

DNA TECHNOLOGY

DNA FINGERPRINTING & GENETIC ENGINEERING

TODAY 1/2

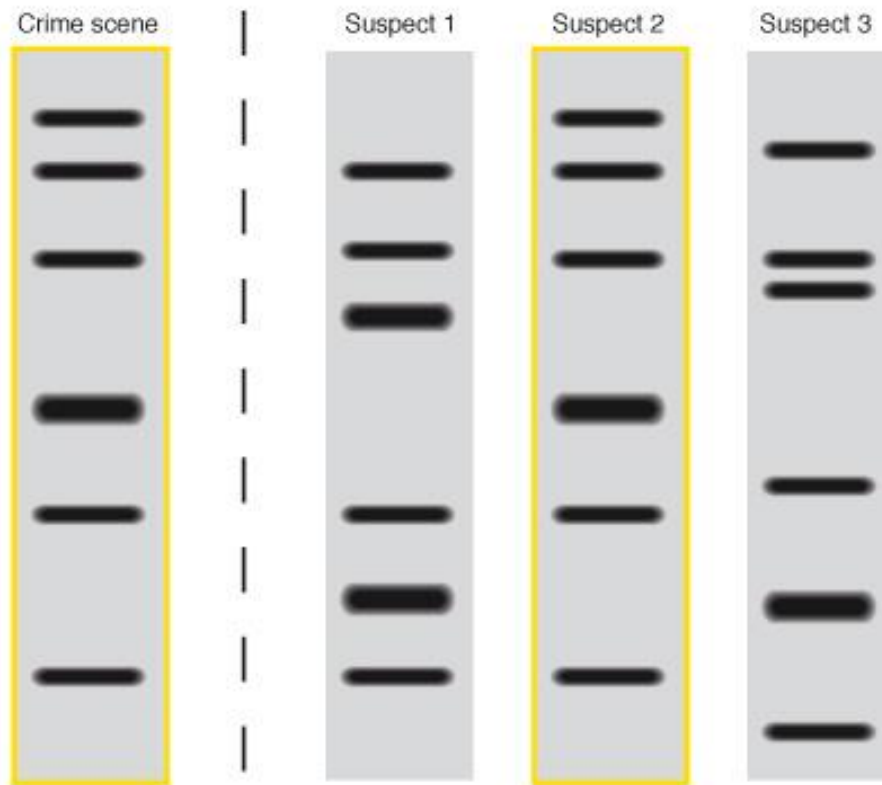
Should DNA be used to explain criminal's actions?

DNA FINGERPRINTING

IN FORENSICS

WHAT IS DNA FINGERPRINTING?

Method used to identify DNA between two organisms



HOW IS DNA FINGERPRINTING DONE?

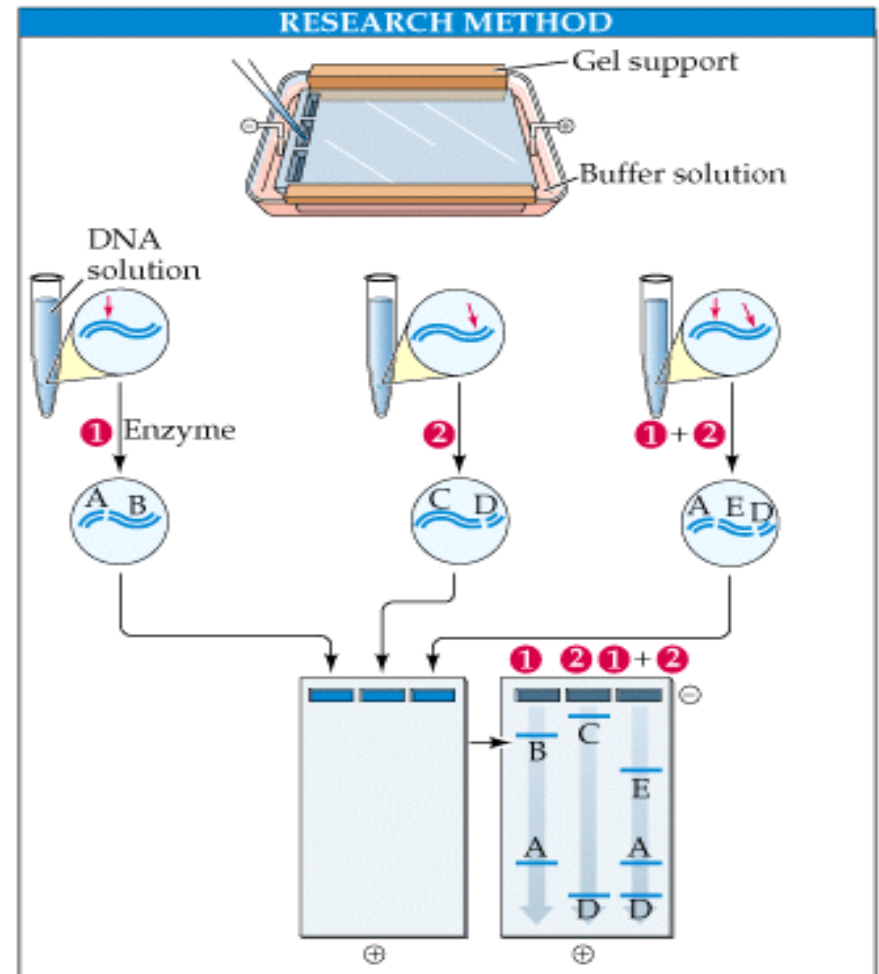
DNA is exposed to restriction enzyme = cuts it

