

18 Cloning Can't Be Stopped

Daniel J. Kevles

Dolly, the world's most famous sheep, was cloned from the udder cells of an adult ewe. On announcing her birth in 1997, embryologists Ian Wilmut and Keith Campbell, who had engineered her, noted that she had been named in honor of the entertainer Dolly Parton. Wilmut explained, "No one could think of a more impressive set of mammary glands than Dolly Parton's." Parton responded, "I'm honored."

Dolly's birth was a milestone in the engineering of animals for food and medicine, but not everyone was as pleased as Parton by the event, much less by the implication that the same methods might be used to clone human beings. On the contrary: since Dolly's arrival, the prospect of human reproductive cloning has been widely condemned by clerics and ethicists, politicians, pundits and scientists as unethical, unsafe and socially dangerous.

Yet human cloning will almost surely happen. In the past, other new reproductive technologies were also denounced at first; but then they were adapted to serve human procreational needs and ultimately became commonplace practices. Human cloning already has advocates—according to polls, six to seven percent of adult Americans, including, no doubt, many who cannot or prefer not to have children by conventional means. If human cloning is made reliably safe for both mother and child, market demand for it will gain considerable force, likely overpowering the residue of moral objection.

At the moment, the moralists enjoy a strong advantage. Ian Wilmut himself opposes human cloning, calling it "offensive." Clerics of many different faiths attack it as a violation of God's order; ethicists denounce it as a denial of the cloned child's right to a unique genetic identity. Social critics warn that cloning would simply permit the rich to indulge in reproductive ego-

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mania or entrepreneurs to mass-produce superior athletes. In a recent report, a panel appointed by the National Academy of Sciences concluded, based on animal experiments conducted since 1997, that production of babies by cloning “is dangerous and likely to fail” and that human reproductive cloning should be legally prohibited. Laws banning it have been enacted in 24 countries, including France, Germany, the United Kingdom, India, Japan, South Africa and Brazil. Calls for the prohibition of human cloning have been strongly endorsed by President George W. Bush and the U.S. House of Representatives, though not—as *Technology Review* goes to press—by the Senate.

The outcry brings to mind the great biologist J. B. S. Haldane’s *Daedalus*, a slim book of reproductive utopianism published in 1924. Haldane held that the Daedalus of Greek mythology was the first biological inventor (the first genetic engineer, we would say) because he was connected with the creation of the Minotaur through the coupling of Pasiphaë and the Cretan bull. Daedalus escaped punishment from the gods for his hubris, Haldane noted, but he suffered “the age long reprobation of a humanity to whom biological inventions are abhorrent.”

While Daedalus did not offend the gods of his day, many people have indicted innovators in reproductive technology for affronting God, or ethics, in ours. Haldane’s ideas were mocked in Aldous Huxley’s *Brave New World*. In the 1930s, artificial insemination was promoted as a means to a radical eugenics by, among others, the American biologist Hermann J. Muller, a socialist and future Nobel laureate. At the time, eugenics had yet to be discredited by its association with the Nazis, and Muller, along with other biologists on the left, thought that a eugenic revolution could be achieved if outstanding men could spread their seed via artificial insemination. To Muller’s mind, so “many women... would be eager and proud to bear and rear a child of Lenin or of Darwin... that restraint, rather than compulsion, would be called for.” Muller was naive to think that women would eagerly make themselves into vessels for the sperm of great men, but his ideas were also thwarted by the moral conventions of the day, which held artificial insemination—even to compensate for a husband’s sterility—to be tantamount to adultery.

In the early 1970s, the British scientists Patrick Steptoe and Robert Edwards faced moral condemnation for their research into the creation of human embryos through in vitro fertilization. The medical ethicist Leon

Kass, claiming that infertility was a social problem rather than a medical one, contended that such fertilization was not therapeutic because it did not cure women of that condition. Kass—now the head of President Bush's bioethics commission—insisted that by making embryos in the lab, biologists like Edwards were doing experiments on “potential human subjects” who might suffer birth defects because of the procedure but who could not give their consent. Paul Ramsey, a theologian at Princeton University, found implications of eugenics—now a dirty idea following the revelations of the Nazi death camps—in test-tube fertilization. He insisted that it was a manufacturing process that, if coupled to genetic engineering, might enable parents to choose “to have a girl rather than a boy, blond hair rather than brown, a genius rather than a lout.” He wanted such fertilization prohibited on moral grounds, and so did the American Medical Association.

