

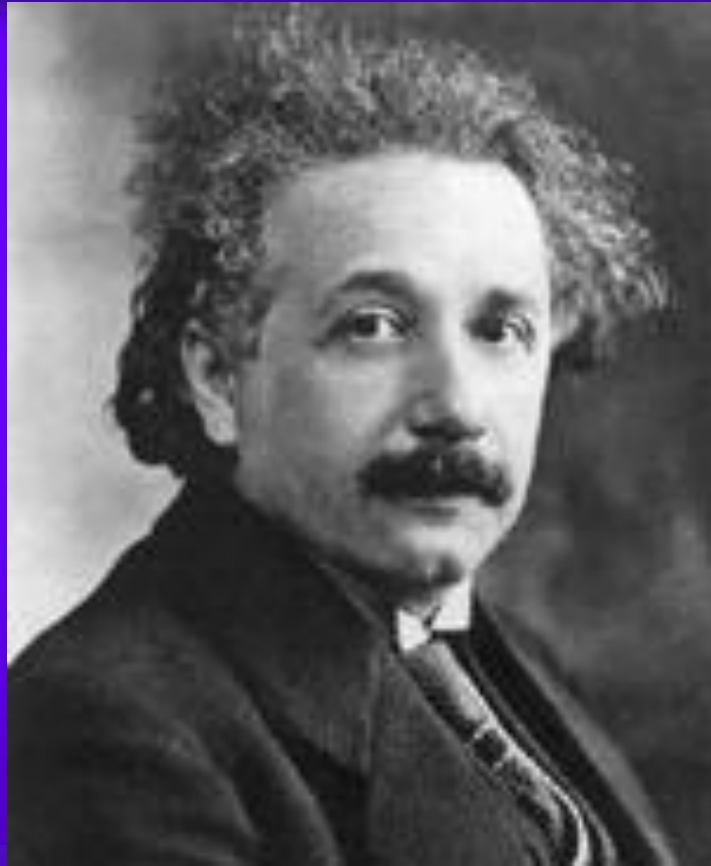
# Animal Cloning: To Clone, or not to Clone



Dolly

Georgia Agriculture Education  
Curriculum Office

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# Pros:

- ◆ Cure human diseases
- ◆ Using animal organs
- ◆ Create animals that are disease resistant
- ◆ More consistent food products
- ◆ Save endangered species





# Cons:

- ◆ Public perception
- ◆ Use technology to clone humans
- ◆ Expensive
- ◆ Not efficient
- ◆ Cloned products cannot be marketed





# Cloning

Definition: The process of making identical genomic copies of an original animal.

Encyclopedia Britannica: An individual organism that was grown from a single body cell of its parent and that is genetically identical to it.



# Brief History of Cloning

- ◆ 1902: Walter Sutton proves chromosomes hold genetic information.
- ◆ 1902: German scientist Hans Spemann divides a salamander embryo.
- ◆ Spemann proposes a “fantastical experiment”



# Brief History of Cloning

- ◆ 1952: Briggs and King clone tadpoles.
- ◆ 1953: Watson and Crick find the structure of DNA.
- ◆ 1962: John Gurdon clones frogs from differentiated cells.
- ◆ 1963: J.B.S. Haldane coins the term 'clone'.



# Brief History of Cloning

- ◆ 1977: Karl Illmensee creates mice with only one parent,
- ◆ 1984: Twinning- create genetic copies from embryonic cells.
- ◆ 1996: First animal cloned from adult cells is born.



# The Cloning Process

- ◆ 1978: Splitting embryos
- ◆ 1986: Embryo Cloning
- ◆ 1994: Embryonic cell line cloning
- ◆ 1996: Adult or Somatic cell cloning

# Creating Dolly





# Stage 1



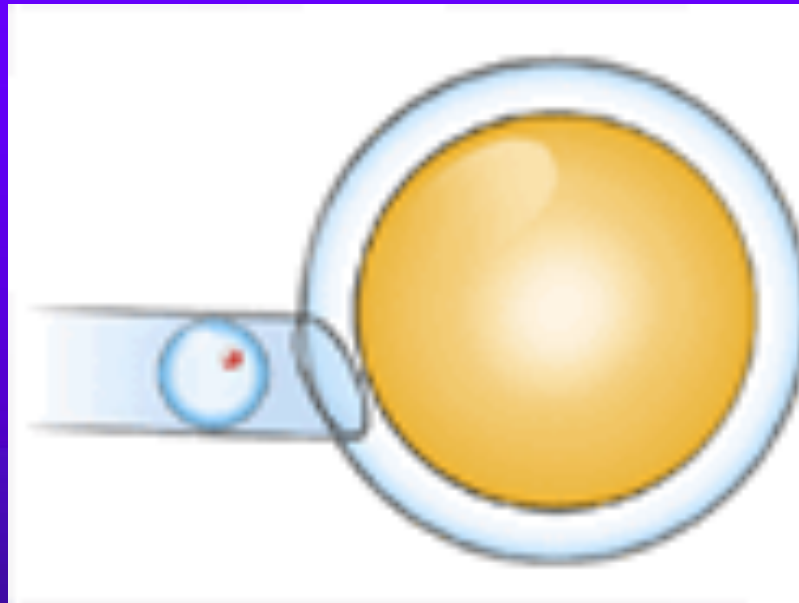
Cell collected from a sheep's udder.

## Stage 2



Nucleus is removed from unfertilized egg of second sheep.

## Stage 3



Udder cell is inserted into egg with no nucleus.

# Stage 4



Insertion is successful.



## Stage 5



Electrical charge is supplied.



## Stage 6



Cells begin to divide.

## Stages 7 & 8

7.  
Embryo is placed  
into a third sheep,  
the surrogate mother.



8.  
Dolly is born.



# Cloning Facts

- ◆ Plant cloning has been around for thousands of years
- ◆ Farm animal cloning has been around for over 20 years
- ◆ Cloning is a form of asexual reproduction
- ◆ Clones are not exact copies
- ◆ Cloned animals are safe to raise and eat



# Cloning Fallacies

- ◆ Genetic make-up is altered
- ◆ Mutants are created
- ◆ Clones are unhealthy
- ◆ Will eventually lead to cloning humans
- ◆ Possible to recreate people such as Hitler



# House Bill 2505

## Human Cloning Prohibition Act

- ◆ Prohibition on human cloning
- ◆ Criminal Penalty: Up to 10 years imprisonment
- ◆ Civil penalty: Minimum 1 million dollar fine



# Final Thoughts

- ◆ Cloning has been around for a long time
- ◆ Cloned products are safe
- ◆ Useful in medical and pharmacological fields
- ◆ Will not replace traditional animal agriculture
- ◆ Need to better educate public
- ◆ Close regulation