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# Cloning


Stephen Ferry/Getty Images

**Animal cloning has been the subject of scientific experiments for years, but garnered little attention until the birth of the first cloned mammal in 1997, a sheep named Dolly.**

## Introduction

Cloning is the process of making a genetically identical organism through nonsexual means.

Since Dolly, several scientists have cloned other animals, including cows and mice.

The recent success in cloning animals has sparked fierce debates among scientists, politicians and the general public about the use and morality of cloning plants, animals and possibly humans.

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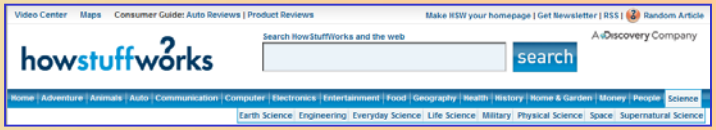


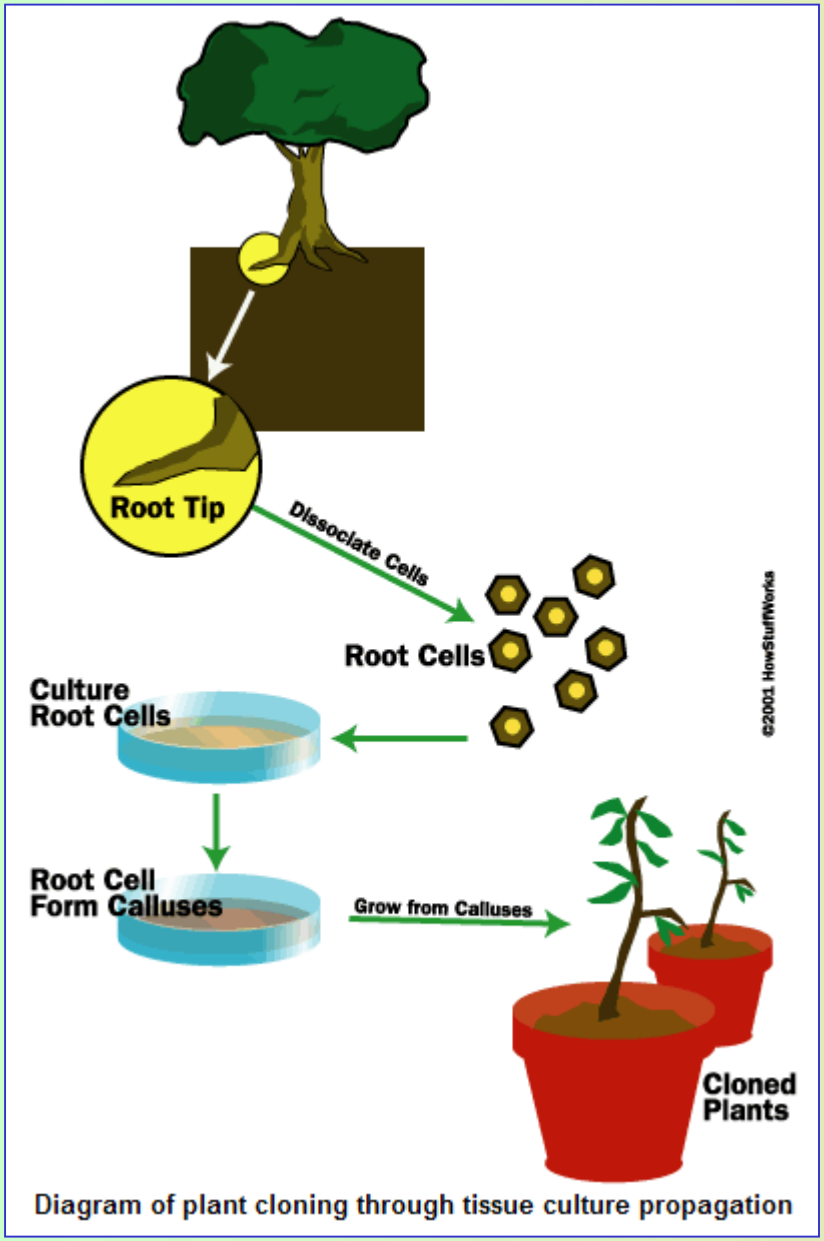

Diagram of plant cloning through tissue culture propagation

## Producing clones: plant life

Scientists have been able to clone plants by taking pieces of specialized roots, breaking them up into root cells and growing the root cells in a nutrient-rich culture.

