cloning.[61] The probability of achieving a moral consensus in the United States will likely remain practically zero because neither moral philosophers nor religious scholars can agree on what is the best moral code from which to start an analysis.[62]

Many people responded to Dolly's announcement with reactions based upon the incorrect belief that a child or even a fully grown adult, identical in thought, appearance, and action to an already existing person, could be

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59. Cellular aging involves a shortening of the ends of the chromosomes, the telomeres, as well as other genetic changes. Germ cells have special pathways and enzymes to evade cellular aging. By fusing the nucleus of a somatic cell with an enucleated egg cell, it is possible that cellular aging is completely reversed. However, only time and further research will show if cellular aging has an increased negative effect on animals created through somatic cell nuclear transfer. *See* NBAC, *supra* note 4, at 23; *see also* Winston, *supra* note 3, at 913.

60. Until the technique is dramatically improved in animal models, it is difficult to find a compelling justification to attempt cloning in humans. One example of a high-risk technique with a compelling justification is cancer treatment. Some types of cancer treatment involve very high risks to the patient, but these risks are outweighed by the alternative where the patient will die of cancer without treatment. Unlike cancer treatment, the risks of birth defects, early cancer, and early cellular death by using somatic cell nuclear transfer are not outweighed by the alternative of creating a child through another reproductive technique. *See* NBAC, *supra* note 4, at 65.

61. It is beyond the scope of this comment to completely examine all aspects of the ethical and social implications of human cloning. For review of the ethical and religious arguments about human cloning, see NBAC, *supra* note 4, at 39-85.

62. *See, e.g.*, Michael Broyde, *Cloning People: A Jewish Law Analysis of the Issues*, 30 CONN. L. REV. 503 (1998); PAUL RAMSEY, FABRICATED MAN: THE ETHICS OF GENETIC CONTROL (1970); Leon Kass, *The Wisdom of Repugnance*, THE NEW REPUBLIC, 17-26 (June 2, 1997); HANS JONAS, PHILOSOPHICAL ESSAYS 153-63 (1974); Francis Pizzulli, *Asexual Reproduction and Genetic Engineering: A Constitutional Assessment of the Technology of Cloning*, 47 S. CAL. L. REV. 476-584 (1974).

produced. However, the belief that genes alone determine all aspects of a person is false.[63] Other arguments used against human cloning are often resemble arguments raised against previous advances in reproductive technologies[64] such as *in vitro* fertilization or artificial insemination.[65] Additional religious and ethical concerns about human cloning include potentially undermining the family unit,[66] diminished personal autonomy and individuality for the child,[67] and the temptation to manipulate others

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63. Identical twins are clones, but there are differences in personality, preferences, appearance, and even fingerprints. *See* Robert Wachbroit, *Human Cloning Isn't as Scary as It Sounds*, THE WASH. POST, Mar. 2, 1997, at C1. The interactions of genes with each other and the environment are extremely complex. For example, a female having a genetic predisposition for breast cancer does not have a 100% chance of developing breast cancer—her environment plays a very significant role as well. Even by knowing the complete genome of a person at birth, it would be impossible to predict what that person would be like as an adult. *See* NBAC, *supra* note 4, at 32.

64. *See* Darragh Johnson, *Another Day, Another Double? Some People See a Time Coming when Cloning No Longer Sparks Controversy*, THE SACRAMENTO BEE, Jan. 28, 1998, *available in* 1998 WL 8806682; *see also* Shultz, *supra* note 15, at 333-47.

65. The Catholic Church views cloning as morally wrong, in keeping with its position that all forms of artificial reproduction are morally wrong, including artificial insemination, in vitro fertilization, and surrogate motherhood. *See* RELIGION & ARTIFICIAL REPRODUCTION: AN INQUIRY INTO THE VATICAN 'INSTRUCTION ON RESPECT FOR HUMAN LIFE IN ITS ORIGIN & ON THE DIGNITY OF HUMAN REPRODUCTION' 157-65 (T. Shannon & L. Cahill eds. 1988).

66. *See* NBAC, *supra* note 4, at 68-70. While many of the ethical objections to human cloning are connected with a concern about the breakdown of the family unit, there are some situations where human cloning would be the only way to preserve the family unit. For example, suppose a child falls victim to a viral infection and, as a result, is in need of a bone marrow transplant in order to live. No compatible donor is found, so the parents want to clone the child. If successful, the new child will be a perfect match for the transplant and there is no significant risk or discomfort caused by bone marrow donation. The net result is two healthy identical twins of different ages, both loved by their parents. Any moral argument concerned about the health and safety of a child might likely favor saving the sick child with the use of cloning technology.

