

# Agricultural Implications



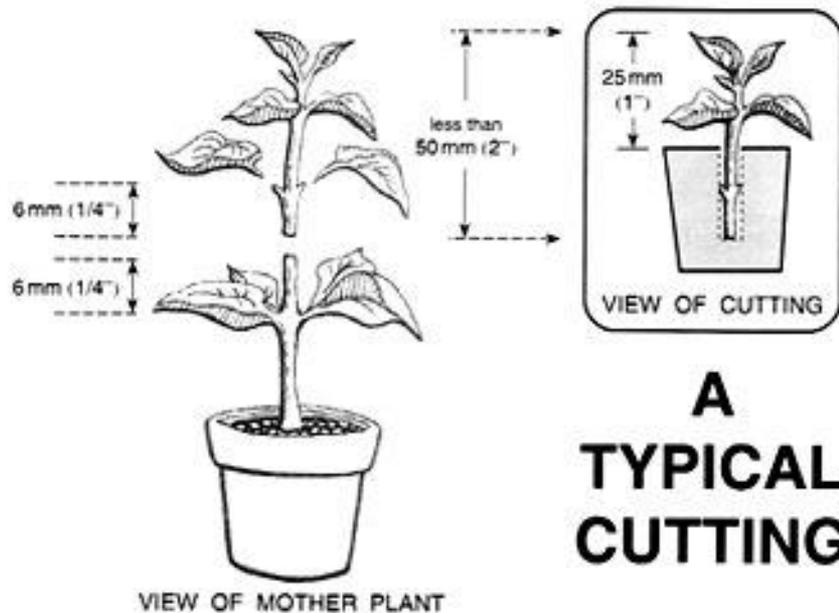
S1-1-04 Investigate and describe agricultural applications of asexual reproduction.  
Examples: cloning, cuttings, grafting (vegetative propagation), bulbs

# Vegetative Propagation:

When a **NEW PLANT** is grown from a **PIECE** of another plant. There are several ways a plant can reproduce this way:

## CUTTINGS:

- Cut a leafy **ROSE STEM** and place it into wet **SAND/WATER**. New **ROOTS** will grow, creating a **NEW PLANT**.



# Vegetative Propagation:

## BULBS:

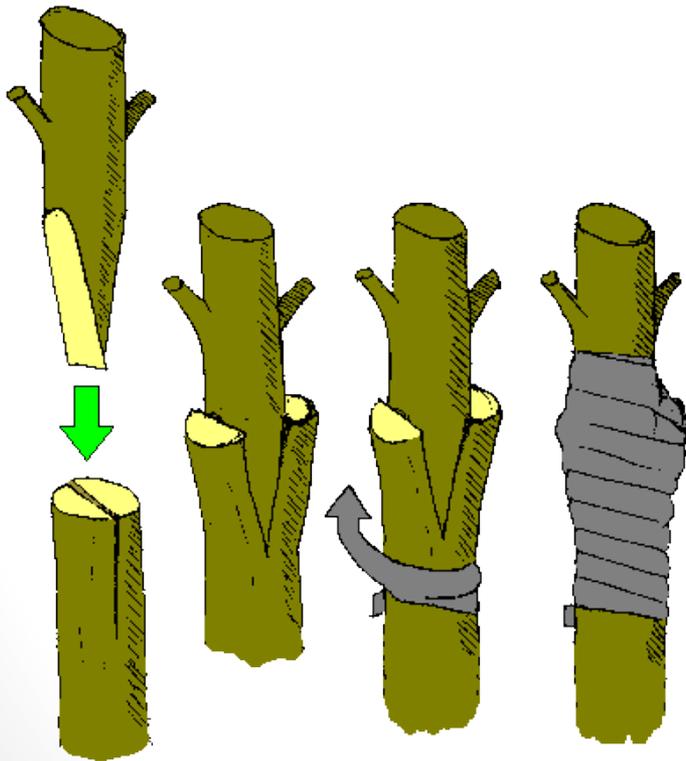
- Are thick, fleshy UNDERGROUND STEMS.
- They have a large store of FOOD, which allow them to survive for a while BEFORE being PLANTED. (ONIONS, TULIPS)



# Vegetative Propagation:

## GRAFTING:

- A **BRANCH** of one type of plant is placed into the **CUT** of **ANOTHER**. They must be **CLOSELY RELATED**. (**APPLE TREES**, etc)



# Cloning

You'll be surprised to hear that cloning is not the "mad science" that you see in the movies. In fact, **CLONES** are around you all the time.

Cloning is a **NATURAL** process by which **MOST** organisms **REPRODUCE**.

In all types of **ASEXUAL REPRODUCTION**, organisms make **EXACT** genetic **DUPLICATES** of themselves, which are essentially clones!

→ they have the exact same **DNA**.



"Holy Crap! I've been cloned!"

In cloning, there is only **ONE PARENT**. If there were two, then the offspring would have a combination of DNA from each parent.

Hence, **ASEXUAL REPRODUCTION** produces **CLONES**.