In culture, the specialized cells become unspecialized (dedifferentiated) into calluses. The calluses can then be stimulated with the appropriate plant hormones to grow into new plants that are identical to the original plant from which the root pieces were taken.

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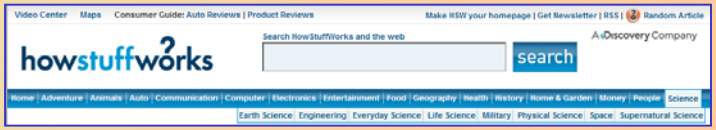


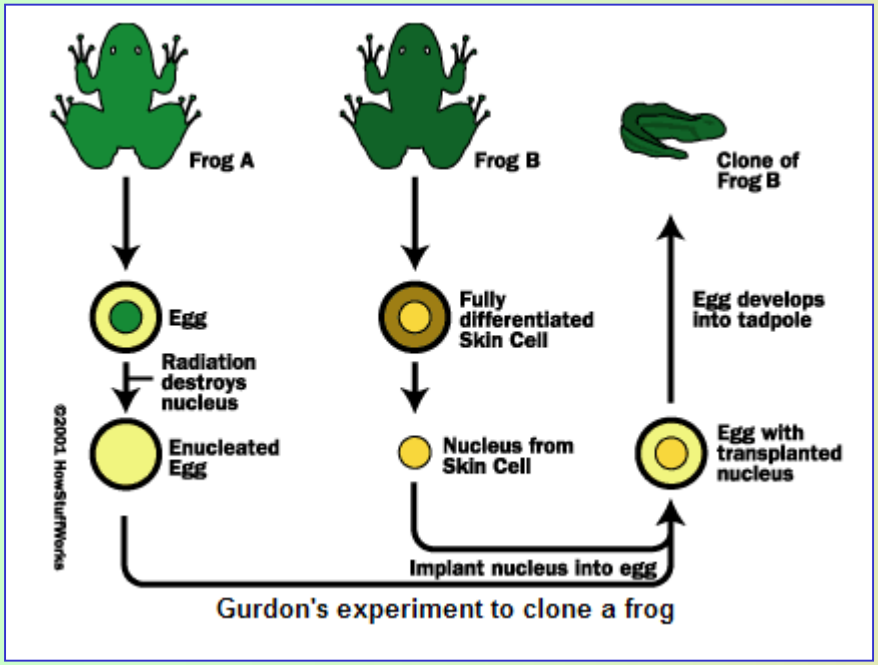


## Producing clones: animal kingdom

The unfertilized eggs of some animals (small invertebrates, worms, some species of fish, lizards and frogs) can develop into full-grown adults under certain environmental conditions -- usually a chemical stimulus of some kind.

Scientists rely on transplanting the genetic information from a specialized cell into an unfertilized egg cell whose genetic information has been destroyed or physically removed.

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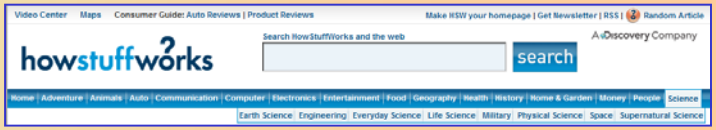