DNA is loaded into a gel and run through an electrophoresis machine

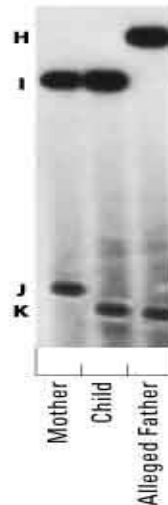
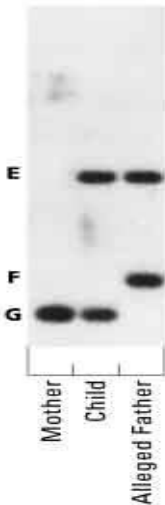
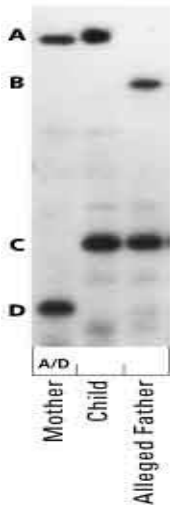
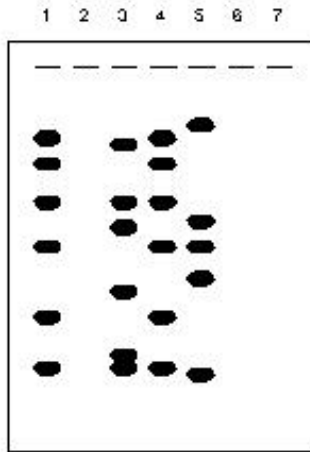
Since DNA is cut at certain sequences, each piece is a different length and weight

Pieces that are heavier stay at the top of the gel, lighter will “run” to the bottom

Every person is genetically different, so DNA fingerprints are different



WHAT ARE SOME APPLICATIONS FOR DNA FINGERPRINTING?



Can be used to:

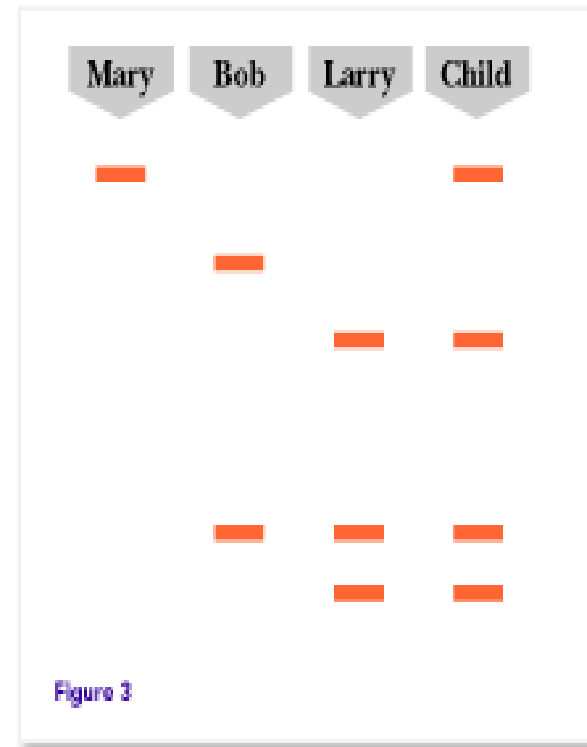
identify or eliminate suspects when genetic material has been collected at a crime scene

determine paternity of a child, or establish other family relationships

identify a deceased person

QUESTION?

