



2001


Cloning in the Popular Imagination

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Recommended Citation

Nelkin, D., & Lindee, S. M. (2001). Cloning in the Popular Imagination. *The Cloning Sourcebook*, 83-93. Retrieved from http://repository.upenn.edu/hss_papers/12

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Cloning in the Popular Imagination

Abstract

Dolly is a cloned sheep born in July 1996 at the Roslin Institute in Edinburgh by Ian Wilmut, a British embryologist. She was produced, after 276 failed attempts, from the genetic material of a six-year-old sheep. But Dolly is also a Rorschach test. The public response to the production of a lamb from an adult cell mirrors the futuristic fantasies and Frankenstein fears that have more broadly surrounded research in genetics, and especially genetic engineering. Dolly stands in for other monstrosities—both actual and fictional—that human knowledge and technique have produced. She provokes fear not so much because she is novel, but because she is such a familiar entity: a biological product of human design who appears to be a human surrogate. Dolly as "virtual" person is terrifying and seductive—despite her placid temperament.

Disciplines

Biology | Cultural History | History of Science, Technology, and Medicine | Science and Technology Studies

7

Cloning in the Popular Imagination

Dorothy Nelkin & M. Susan Lindee

Dolly is a cloned sheep born in July 1996 at the Roslin Institute in Edinburgh by Ian Wilmut, a British embryologist. She was produced, after 276 failed attempts, from the genetic material of a six-year-old sheep. But Dolly is also a Rorschach test. The public response to the production of a lamb from an adult cell mirrors the futuristic fantasies and Frankenstein fears that have more broadly surrounded research in genetics, and especially genetic engineering. Dolly stands in for other monstrosities—both actual and fictional—that human knowledge and technique have produced. She provokes fear not so much because she is novel, but because she is such a familiar entity: a biological product of human design who appears to be a human surrogate. Dolly as “virtual” person is terrifying and seductive—despite her placid temperament.

Cloning was a term originally applied to a botanical technique of asexual reproduction. But following early experiments in the manipulation of hereditary and reproductive processes during the mid-1960s, the term became associated with human biological engineering. It also became a pervasive theme in horror films and science fiction fantasies. Appearing to promise both new control over nature and dehumanization, cloning attracted significant popular attention.

Underlying many depictions of cloning is the idea that human beings in all their complexity are simply readouts of a powerful molecular text. In *The DNA Mystique: The Gene as a Cultural Icon*, we called this idea *genetic*

essentialism, a deterministic tendency to reduce personality and behavior to the genes.¹ Exploring the popular appeal of genetic essentialism, we tracked its manifestations in the mass media—in television programs, advertising and marketing media, newspaper articles, films, child-care books, and popular magazines. We found repeated messages suggesting that the personal characteristics and identity of individuals are entirely encoded in a molecular text. We found references to genes for criminality, shyness, arson, directional ability, exhibitionism, tendencies to tease, social potency, sexual preferences, job success, divorce, religiosity, political leanings, traditionalism, zest for life, and preferred styles of dressing. We found pleasure-seeking genes, celebrity genes, couch-potato genes, genes for saving, and even genes for sinning. And we documented the public fears—or sometimes hopes—that geneticists will soon acquire the awesome power to manipulate the molecular text and thereby to determine the human future.

The responses to the Dolly phenomenon reflected these ideas. Dolly and cloning were immediately the subject of jokes on late-night talk shows and Internet web sites. Their humor depended largely on the assumption that human identity is contained entirely in the sequences of DNA in the human genome: Why not clone great athletes like Michael Jordan, or great scientists like Albert Einstein, or popular politicians like Tony Blair, or less popular politicians like Newt Gingrich, or wealthy entrepreneurs like Bill Gates? But there were also many anxious scenarios in the popular press, including futuristic stories about making new Frankenstein monsters, or creating Adolph Hitler clones, or producing “organ donors” only to harvest their (fully compatible) viscera.²

Dolly seems to lead to a future of highly managed, commercialized bodies, both animal and human. She is a manifestation of scientific rationality—a machine that can be tailored to human needs. And she is a symbol of human vulnerability—a sign that males may become obsolete or that commercial interests will dictate the human future. Speculations about Dolly reveal the patterns of current perceptions of science in the biotechnology age.