Haldane knew that although a given biological innovation might initially be seen as a perversion, over time it could become accepted as “a ritual supported by unquestioned beliefs and prejudices.” Acceptance depends on social circumstances and the purposes to which the innovation is adapted. The women's movement that began in the 1960s, by emphasizing a woman's right to control her own body, led a few women to avail themselves of the Repository for Germinal Choice, the so-called Nobel Prize sperm bank, a venture in Escondido, CA, that Muller's ideas had inspired. But the women's movement helped infinitely more to divorce artificial insemination from both its eugenics connection and its adulterous connotation and associate it with the simple desire to have a child.

In England, Edwards—confident in his results from *in vitro* fertilization with lower animals—effectively rebutted the warnings of critics like Kass with the July 25, 1978, birth of Louise Brown, the world's first test-tube baby, perfectly formed and healthy, a joy to her hitherto infertile mother. By the mid-1990s, more than 150,000 babies fertilized in petri dishes had been born, and with *in vitro* fertilization clinics proliferating around the world, the number today could be higher than 500,000. Follow-up studies of test-tube babies have concluded that, while twice as many come into the world with handicaps such as low birth weight, nine out of ten of them are no more likely to suffer from disease or disability than conventionally conceived children.

Surrogate motherhood, in which one woman carries a fetus for another, was also condemned at first as immoral and exploitative but has since become commonplace. Thanks to advances in prenatal diagnosis, many women at risk for bearing children with genetic or chromosomal disorders resort to abortion if their fetuses have lost the roll of the genetic dice. It seems inevitable that human cloning, if made medically safe, will undergo similar taming and adaptation to human wants. According to polls, a majority of the U.S. public already supports so-called therapeutic human cloning—the creation of cloned embryos for research, particularly on stem cells—and so does the National Academy of Sciences. President Bush and his conservative allies, including Kass, object to research cloning, saying it creates life only to destroy it, but they appear to be fighting a rear-guard moral action. The mere prospect that human therapeutic cloning will pay medical dividends has so far sufficed to block the absolutists in the Senate who want to ban human cloning for any purpose. If work with embryonic stem cells begins to yield actual treatment for disease, therapeutic cloning will become even more common in the lab than artificial insemination and *in vitro* fertilization are in the clinic.

Therapeutic cloning today will hasten the arrival of reproductive cloning tomorrow. Even without it, cloning techniques and technology are advancing rapidly. Since Dolly, cattle and pigs have been cloned, and so have mice, goats, cats and rabbits, with techniques that are said to be promising for overcoming the practical difficulties in getting human clones to grow. Human cloning research will surely yield still further improvements in safety and reliability—and someday, somewhere, lead a biologist to implant a cloned embryo in a willing woman's womb.

The demand for human reproductive cloning is already evident. Calls for permitting it have come from gay men, lesbians and infertile couples who wish to have genetically related children, and from people who want to clone lost children or other relatives. James Grifo, a fertility specialist at New York University Medical Center, has said of cloning opponents, "None of them have seen the misery my patients are living through." Still, human clones will not be what some people expect—replacement duplicates of their sources. They will, like everyone else, be born as babies. Each will be genetically the same as its clonal parent, a new kind of identical twin; but since each will be shaped by environmental influences different from those the parent encountered, each will develop uniquely.

Yet human clonal reproduction will open uncharted territory in familial dynamics, especially where children are raised by their clonal parents. No twin has ever been called into being and then reared by its identical sibling. How the child will turn out psychologically and emotionally is anybody's guess. But that uncertainty will not stop prospective clonal parents, just as similar unknowns about how children will turn out have of course not stopped conventional reproduction.

Once reproductive cloning is made physically safe for the fetus, its enthusiasts may find an ally in U.S. law. The U.S. Congress, of course, could decide to ban human cloning for any purpose, claiming the power to do so because it can regulate interstate commerce, and a cloning clinic would be open to women from anywhere in the country. But such a law could well run afoul of the U.S. Supreme Court's ruling in *Roe v. Wade*, which, by upholding the right of a woman to choose an abortion, arguably implies that the state cannot interfere with how she chooses to reproduce.

The first human clone will probably be born outside the United States—perhaps in China, where work on human cloning is reported to be proceeding. Wherever the child appears, its birth will undoubtedly electrify the world. Unlike Louise Brown, this baby will not fade immediately into the noise of daily life; people will want to know with much greater interest if it is healthy, and if it remains so. If it does, one imagines that other cloned children will follow and become commonplace—beneficiaries, like Louise Brown's successors, of a new commodity in the growing emporium of human reproduction.