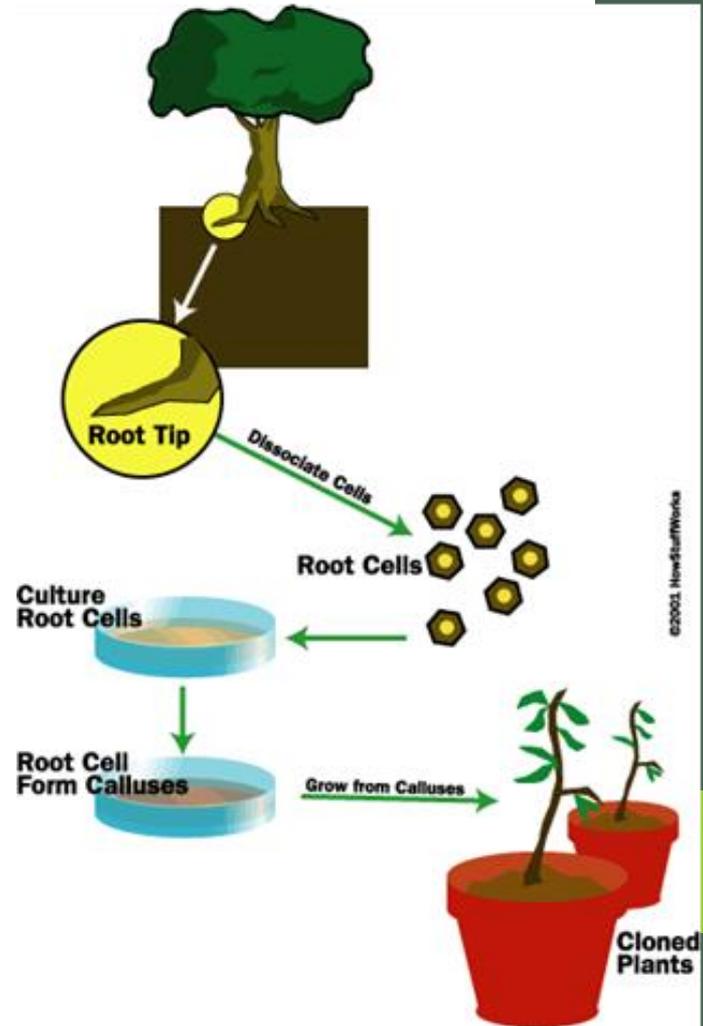
# *Cloning a Plant From a Single Cell:*

In 1958, Frederic Stewart cloned a **CARROT**. He took a cell from the **ROOT** of the **PARENT** carrot, and grew a "**CLONE**" from it.

Today, plants are bred with desired **TRAITS**, and are then **CLONED** to keep **REPRODUCING** these **TRAITS**

Examples of this are **SEEDLESS WATERMELONS**, **ORANGES**, different varieties of **FLOWERS**, etc.

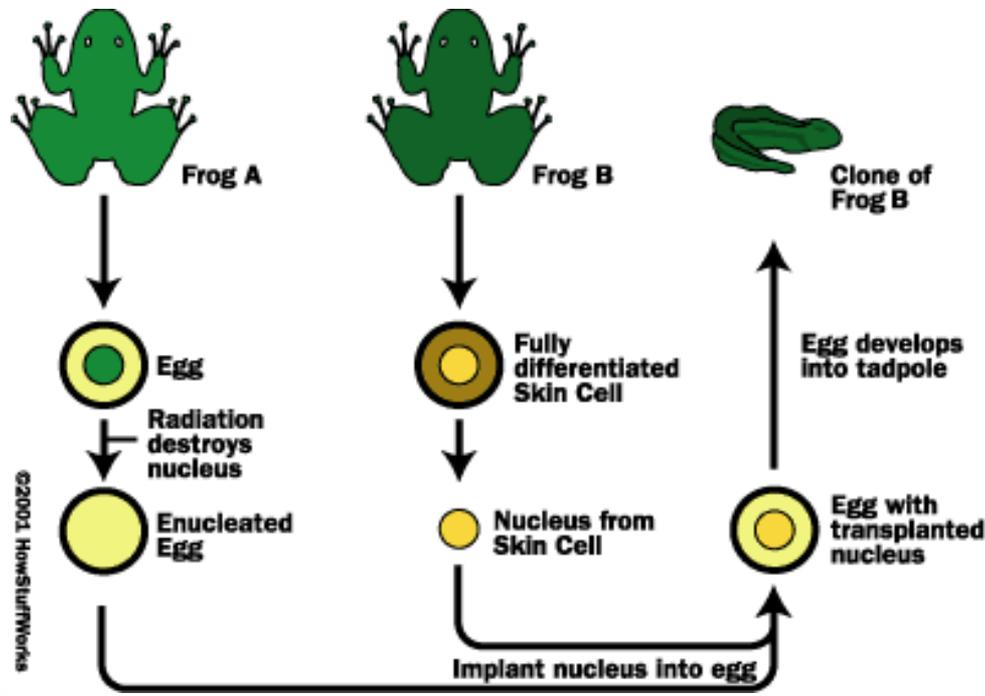
In fact, some animals have even been cloned...



# How a Frog Was Cloned

In the 1970s, a scientist named John Gurdon successfully cloned TADPOLES.

- He TRANSPLANTED the NUCLEUS from a SPECIALIZED skin cell of one frog into an UNFERTILIZED EGG of another frog in which the NUCLEUS had been DESTROYED by UV LIGHT.
- The egg with the TRANSPLANTED nucleus developed into a TADPOLE that was genetically IDENTICAL to the first frog.



# The “Dolly” Revolution

Scientists later cloned an adult sheep. The clone was called Dolly.

## How Dolly Was Cloned:

- Cells from the UDDER of a FINN DORSET SHEEP were taken.
- The NUCLEUS was taken out and then placed in an ENUCLEATED EGG CELL of another sheep.
- The new cell was placed into a BLACKFACE SHEEP...which gave birth to DOLLY, a CLONE of the FINN DORSET.