MORAL NARRATIVES

Cloning has long been a theme in novels and science fiction films. Most of these stories tend to be traditional narratives of divine retribution for violating the sanctity of human life. These days they employ the language of genetics, and they often dwell on the horrible consequences of genetic manipulation. A typical story appeared shortly after the 1976 controversy over recombinant DNA research. Stephen Donaldson’s *Animal Lover* is about a famous geneticist named Avid Paracels who became the victim of “genetic riots” that took place when news spread about his efforts to create a superior human being. The public was morally outraged by his research. He had threatened the “sanctity of human life.” The geneticist lost his grants and

had to abandon his career. "I can't understand," he complained, "why the society won't bear biological improvements. . . . What's so sacred about biology?" Other novels, such as Robin Cook's *Mutation* and Michael Stewart's *Prodigy*, convey the same theme. "No man has the right to tamper with the building blocks of human life."

Real research projects associated with cloning have evoked a similar sense of horror and dismay. As early as 1938, a British magazine called *Titbits* reported on research taking place at the Srangeway laboratory and tissue archive in Cambridge, England, the first laboratory devoted to tissue cultivation. The writer predicted that "canned blood" would be used to create new lives, and he wondered: "What exactly will be created? Could you love a chemical baby? Will the sexless, soulless creatures of chemistry conquer the true human beings?"³ Dreams of such creatures have been fueled by new biological technologies associated with agricultural and fertility research.

In 1993, scientists from George Washington University "twinned" a nonviable human embryo in an experiment intended to create embryos for in vitro fertilization. When they reported their work at the meeting of the American Fertility Society, newspapers, magazines, and television talk shows covered the experiment as if it involved a cloning technology for the mass production of human beings.⁴ While the scientists viewed their research as a contribution to helping infertile patients, the media stories about the research envisioned selective breeding factories, cloning on consumer demand, the breeding of children as organ donors, a cloning industry for selling multiples of human beings, and even a freezer section of the "biomarket."⁵ Journalists anticipated a "Brave New World of cookie cutter humans,"⁶ and they asked if the GWU scientists were playing God. A *Time* magazine survey found that 75% of their respondents thought cloning was not a good thing, and 58% thought it was morally wrong. Thirty-seven percent wanted research on cloning to be banned; 40% called for a temporary halt to research.

Yet, public responses to the GWU experiment in 1993 and then to Wilmut's experiment four years later were not all so negative. For some, cloning held the promise of creating perfect cows, sheep, and chickens, or perhaps even perfect people. Reflecting deterministic assumptions of genetic essentialism, media stories have suggested that clones would surely be identical products of their genes.

Reproduction has often appeared in mass media stories as a commercial transaction where the goal is to produce good stock. Sperm banks are described as a place to shop for "Mr. Good Genes" where potential parents scan lists of desirable genetic traits.⁷ Why not, in this context, use cloning to produce and reproduce perfect babies? They could, after all, be dependable reproductive products with proven performance.

Cloning has also been viewed as a way to assure a kind of immortality. Scientists have commonly constructed DNA as an immortal text. The Human Genome Diversity Project seeks to "immortalize" vanishing popula-

tions through saving their DNA. Molecular biologists have tried to extract “immortal” DNA from the remains of historical figures such as Abraham Lincoln and to reconstruct their health and personal characteristics long after they are dead. In his popular book *The Selfish Gene*, sociobiologist Richard Dawkins argues that DNA is immortalized through the reproductive process, for we are blindly programmed to preserve and pass on our genes. And, of course, in *Jurassic Park*, the DNA lives on forever in fossilized form and contains the complete instruction code of the living organism. In Michael Crichton’s story, if you want a dinosaur, all you need is dinosaur DNA.

Post-Dolly narratives build on these assumptions. Again and again media stories have predicted that cloning will allow the resurrection of the dead (bereaved parents, for example, might clone a beloved deceased child). Or the technology could provide life everlasting for the deserving (narcissists could arrange to have themselves cloned). Dawkins confessed his own desire to be cloned: “I think it would be mind-bogglingly fascinating to watch a younger edition of myself growing up in the twenty-first century instead of the 1940s.”⁸ Indeed, psychiatrist Robert Coles, in a *New York Times* interview, suggested that the very idea of cloning “tempts our narcissism enormously because it gives a physical dimension to a fantasy that one can keep going on through the reproduction of oneself.”⁹