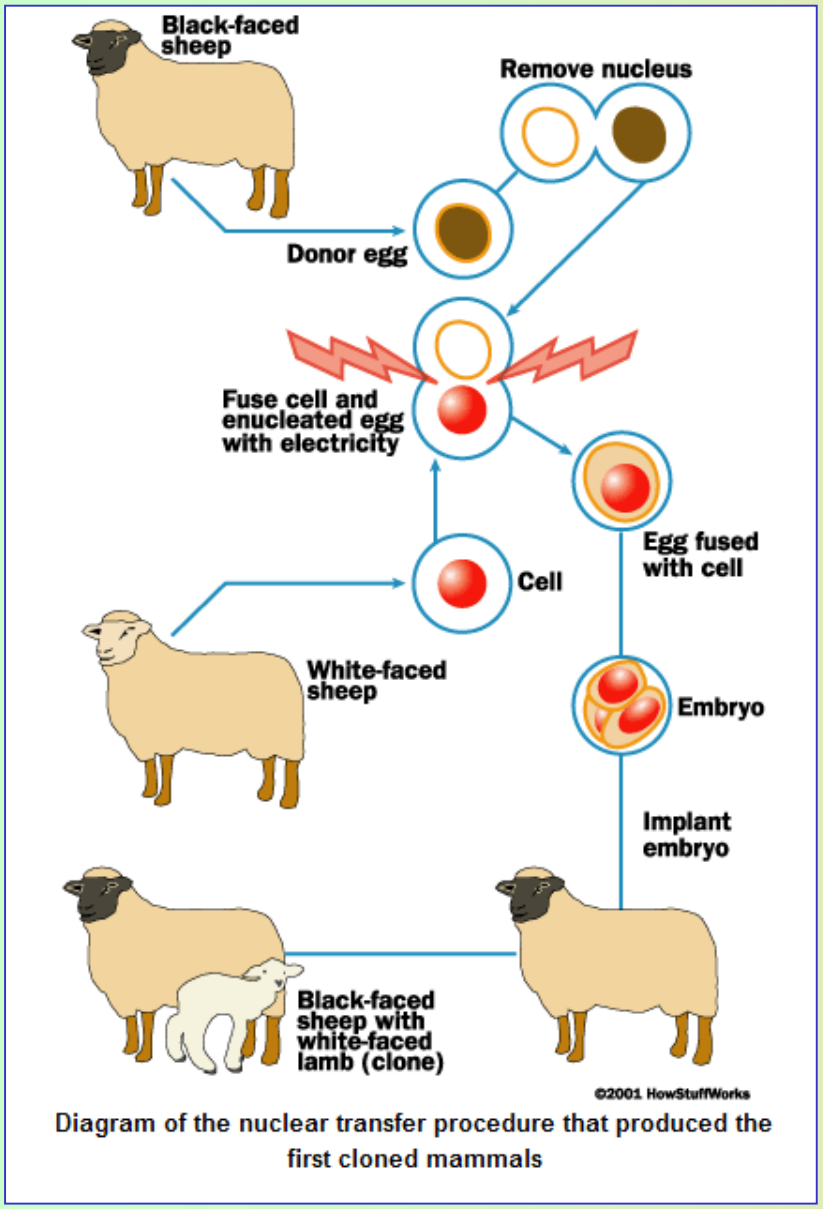


Diagram of the nuclear transfer procedure that produced the first cloned mammals

## Dolly

In 1997, cloning was revolutionized when Ian Wilmut and his colleagues successfully cloned a sheep named Dolly.

Dolly was the first cloned mammal. Wilmut and his colleagues transplanted a nucleus from a mammary gland cell of a Finn Dorsett sheep into the enucleated egg of a Scottish blackface ewe.

The nucleus-egg combination was stimulated with electricity to fuse the two and to stimulate cell division. The new cell divided and was placed in the uterus of a blackface ewe to develop. Dolly was born months later.