67. *See* MARTHA NUSSBAUM, ARISTOTELIAN SOCIAL DEMOCRACY, LIBERALISM AND THE GOOD 27-226 (R. Bruce Douglass et al., eds., 1990). In rebuttal to the idea cloning would decrease individuality, assume for a moment that genetic twins did not exist in nature and person used current scientific techniques to separate an early human blastocyst, implanted both resulting blastocysts and genetically identical twins were born. In a world without naturally occurring genetic twins, a hue and cry would likely be raised about the immorality of creating two identical people and the loss of individuality. However, experience shows that individuality is not diminished and personal autonomy is not compromised when genetic twins are born. Even with an extremely similar environment, genetic twins have many differences. Given the complex interactions between genes and the environment, a delayed genetic twin would have even more differences than naturally occurring identical twins.

as if they are merely objects and not people.[68] Another area of concern is that, if cloning becomes widespread, it might open the door to eugenics.[69]

On the other hand, arguments against a ban on human cloning include: the presumption that individual liberty should be upheld,[70] that human reproduction is of a particularly private nature and should be maintained,[71] that scientific inquiry must remain free,[72] that there are some exceptional cases where a valid reason for creating a child through human cloning is so compelling it transcends moral objections,[73] and that many objections are mere speculation and unproven.[74]

Religious and social perspectives differ in paradigm, modes of reasoning, and conclusions. Thus, some scholars hold fundamental beliefs and norms which provide a clear negative answer to the question of clon-

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68. *See* George Annas, *Human Cloning: Should the United States Legislate Against It? Yes: Individual Dignity Demands Nothing Less*, 83 ABA J. 80 (1997). *But see* John Robertson, *Human Cloning: Should the United States Legislate Against It? No: The Potential for Good is Too Compelling*, 83 ABA J. 81 (1997). Concerns about treating children as objects overlook the simple fact that this has always happened. Even the statement, "This is *my* child," implies ownership. It is also true is that parents often have extremely high expectations for their naturally conceived children. It could be argued a child created through cloning would be in a better position to resist these high expectations since they would be a genetic sibling, or even a genetic parent, to the person with these expectations.

69. The concerns about eugenics and future genetic manipulations will exist even if no one ever clones a human being. While human cloning may "open the door" to an increased interest in eugenics, a ban on human cloning would not "close the door" on eugenics. The prospect of somatic cell nuclear transfer in humans likewise increases the possibility of genetic manipulation and creating a race of super-humans or half-humans. These issues are beyond the scope of this comment. With or without a ban on human cloning, eugenics and genetic manipulations are issues we will need to address, perhaps in the not so distant future. *See* NBAC, *supra* note 4, at 74.

70. Personal liberty is one of the most important values shared by United States citizens. Yet the value of personal liberty is not supreme. Competing against it can be the values of equality, nonmaleficence, and others. Even commentators who argue personal liberty requires us to leave a decision to create a child through cloning still recognize nonmaleficence as a limit to liberty. *See* NBAC, *supra* note 4, at 76; *see also* Susan Wolf, *Ban Cloning? Why NBAC Is Wrong*, 27 HASTINGS CENTER REPORT, 12 (1997).

71. There is a presumption that human reproduction is of a particularly private nature and should be maintained. *See generally* Shultz, *supra* note 15.

72. *See* Natasha Lisman, *Freedom of Scientific Research: A Frontier Issue in First Amendment Law*, 35 BOSTON BAR J. 4 (1991).

73. Jewish law maintains there is a duty to heal, and infertility is viewed as an illness. Thus, Jewish scholars are generally opposed to a ban on human cloning and would prefer to have decisions made on a case-by-case basis. *See* Broyde, *supra* note 62, at 505.

74. *See* NBAC, *supra* note 4, at 81.

ing humans, some believe that more reflection is needed in order to evaluate the prospect of human cloning,[75] and some believe that if cloning becomes technically feasible, it should be made available to those who need it.[76] A unanimous consensus on human cloning will probably never exist.