Not surprisingly, in the United States, where demands and desires are frequently framed in terms of rights, cloning too has been defined as a “right.” Infertile women and their physicians have been among the most ardent advocates of cloning as a right; for if a single embryo could be used to create identical embryos for later fertilization, this could avoid the hormonal overload and painful procedures that women undergo for in vitro fertilization. The technology of cloning thus spawned not only Dolly but an association called “Cloning Rights United Front.” Its members insisted that cloning is part of the reproductive rights of every human being, and, in tune with the political sentiments of the 1990s, they wanted “the government to keep out.”¹⁰

Dolly also spawned an amazing range of humor—some silly, some funny—about the implications of cloning. Poems, cartoons, one-liners and puns about cloning appeared almost immediately on the Internet and in mainstream publications. Jokes can reveal cultural fault lines and social tensions; for their humor often plays on the contradictions and ironies of familiar contexts, events, or situations. Dolly jokes were no exception.

While cloning could theoretically make both sexes irrelevant to reproduction, it was suggested that the technology could be a threat to the male of the species—men will no longer be necessary! Writer Wendy Wasserman wondered what you would say to your shrink if you are your own mother.¹¹ An Internet inquirer wondered: “If I have sex with my clone, will I go blind?” A cartoonist in the London *Guardian* depicted a woman comforting a cab driver who had just run over her husband: “That’s alright, I have another one upstairs.” Even the issue of scientific fraud became a source of

cloning humor. What if the cloning experiment was in fact a fraud? “Well, they really would have pulled the wool over our eyes.”

Meanwhile, a journalist predicted a new action movie called *Speed Sheep* in which thousands of cloned sheep clogged Interstate 95. Headlines of cloning stories reveled in puns: “An Udder Way of Making Lambs,” “Send in the Clones,” “Little Lamb, Who Made Thee?” “Will There Ever Be Another Ewe?” and “Getting Stranger in the Manger.” And inevitably there was the anticipation of “Double Trouble.”

Many of the cloning quips were comments on social, political, and professional tensions.¹² A divorce lawyer predicted the doubling of his business. Historians wondered if the Founding Fathers could be cloned for display in a “living history” exhibit in a theme park: they suggested that the park might be called “Clonial Williamsburg.” Some cynical policy commentators announced that cloning experiments could be developed to solve social problems: The race problem could be resolved by manipulating the balance between melanin and IQ genes. The age-old nature-nurture dispute could be definitively settled by creating clones and raising them systematically in different environments.

Religious ethicists and theologians had a lot to say about the cloning experiment.¹³ One writer quipped that cloning offered a “second chance for the soul.” If you sin the first time, try again. But a theologian, Rabbi Mosher Tendler, a professor of medical ethics at Yeshiva University in New York, warned that “whenever man has shown mastery over man, it has always meant the enslavement of man.” Other theologians, long concerned about the implications of genetic engineering, worried that the scientists who experimented with cloning were “playing God” and “tampering with God’s creation.”¹⁴ However, a less reverent wag wondered about the implications of cloning the Pope: Would they both be infallible? And what if they disagree?

ECONOMIC NARRATIVES

In his scientific paper itself, Wilmut fussed over the problem of whether “a differentiated adult nucleus can be fully reprogrammed.” He called the lamb in question 6LL3 rather than Dolly, and made it clear, in diagrams and illustrations of gels, that there is some question about the precise genetic relationship between Dolly and the “donor.”¹⁵ Somatic DNA, which was the source of Dolly’s genes, is constantly mutating. Dolly, in fact, may not be genetically identical in every way to her “mother,” a point that is of some importance for the possible agricultural uses of cloning techniques.

For writers in the popular press, however, such technical details were less important than symbolic associations. The cloning of a lamb was immediately set in a context of other fears about genetics and genetic manipulation, and especially about rapid and sometimes startling advances in

reproductive technology. The technological changes allowed by the possibility of freezing sperm and embryos and by the improvements in techniques of in vitro fertilization (IVF) have been remarkable. But they have also been controversial. They have included, for example, a controversial proposal, put forth by a fertility specialist, to harvest eggs from the ovaries of aborted fetuses and then mature the fetal cells and fertilize them in a petri dish for use in research and implantation. And they have included a plan for creating embryos through parthenogenesis.¹⁶ The debates over such reproductive techniques set the stage for the response to cloning.