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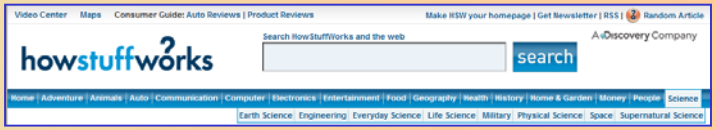


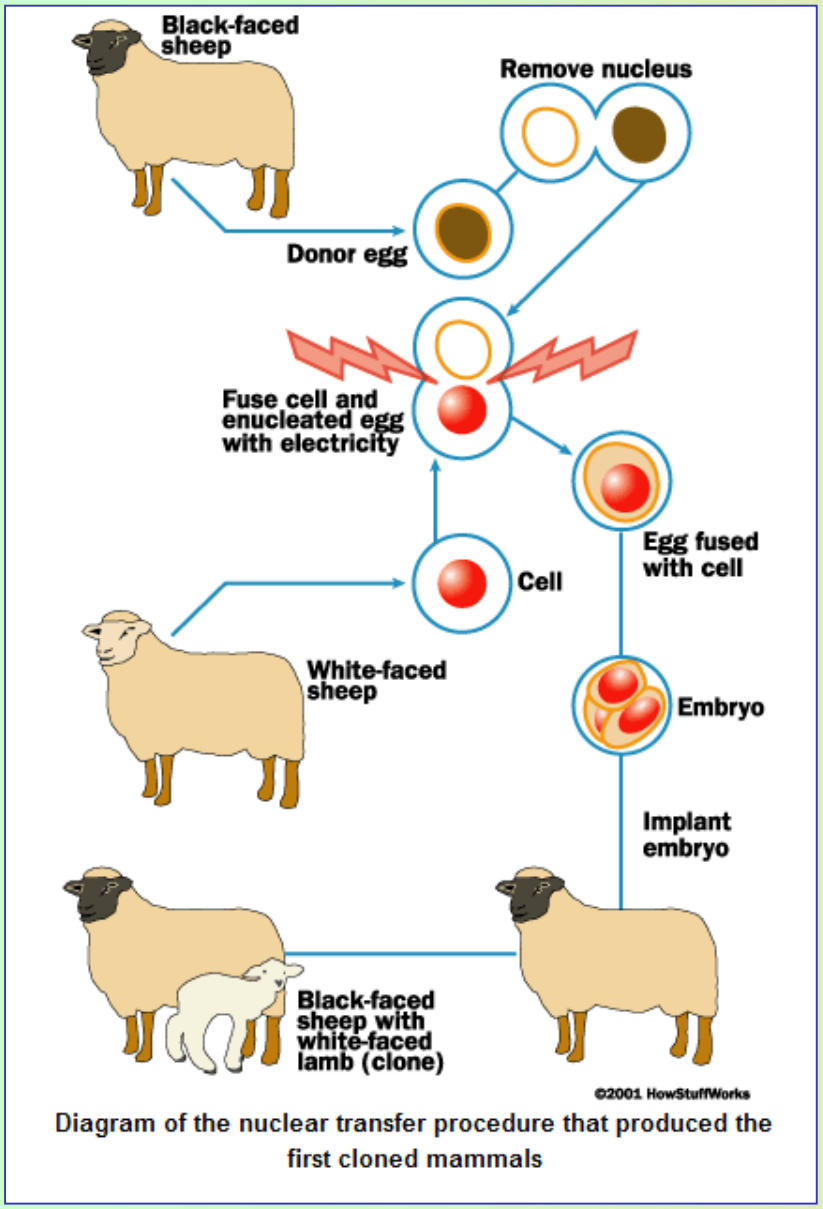


Diagram of the nuclear transfer procedure that produced the first cloned mammals

## Why cloning?

The main reason to clone plants or animals is to mass produce organisms with desired qualities, such as a prize-winning orchid or a genetically engineered animal -- for instance, sheep have been engineered to produce human insulin.

If you had to rely on sexual reproduction (breeding) alone to mass produce these animals, then you would run the risk of breeding out the desired traits because sexual reproduction reshuffles the genetic deck of cards.