V. CONSTITUTIONAL CHALLENGES

A law banning human cloning, if challenged, will probably be contested on various constitutional grounds.[77] Legislation without clear limits may be unconstitutionally vague.[78] Also, a ban on research may infringe the freedom of scientific inquiry under the First Amendment.[79] Furthermore, a large measure of constitutional protection in the liberty to reproduce has been given to couples and individuals.[80] Finally, any federal legislation may exceed the limits of federal power, especially since medicine has traditionally remained one of the state powers.[81]

Freedom of inquiry has a long history of support in the United States.[82] Both the tradition of freedom of expression found in the First Amendment

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75. "It is not good to have zeal without knowledge, nor to be hasty and miss the way." *Proverbs* 19:2 (New International Version). *See* Broyde, *supra* note 62, at 503.

76. *See, e.g.*, Broyde, *supra* note 62, at 503.

77. *See* Wolf, *supra* note 70, at 13.

78.
> Vague laws ... violate due process in three ways. First, they fail to give adequate notice of precisely what conduct is being prohibited .... The second problem with vague statues is that ... they invite arbitrary and discriminatory enforcement by the police, judges, and juries .... Last, vague standards of unlawful conduct will inevitably cause people to 'steer far wider of the unlawful zone ... than if the boundaries of the forbidden areas were clearly marked.' Grayned v. Rockford, 408 U.S. 104, 109 (1972). This is an especially dangerous consequence of vague statues that encroach upon constitutional rights.

Lifchez v. Hartigan, 735 F. Supp. 1381, 1364 (N.D. Ill. 1990), aff'd without opinion, 914 F.2d 260 (7th Cir. 1990), cert. denied sub nom. Scholberg v. Lifchez, 498 U.S. 1069 (1991).

79. *See generally* Lisman, *supra* note 72; Richard Delgado & David Millen, *God, Galileo, and Government: Toward Constitutional Protection for Scientific Inquiry*, 53 WASH. L. REV. 349-404 (1978); James Ferguson, *Science and Technological Expression: A Problem in First Amendment Theory*, 16 HARV. CIV. RTS.-CIV. LIB. L. REV. 519 (1981).

80. *See*, JOHN ROBERTSON, CHILDREN OF CHOICE: FREEDOM AND THE NEW REPRODUCTIVE TECHNOLOGIES (1994); *see also Lifchez*, 735 F. Supp. at 1364 (constitutional protection for reproductive technologies).

81. *See, e.g.*, United States v. Lopez, 514 U.S. 549 (1995) (holding a federal law unconstitutional because it violated the Tenth Amendment).

82. *See* Branzburg v. Hayes, 408 U.S. 665, 705 (1972) (holding the government had to show a compelling interest to over-come the First Amendment); *see also* Griswold v.

and the tradition of scientific inquiry share a common genesis in the philosophy of Enlightenment.[83] The nature of scientific inquiry is consistent with well-established principles extending the First Amendment to a variety of "ideational pursuits."[84] The fact that scientific experimentation constitutes "conduct" rather than "speech" probably does not exclude it from the protective penumbra of the First Amendment.[85] Freedom of inquiry assumes, however, an ethical and responsible pursuit of knowledge, which has not always been achieved.[86] A presumption in favor of freedom of inquiry is beneficial to the promotion of scientific advancement. However, this presumption is rebuttable by values such as nonmaleficence and safety. Both state governments and the federal government regulate research methods in order to safeguard against irresponsible pursuits of knowledge.[87] Provided the government exercises its legitimate regulatory powers in a manner designed to create the least burden possible on protected rights, the First Amendment permits restrictions on the time, place, and manner of expression.[88]

Connecticut, 381 U.S. 479 (1965); Meyer v. Nebraska, 262 U.S. 390 (1923) (holding the Fourteenth Amendment encompasses freedom to "acquire useful knowledge ... and generally to enjoy those privileges long recognized at common law as essential to the orderly pursuit of happiness by free men."); Henely v. Wise, 303 F. Supp. 62 (N.D. Ind. 1969). The provisions of the First Amendment have been held applicable to the states through incorporation into the Due Process Clause of the Fourteenth Amendment.

83. *See* Lisman, *supra* note 72, at 4. Speech and science are both facets of the same commitment of Enlightenment to the pursuit of human purposes through the rational method. *Id.*

> The colonists conceived the right to freedom of speech, press, assembly, and petition as vital to the process of discovering truth, through exposure to all facts, open discussion, and testing of opinions. ... The process is essentially the method of science. The theory of freedom of expression, indeed, developed in conjunction with, and as an integral part of, the growth of the scientific method. Locke, following Hobbes, based his philosophical and political theories on the premises of science.