So too, responses to Dolly reflected public debates about other uses and abuses of science and technology. One journalist compared cloning to weapons development. Another worried that the shortage of organs for transplantation would be resolved by cloning anencephalic babies (who are born without a brain but are otherwise normal), so that their organs could be harvested for patients in need. Many news stories have reflected mistrust of scientists, and the fear that the outrageous possibilities suggested by cloning a sheep will eventually, perhaps inevitably, be realized in human beings. News headlines frequently suggest that science cannot be controlled: "Science Fiction Has Become a Social Reality." "Whatever's Next?" And, of course, "Pandora's Box."

Many news and popular culture accounts have expressed the growing tensions over commercial trends in genetics and biotechnology and their implications for the commodification of the body. A series of legal developments in the 1980s set the stage for commercial developments in biotechnology. They encouraged collaborations between university researchers and biotechnology companies and allowed the patenting of products of nature, including human genes.¹⁷ In this context, business interests welcomed Dolly; for cloning has huge potential economic implications especially for agricultural and pharmaceutical applications. As predicted by a *Business Week* cover article in March 1997, called "The Biotech Century," "cloning animals is just the beginning." Such advances "will define progress in the 21st century. It's all happening faster than anyone expected."¹⁸

But there is a downside of these commercial trends that also helped to shape responses to the cloning experiments. Critics have documented the growing conflicts of interest in science, the increased secrecy, and the reluctance to share data.¹⁹ Reporters noted that Wilmut held back the announcement of Dolly's birth until he registered a patent. And other observers speculated about the implications of patenting clones for perceptions of the person. Is the body to become little more than a commodity, a commercial entity that can be simply constructed as a product?²⁰

Just as the GWU experiment evoked images of a cloning industry and breeding factories, so Dolly evoked cynical references to "test-tube capitalists," and sardonic queries about a market for genetic "factory seconds" and "irregulars." A World Wide Web site called Dreamtech satirized the issues by advertising a commercial service to create either "custom clones" or "designer clones." The "company" would clone various celebrities for a

range of licensing fees, depending on the anticipated value of the product. The advertisement also offered a personal extraction kit, surrogate services, rapid delivery, and a backup embryo.²¹

In the 1990s, the bar-code has become a popular image, to be seen, for example, as a common body tattoo. It is also a symbol of protest. In London, protesters organized a demonstration against the granting of a patent for the processing of umbilical cord blood, a useful source of stem cells. The demonstration featured a pregnant woman with a bar code on her belly. And in a casual but revealing conversation after a television interview on cloning with one of the authors, a camera technician who was cleaning up the gear quipped, only half in jest: "I used to be a person, then I became a social security number. Now I am just a bar code—just a commodity like the cloned sheep."²²

The commercialization of fertility procedures through the growth of an IVF industry have compounded concerns about commodifying the body. The full-page advertisements for private fertility clinics, the calls for female egg donors as well as sperm donors, the incidents of embryo theft, have tainted this thriving enterprise. There is a sense, especially in feminist writings, that the human body is being devalued as reproduction has become a commercial enterprise.²³ And there is a fear that private clinics would not be constrained at all by moral or ethical reservations about cloning.

NARRATIVES OF CONTROL

The messages evoked by Dolly have ranged from promises of progress to portents of peril, from images of miracles to visions of apocalypse. There were many calls for regulation and for a moratorium on cloning experiments. Just a week after the cloning of Dolly, President Clinton issued a directive banning the use of federal funds to support research on the cloning of human beings. So too, the president of France, the president of the European Commission, the director-general of Unesco, and the Vatican all called for a moratorium on research on cloning, which had clearly become politically unacceptable.

As political and social pressures grew, scientists responded, defending the importance of the work. Media images were "selling science short." The calls for regulations and restrictions, they argued, ignored the medical benefits that could follow from cloning experiments and their potential contribution to the development of life-saving treatments, skin grafts for burn victims, treatments for infertile couples, and a means of testing new drugs.²⁴ We are not interested in playing God, said James Geraghty, president of the biotechnology firm Genzyme, but in "playing doctor."²⁵ Mammalian cloning could help to generate tissue for organ transplantation and encourage transgenics experimentation. And certainly research using cloning would enhance scientific knowledge about cell differentiation. The politicians who sought a ban on cloning research, said scientists, were "shooting from the

hip.”²⁶ Science fiction, they insisted, should not be the guide to science policy.