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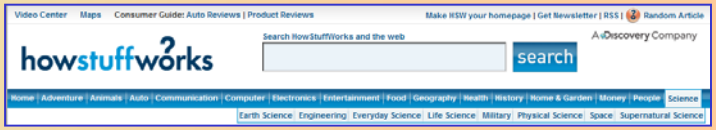


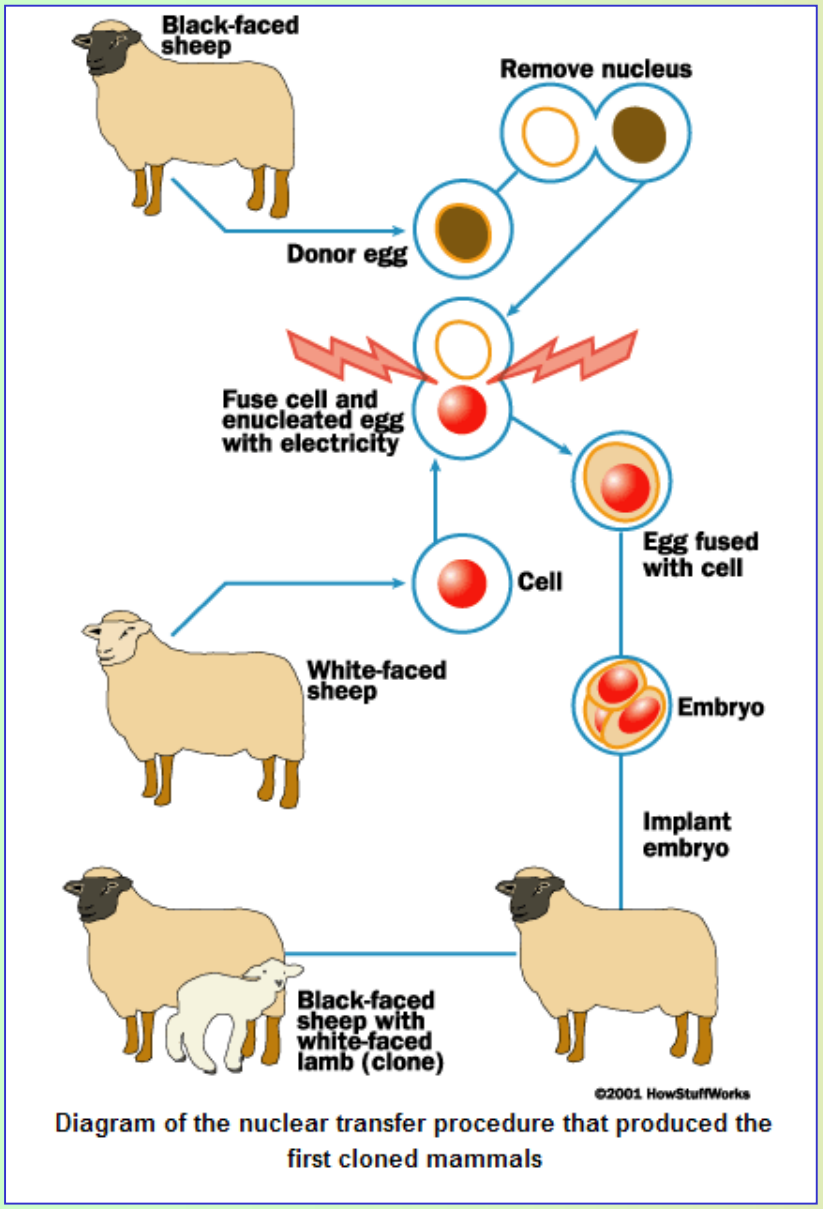


Diagram of the nuclear transfer procedure that produced the first cloned mammals

## Why cloning?

Other reasons for cloning might include replacing lost or deceased family pets and repopulating endangered or even extinct species. Whatever the reasons, the new cloning technologies have sparked many ethical debates among scientists, politicians and the general public.

Several governments have considered or enacted legislation to slow down, limit or ban cloning experiments outright. It is clear that cloning will be a part of our lives in the future, but the course of this technology has yet to be determined.