

C L O N I N G

(use with PowerPoint Presentation)

Cloning is the process of forming _____ offspring using the _____ material of a donor cell.

Examples of organisms that have been cloned include:

_____/_____/_____
_____/_____/_____

CLONING A FROG

1. Remove _____ from an _____ cell using a micropipette to form an _____ egg (recipient).
2. Remove _____ from a _____ cell of a separate frog (donor) and insert it into the _____ egg cell.
3. Egg cell with new _____ divides by _____ to form a _____ (embryo).
4. The blastula grows into a _____ frog with genetic material identical to the _____ donor.

CLONING A WHITE MOUSE

1. Obtain _____ cell from a _____ mouse (donor).
2. Extract WHITE mouse _____ to clone.
3. Obtain _____ egg from _____ mouse (recipient) and remove _____ (enucleate it).
4. Insert WHITE _____ into BROWN enucleated unfertilized _____.
5. After cells divide, implant _____ into BROWN mouse uterus (_____).
6. BROWN surrogate mouse gives birth to a cloned _____ mouse that is _____ identical to donor.

CLONING A SHEEP

It is very hard to create a clone from an _____ cell. Early embryonic cells are _____, meaning any _____ can direct the development of an entire organism.

In adult cells, the nuclear material has _____ so that a nucleus will normally not develop into an entire organism because the cells are too _____.

Scientists found away around this when they cloned _____, the sheep. By _____ adult cells of nutrients, they began to act like the unspecialized cells of an _____.

Thus, the _____ of an adult somatic cell could be used for cloning.

THERAPEUTIC CLONING

1. Extract _____ of healthy adult _____ cell from patient.
2. Insert patient nucleus into enucleated human _____ cell.
3. Grow cells to _____ state (_____ cells).
4. Separate stem cells and grow complete _____ or _____.
ie. _____ / _____ / spinal-cord / _____-producing cells, etc.
5. Insert tissue or organ back into _____ with no _____ problems.