

## Cloning's Historical Timeline

5000 B.C.	Humans discover that they can improve corn crops by planting seeds from the best plants.
1866	Gregor Mendel publishes "Experiments in Plant Hybridization," which establishes the basic laws of inheritance. Mendel comes to be known as the father of genetics.
1869	Johann Friedrich Miescher extracts what comes to be known as DNA from the nuclei of white blood cells.
1880	August Weissmann states genetic information of a cell diminishes with each cell division.
1902	Walter Sutton proves chromosomes hold genetic information.
	Hans Spemann divides a salamander embryo in two and shows early embryo cells retain all the genetic information necessary to create a new organism. This experiment is the first artificial inducement of the natural cloning that produces identical twins, triplets, and so on.
1903	Herbert Webber of the U.S. Dept. of Agriculture coins the word <i>clon</i> —which eventually becomes <i>clone</i> —to refer to "any group of cells or organisms produced asexually from a single sexually produced ancestor."
1928	Hans Spemann performs first nuclear transfer experiment using salamander embryos.
1929	Pheobus Levene discovers a previously unknown sugar, deoxyribose, in nucleic acids that do not contain ribose; those nucleic acids are now known as deoxyribonucleic acids, or DNA.
1938	German scientist Hans Spemann proposes a "fantastical experiment" to transfer one cell's nucleus into an egg without a nucleus, the basic method that would eventually be used in cloning.
1944	Oswald Avery discovers genetic information is carried by the nucleic acids of cells.
1952	Briggs and King clone frogs by using nuclear transfer. Although successful, scientists believe for more than 40 years thereafter that adult cells cannot be used for cloning "higher" animals.
1953	Watson and Crick find the structure of DNA.
1958	F.C. Steward grows whole carrot plants from carrot root cells, which encourages the belief that cloning from adult cells may be possible.
1962	John Gurdon clones frogs from differentiated adult cells.
1963	J.B.S. Haldane coins the term <i>clone</i> .
1966	Nirenberg, Mathaei, and Ochoa determine which codon sequences specify each of the 20 amino acids, thereby "cracking the genetic code" and opening the door to advances in genetic engineering.
1967	Enzyme DNA ligase isolated.
1969	Shapiro and Beckwith isolate the first gene.
1970	First restriction enzyme isolated.
1972	Paul Berg creates the first recombinant DNA molecules.
1973	Cohen and Boyer create first recombinant DNA organisms.
1977	Fred Sanger invents a method for sequencing DNA, which later enables researchers to map the genomes of various species.

1978	The release of David Rorvik's book, <i>In His Image: The Cloning of a Man</i> , sparks a worldwide debate on cloning ethics.
1980	U.S. Supreme Court rules that live, human-made organisms are patentable material.
1981	Karl Illmensee and Peter Hoppe claim to have cloned mice by transplanting the nuclei of mouse embryo cells into mouse eggs. Other scientists are unable to reproduce the results. It is later discovered that the results were faked.
1983	Kary B. Mullis develops the polymerase chain reaction technique for rapid DNA synthesis.
	Solter and McGrath fuse a mouse embryo cell with an egg without a nucleus, but fail to clone using their technique.
1984	Steen Willadsen, a Danish scientist, reports he has made a genetic copy of a lamb from early sheep embryo cells, a process now called <i>twinning</i> . This is the first verified cloning of a mammal via nuclear transfer. Other scientists will eventually use his method to twin cattle, pigs, goats, rabbits, and rhesus monkeys.
	Sir Alec Jeffreys accidentally invents DNA fingerprinting while studying how genes evolve.
1986	Steen Willadsen clones cattle from differentiated cells.
	First, Prather, and Eystone clone a cow from embryo cells.
1990	Human Genome Project begins.
1994	Neal First produces genetic copies of calves from embryos. They grow to at least 120 cells.
1995	Ian Wilmut replicates First's experiment with differentiated cells from sheep, but puts embryo cells into an inactive state before transferring their nuclei to sheep eggs. The eggs develop into normal lambs.
1996	Dolly, the first animal cloned from adult cells, is born (not announced until 1997).
1997	Only a week after the Dolly announcement, scientists bring cloning technology closer to humans by twinning rhesus monkeys from embryos.
	The first cloned cow is produced from a fetal cell.
	Researchers at the University of Hawaii produce first mouse cloned from an adult cell.
	President Bill Clinton proposes a five-year moratorium on human cloning.
	Scientists and ethicists testifying at a Senate hearing on cloning urge Congress not to rush to ban research on the cloning of human beings.
	President Clinton signs a five-year moratorium on the use of federal funds for human cloning research. His National Bioethics Advisory Commission had concluded that human cloning would be unsafe and unethical.
	The scientists who produced Dolly announce that they have created a lamb with a human gene in every cell of its body. Named Polly, the lamb was produced using a method similar to that used to create Dolly.
	Richard Seed, a successful fertility researcher, announces his plans to clone a human.
1998	Ryuzo Yanagimachi and his postdoctoral student Teruhiko Wakayama in Hawaii clone some 50 mice from an adult cell. Some of the mice are clones of clones, created by using a technique different than that used to produce Dolly the sheep.