Thomas Emerson, Colonial Intentions and Current Realities of the First Amendment, 125 U. PENN. L. REV. 737, 740-41 (1977).

84. Lisman, *supra* note 72, at 4.

85. *Id.*

86. The Tuskeegee Syphilis Study remains one of the most outrageous examples of disregard of basic ethical principles of conduct, not to mention violations of standards for ethical research. In this study, the United States Public Health Service decided to study the effects of untreated syphilis on human subjects even after a cure had been found. *See* (visited Feb. 16, 1998) <http://www.ssc.msu.edu/~sw/mlk/tuskg.htm>.

87. As a result of the Tuskeegee experiment, the regulations on working with human subjects were completely rewritten for Health, Education, and Welfare. *See id.*

88. *See* Lisman, *supra* note 72, at 7.

Another ground for challenging anti-cloning laws could be the constitutional right to privacy, which includes the deeply personal choice of deciding to raise a family. Courts have given a high measure of constitutionally-based protection to a person's choice of whether and when to bear children.[89] Some commentators respond that cloning is merely a form of replication and not reproduction, thus they argue it should not receive any constitutional protection.[90] This view is based upon the idea that reproduction is sexual and collaborative, where cloning is asexual. A constitutional distinction between "asexual" cloning, *in vitro* fertilization, and sexual coitus, however, would miss the point that all of these techniques could potentially result in the birth of a human child who would be entitled to every right all children are born with,[91] irrespective of how the child was conceived.

The California law would most likely withstand these types of constitutional challenges. Also, because it is a state law, it avoids any Tenth Amendment challenges.[92] It would also likely survive freedom of scientific inquiry based on the First Amendment, given the scientific uncertainty about potential harm to the child. Concerns about that harm would probably constitute a justifiable state interest. Moreover, while the constitutional right to privacy may protect a woman's right to choose cloning as a form of procreation in the future, the hazards involved with cloning at this time likely outweigh that right. One additional factor in favor of the constitutionality of the California law is its sunset clause limits the length of the state's intrusion into potentially protected rights.[93]

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89. *See Griswold*, 381 U.S. at 485-86. While the Supreme Court has given states more room to regulate abortions, it has not over ruled *Roe v. Wade*, 410 U.S. 113 (1973). Also, successful cloning involves a woman's choice to bear a child, not the choice not to bear a child.

90. *See* Leon Kass, *The Wisdom of Repugnance*, THE NEW REPUBLIC, June 2, 1997 at 17-26; *see also* Annas, *supra* note 68, at 80.

91. "Novels such as Frankenstein and Brave New World, and films such as Jurassic Park and Bladerunner have prepared the public to discuss deep ethical issues in human cloning." Annas, *supra* note 68, at 80. However, in the above fictional works of literature, people created through alternative reproductive methods do not have the same rights as those "naturally" born. This argument fails to notice that those born with the assistance of in vitro fertilization, or other reproductive technology, have the same rights as every other human.

92. The Tenth Amendment reserves to the states any powers not specifically granted by the Constitution to the federal government.

93. A ban without a time limit is not in keeping with constraining liberty as little as possible while serving the public interest. Also, cloning may soon become a safe technique, so the medically based state interest in interfering with freedom of scientific inquiry and reproduction might become invalid.

Legislation banning human cloning is currently pending in several states and before Congress. Constitutional challenges to these may vary in success, depending upon how carefully a specific law is drafted. If a state adopts legislation similar to the broad cloning ban recently proposed in Senate Bill 1601,[94] introduced by Senators Bond (R-Mo.) and Frist (R-Tenn.), there are multiple reasons such a law to might be unconstitutional.

VI. AFTER JANUARY 1, 2003

It is impossible to predict exactly what the technology of cloning will be like in five years. Given the rapid pace at which science can advance, it is very possible a child will have been born using somatic cell nuclear transport within the next five years. If scientifically possible, human cloning is almost certainly only a matter of time. Laws completely banning the cloning of a human being may expend a great deal of energy, time, and money, but in the end, will prevent very little. Legislators' time might be better focused on regulating the research of cloning in labs within United States jurisdictions. The alternative could end up sending the practice underground or to foreign jurisdictions.

94. 105th Cong. (1998). In breaking ranks along with 11 other Republicans and voting against this bill, Sen. Strom Thurmond (R - S.C.) said his daughter had diabetes, and "we need to investigate [human cloning legislation] more thoroughly so that we do not deny our citizens and our loved ones of any possible life saving research." *See* 144 CONG. REC. S599-05.

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