



Cheat Sheet: BioTech

Artificial selection/ selective breeding- breed two parents with desired traits been done for hundreds of years-Results are not guaranteed-

Inbreeding- two closely related individuals mate

Harmful Recessive alleles- possibly sterile- used when populations are low

Hybridization- breed two parents with different desirable traits

Hybrid vigor-possibly sterile- "best of both worlds"

Genetically modified organisms GMO- genes from other organisms

Include 3 above- genes have been altered- recombinant DNA technology

Transgenic organism- contains genes from another species

Plasmid- circular DNA in bacteria - combined with desired genes= *recombinant*

Vector- way to get genes into organisms (virus or recombinant bacteria)

Restriction enzyme- cuts DNA- come from bacteria- sticky ends are preferred

Recombinant DNA- plasmid cut with restriction enzyme and desired gene put in

This gene produces proteins- example HGH and insulin

DNA-(deoxyribonucleic Acid)all things have the same subunits-nucleotides(A-T-C-G)

PCR (polymerase chain reaction) - used when little DNA is available

Original DNA is used as template. Think little DNA=PCR/little individuals cloning or inbreeding

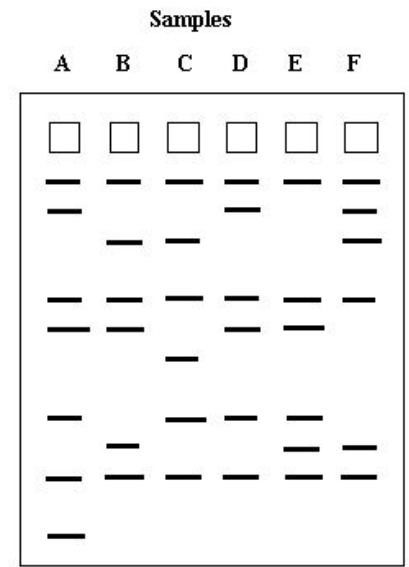
Gene therapy is used to treat genetic disease- fix incorrect or missing genes

Virus can be used to transfer desired genes-cystic fibrosis,Parkinson's, possible cancer treatments **NOT PASSED ON**

Electrophoresis (shown on right) separates DNA fragments by size- used for paternity - crime scene - relatives

Black bands represent DNA fragments- these fragments are cut by *restriction enzymes*- run electric current move from negative to positive - smallest fragments move furthest (bottom most band is smallest)

Similar banding patterns show genetic similarity (closely related)(sample A & D) same pattern-same person or twin



Cloning- 3 types

Recombinant DNA- asexual bacterial replication- **MITOSIS**

clones desired genes (process shown below)

reproductive cloning- cloning of animals- used when numbers are low, or to clone "good" animals- (think of a much younger twin)

somatic cell- body cell *not sex cells*, remove nucleus for SCNT

Enucleated egg cells- nucleus removed egg cell

SCNT- take nucleus from body cell and put in egg and shock

Embryo can be *-grown into a clone*

Embryo can be *-separated out and grown into tissues*

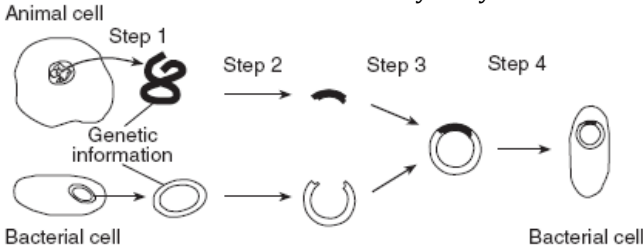
Embryo can be *-harvested for stem cells*

Therapeutic cloning- making cloned body tissues

Human cloning and human testing- **always controversial**

Stem cells- treat or cure disease by replacing defective cells

Undifferentiated-Can be made into any body cell



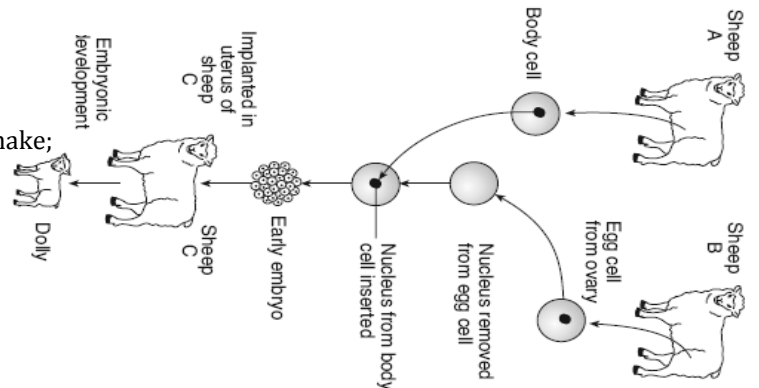
Sheep A provides somatic cell - nucleus is taken from here

Sheep B provides the Egg cell (it is then enucleated)

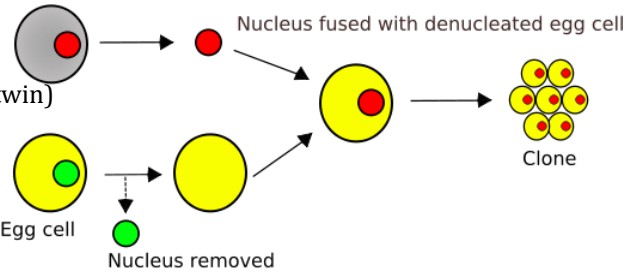
Sheep A's nucleus is fused with sheep B's egg cell-embryo is grown- this "Early embryo" can be used to make; a clone / body tissues(organs) / stem cells

Sheep C provides the womb and births dolly

Dolly is a clone of sheep A



Somatic body cell with desired genes



REPRODUCTIVE CLONING

Surrogate Mother

THERAPUTIC CLONING

Tissue Culture

Recombinant DNA

Step 1: Gene and plasmid are isolated

Step 2: restriction enzyme cuts plasmid and desired gene

Step 3: recombinant DNA (plasmid) is formed

Step 4: recombinant plasmid is put back in bacteria

Step 5: asexual reproduction- cloning of desired genes

Step 6: bacteria produces desired proteins