	The first project aimed at cloning a domestic pet, a dog named Missy (Missyplicity Project), is launched.
	Japanese scientists report they have cloned eight copies of a single cow, the third mammal to be cloned.
	The first goat is cloned from an embryonic cell.
1999	Researchers at the University of Hawaii produce Fibro, the first male clone. The mouse was named after the type of cell—a fibroblast or connective tissue cell—that was taken from the genetic donor. All previous clones of adult mammals had been female.
2000	Britain becomes the first country to grant a patent for cloned early-stage human embryos. Geron Corporation, which received the patent, says it has no intention of creating cloned humans.
	The group that created Dolly the sheep announces the first cloned pigs. Scientists hope that pigs could be genetically engineered for use in human organ transplants.
	Genetics Savings & Clone is founded to produce clones of domestic pets.
	The first goat is cloned from an adult cell.
	A mouflon, a rare kind of sheep, is cloned from an adult cell.
2001	An endangered Asian ox called a <i>gaur</i> is cloned. It dies two days after birth of an ordinary disease after it was cloned and gestated in the womb of a cow.
	The first human clone embryo is produced; it is planned for embryonic stem cell harvesting, <i>not</i> reproductive cloning. However, it stops dividing before stem cells can be harvested.
	Operation CopyCat at Genetic Savings & Clone results in the birth of the first clone of a domestic animal, the cat CC.
2002	The first rabbits are cloned from adult cells.
	The first cloned human baby, a copy of its mother, is reported to be born. However, her existence is never confirmed through DNA tests. Most of the scientific community believes it to be a hoax.
2003	The first cloned bantengs (endangered species) were born to cows. The genetic donor had died 23 years earlier and his DNA preserved in the “Frozen Zoo” at San Diego Zoo’s Center for the Reproduction of Endangered Species.
	The first mule cloned from a mule fetus is born.
	Chromatin transfer (CT) technology, is developed and exclusively licensed for pet cloning.
	The first horse is cloned from an adult cell.
	The first deer is cloned from an adult cell.
	The first African wildcat is cloned from an adult cell.
2004	The first domestic cats are cloned using CT technology, and are publicly displayed.
	The first commercially-produced pet clone, a domestic cat named Little Nicky, is delivered to his owner.
2005	Researchers at Seoul National University produce Snuppy, the first clone of a domestic dog.
	Unrelated cloned African wildcats are successfully bred under natural conditions. This is the first time unrelated clones of a wild species have produced offspring.

Timeline compiled from sources including [www.reproductivecloning.net](http://www.reproductivecloning.net), [www.savingsandclone.com/cloning/timeline.html](http://www.savingsandclone.com/cloning/timeline.html), and [www.tomwmiller.com/cloneshoppingnetwork\\_069.htm](http://www.tomwmiller.com/cloneshoppingnetwork_069.htm).