Responding to the growing threat of regulation, a group of prominent scholars from the International Academy of Humanism signed a “Defense of Cloning and the Integrity of Research.” This academy, a group of self-identified “secular humanists,” have, since the debates over teaching creation theory in the schools during the 1970s, been inclined to interpret every critique of science and every discussion about regulation as a manifestation of antiscience sentiment. There were, they claimed, no particularly profound moral issues related to cloning, but only a “Luddite rejection” of cloning by “advocates of supernatural and spiritual agendas.” They included in this Luddite group the President’s National Bioethics Advisory Commission, which was convened in 1997 to consider moral issues and to recommend government policy.

This 18-member commission had focused on potential physical and psychological risks as well as the moral acceptability of cloning. After three months of intensive deliberation, it concluded that the government should continue its moratorium on federal funding for cloning research. Perhaps most interesting, the commission members worried that private IVF clinics were likely to break the moratorium and to clone babies in response to their private patients’ demands. Thus, the commission recommended legislation that would ban all research on the cloning of people. However, the group was reluctant to permanently fetter research and proposed that legislation be crafted as temporary until there was time for further deliberation over the coming years. And no prohibitions at all were placed on the cloning of individual cells or animals for research purposes. Whether the legislature has the constitutional authority to regulate scientific procedures, and whether federal laws have authority over IVF clinics operating within state boundaries and normally regulated by state laws is a matter of some disagreement within the legal community and remains to be tested.

President Clinton accepted the report and sent legislative recommendations to Congress. In a speech in the Rose Garden, he said: “Cloning has the potential to threaten the sacred family bonds at the core of our ideals and our society . . . to make our children objects rather than cherished individuals.” But the very same day, a Switzerland-based group, supported by a group of investors, launched an international company called Valiant Ventures Ltd. It claims to provide a “Clonaid” service for wealthy parents worldwide who want to have a child cloned. The cost would be just \$200,000.²⁷ In addition, the company would provide safe storage of the tissue from any “beloved person” so that it could be cloned at a later date in case of death. This company also offered to support the efforts of Dr. Richard Seed, the physicist who said, in 1998, that he intended to open a commercial clinic to clone people.

 RORSCHACH READINGS

Dolly, after all, is only a sheep, and she is depicted again and again as cuddly and cute. But as a symbolic site for the exploration of identity, heredity, destiny, and the social meaning of science, she is a spectacular beast. She is a compelling actor in contemporary dreams about science—evoking for some euphoric fantasies; for others horrible nightmares and the fear of science out of control. She offers up the possibility of hyperreality in the management of bodies and of complete genetic control of cows, sheep, and humans as well. She offers the specter of technical decisions that will turn all bodies (human and animal) into intentional products, manufactured and designed “on purpose.” She evokes a way of thinking about bodies as little more than efficient mechanisms for the production of “value”—be it milk, or meat, or creative imagination. But she is also a focus of popular mistrust of research that is tied to commercial interests.

Dolly can thus be regarded less as a sheep than as a microcosm of the history of science—a symbol of the rich interconnections between animals and human beings, of the struggles between technological changes and moral tenets, of the tensions between the advance of scientific knowledge and demands for political expediency in the face of public concerns.

Popular speculations about science and its terrors have often been dismissed as based on journalistic ignorance of science, sensationalism, or willful misinterpretation for the sake of making news. But media messages matter, and often reflect legitimate concerns. Widely disseminated images and narratives have real effects, regardless of their relationship to the technical details of the scientific work. They shape the way people think about new technologies, assess their impacts, and develop ways to control them.

The popular responses to Dolly are especially important because they convey meanings that extend well beyond the single experiment. Dolly has become far more than a biological entity; she is a cultural icon, a symbol, a way to define the meaning of personhood and to express concerns about the forces shaping our lives. She provides a window on popular beliefs about human nature and the social order, on public fears of science and its power in society, and on concerns about the human future in the biotechnology age. She is a stunning image in the popular imagination.

 NOTES

1. Dorothy Nelkin and M. Susan Lindee, *The DNA Mystique: The Gene as a Cultural Icon*, New York: W. H. Freeman, 1995.
2. Robert Langreth, “Cloning Has Fascinating, Disturbing Potential,” *The Wall Street Journal*, February 24, 1997.
3. Strangeway Archives, Spears Archive, Box 5, Wellcome Trust Library, London.

