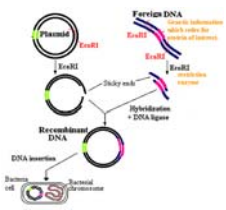
Biology Chapter 13 Sections 3 and 4 – Pages 327-333

Objectives: Students will
A) Identify the role of genetic engineering.
B) Define recombinant DNA.
C) Summarize how transformation occurs.
D) Summarize how transformation creates transgenic organisms.
E) Summarize how genetic engineering creates novel biomedical and agricultural products.
F) Summarize the 7 steps to a successful clone.

B) Define recombinant DNA.

Recombinant Bacteria

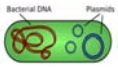


1. Cut the required _____ (i.e. _____) from DNA using "_____ enzymes".
2. Remove _____ DNA (_____).
3. Cut the _____ with same "_____ enzymes".
4. Mix human _____ with _____.
5. Because they were cut with the same _____, the cut ends of the plasmid and human gene _____. Often called "_____ _____".
6. Enzyme DNA _____ is used to stick the ends together = _____ DNA.

A) Identify the role of genetic engineering.
B) Define recombinant DNA.

- Genetic Engineers can _____ the _____ code of living organisms.

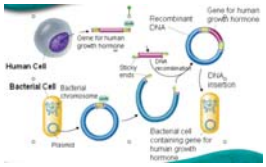
- _____ are often used in biotechnology as they have plasmids
- Plasmid = _____ piece of DNA, exists _____ from the chromosome and _____ on its own.



C) Summarize how transformation occurs.

Re-Introducing the Plasmid Back - _____

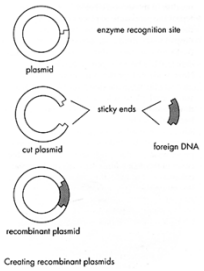
- Plasmid containing _____ DNA needs to be _____ into the _____ so they can _____ and make more of the gene.
- Done by _____ them in a test tube with $CaCl_2$. Calcium ions make the membranes of the bacteria porous = _____.
- Allows _____ to move into the bacterial cells.
- Not all _____ will take up a _____ so monitoring must happen.



B) Define recombinant DNA.

Recombinant DNA

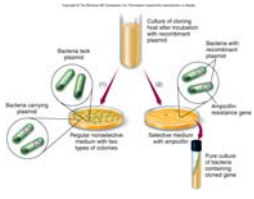
- Combination of a piece of DNA of _____organism with the DNA of _____ organism.
- _____ DNA is often _____ such as *E coli*.
- Why?
- Bacteria reproduce _____ making millions of _____ of the _____ gene.



C) Summarize how transformation occurs.

How do we know which bacteria have the gene?

- Must _____ host bacteria containing the _____ gene. We want the _____ DNA.
- How? By having a gene on the same plasmid that _____ an antibiotic, the other bacteria will _____ when placed in a medium containing the _____.
- The bacteria containing the _____ to the antibiotic will _____.



- _____ _____ used to ID recombinant cells = _____ _____

ANIMATION – RECOMBINANT DNA
Answer the following questions while watching the animation.

- http://www.sumanasinc.com/webcontent/animations/content/plasmidcloning.html

1. What is used to insert foreign DNA?
2. What is used to cleave (cut) the foreign DNA and plasmid?
3. Why is an antibiotic resistance gene also placed in the recombinant plasmid?
4. How are many copies of the recombinant DNA created?

Obj. D) Summarize the 7 steps of cloning multicellular organisms.

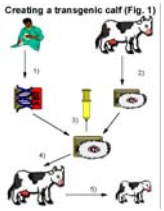
Cloning

1. A body cell is taken from a _____.
2. An _____ is taken from a donor animal.
3. The _____.
4. The _____.
5. The fused cell _____.
6. The embryo is _____.
7. The embryo develops into _____.

D) Summarize how transformation creates transgenic organisms.

How to Create a Transgenic Plant or Animal

1. Create _____ bacteria with _____ gene.
2. Allow the bacteria to "_____" the _____ cells.
3. _____ gene is inserted into plant _____.

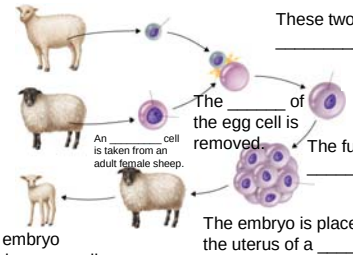


_____ DNA is added to an _____ cell, the _____ time we can modify.

Obj. E) Summarize how Dolly was cloned.

Figure 13-13 Cloning of the First Mammal

A donor _____ is taken from a sheep's _____.



These two cells are fused _____.

The _____ of the egg cell is removed.

An _____ cell is taken from an adult female sheep.

The fused cell begins _____.

The embryo is placed in the uterus of a _____ _____.

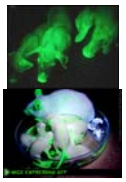
The embryo develops normally into a lamb— _____

E) Summarize how genetic engineering creates novel biomedical and agricultural products.

_____ **creates** _____.

TRANSGENIC ORGANISMS

1. Mice – used to study _____
2. Chickens – more resistant to _____
3. Plants – _____ resistance
4. Bacteria to create _____ = _____ for diabetics, dissolving _____ of heart attack patients, human _____ hormone for those lacking it
5. Pigs and mice – _____ in the dark, _____ and _____ gene
6. Goats – creating _____ with blood _____ agent



Understanding Check

1. What is recombinant DNA?
2. Why is transformation related to transgenic organisms?
3. Identify 2 examples of novel biomedical or agricultural products created from genetic engineering.
4. What is a clone?
5. Why is genetic engineering useful?