4. See, for example, the report on the George Washington University experiment in Philip Elmer Dewitt, "Cloning: Where Do We Draw the Line?" *Time*, November 8; 1993, pp. 64–70.

5. Some of the scenarios appeared in a review of the media coverage of human embryo cloning in the *Newsletter* of the Center for Biotechnology Policy and Ethics of Texas A & M, January 1, 1994.

6. Dewitt, "Cloning: Where Do We Draw the Line?"

7. See a review of the media reports on reproductive technologies in Nelkin and Lindee, *The DNA Mystique*, p. 97.

8. Richard Dawkins, quoted in *Nature* **386**, March 6, 1997. Dawkins called himself a "closet clone" in an interview with the *Evening Standard* (London), February 25, 1997.

9. Robert Coles, quoted in Gustav Niebuhr, "Suddenly Religious Ethicists Face a Quandary on Cloning," *New York Times*, March 1, 1997.

10. Reported in the *New York Times Magazine*, May 25, 1997, p. 18.

11. Quoted in *New York Times*, February 27, 1997.

12. Some of these quips come from the Oracle Service List on the Internet (oracle-list@synapse.net, April 30, 1997). Others come from other Internet communications and from talk shows. Still others are jokes we have heard in casual conversations. We selected them from the many jokes and stories we found in popular sources because they suggest the range of concerns and issues raised in popular culture.

13. For a summary of religious views about cloning, see Gustav Niebuhr, "Suddenly, Religious Ethicists Face a Quandary on Cloning," *New York Times*, March 1, 1997.

14. Articles in evangelical magazines such as *Christianity Today* have regular articles opposing genetic engineering as "tampering with genes." See, for example, *The Plain Truth* **55**, pp. 3–8. Pope John Paul II has taken a position on genetic manipulation, arguing that: "All interference in the genome must be done in a way that absolutely respects the specific nature of the human species, the transcendental vocation of every being and his incomparable dignity." Address to the Pontifical Academy of Sciences, October 8, 1994, quoted in *Family Resource Center News* winter 1996, p. 1.

15. I. Wilmut et al., "Viable Offspring Derived from Fetal and Adult Mammalian Cells," *Nature* **35**, February 27, 1997. pp. 810–812.

16. See discussion in National Institutes of Health, *Report of the Human Embryo Research Panel*, Washington, DC, September 1994, volume I.

17. Among the most important federal laws was 15 U.S.C.S. 3701 et seq. 1995, which provided tax incentives to companies investing in academic research. At the same time, a landmark Supreme Court case, *Diamond v. Chakrabarty*, 147 US 303 (1980), granted a patent on a life form (a bacterium), setting the stage for the patenting of human genes.

18. Cover Story of *Business Week*, March 10, 1997.

19. For example, see David Blumenthal et al., "Participation of Life Science Faculty in Research Relations with Industry," *New England Journal of Medicine* **335** (1996): pp. 1734–1739; and Sheldon Krimsky et al., "Financial Interests of Authors in Scientific Journals," *Science and Energy Ethics* **21** (1996): pp. 395–410.

20. Dorothy Nelkin and Lori Andrews, "Homo Economicas: Commercialization of Body Tissue in the Age of Biotechnology," *Hastings Center Report* 28, September 1998, pp. 30–39, and Andrews and Nelkin, *Body Bazaar*, New York: Crown Books, 2001.

21. Dreamtech, <http://www.D-B.Net/DT1/Intro2.HTML>.

22. Personal communication to Nelkin, May 1997.

23. Gena Corea, "Current Developments and Issues: A Summary," *Reproductive and Genetic Engineering* 2, (1989): p. 3.

24. Medical News and Perspectives, "Threatened Bans on Human Cloning Research Could Hamper Advances," *JAMA* 277, April 2, 1997, p. 1023. Also see statement from the International Academy of Humanism called, "Defense of Cloning and the Integrity of Scientific Research," quoted in *Science* 276, May 30, 1997, p. 1341.

25. James Geraghty, quoted in *Genetic Engineering News*, April 1, 1997, p. 10.

26. Brigid Hogan, professor in cell biology, quoted in Meredith Wadman, "Politicians Accused of 'Shooting from the Hip' on Human Cloning," *Nature* 386, March 13, 1997, p. 97.

27. It advertises on the Internet at <http://www.clonaid.com>.