Who is the father of the child? How can you tell?



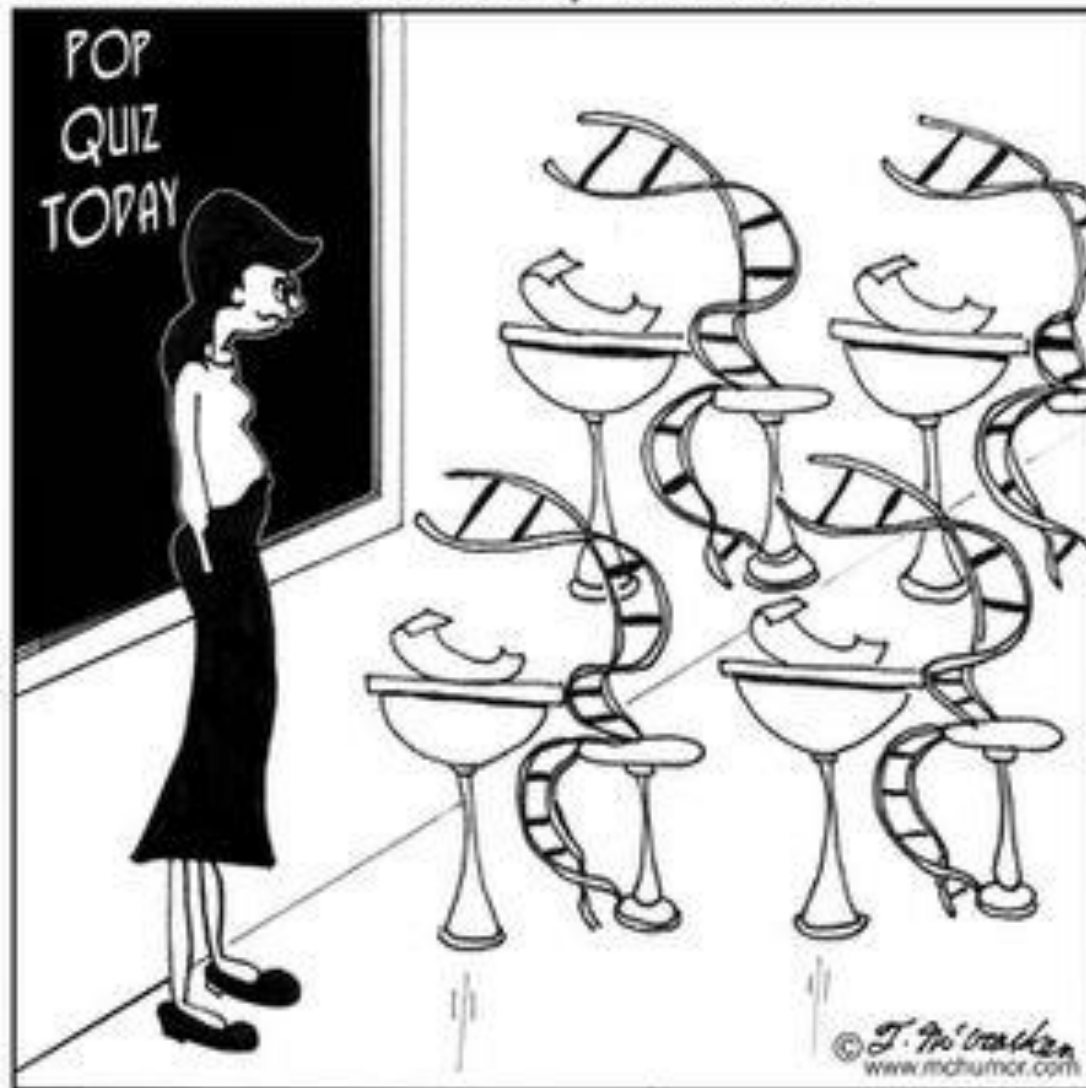
HOMework:

Read the article, “My DNA made me do it? How Behavioral Genetics Is Influencing the Justice System” and come in tomorrow with notes and a formulated opinion on the subject.

Link:

<http://phenomena.nationalgeographic.com/2014/06/04/my-dna-made-me-do-it-how-behavioral-genetics-is-influencing-the-justice-system/>





DNA Testing.

TODAY

In your journal: How much should DNA be used in judiciary decisions??

Write a summary of your opinion on the article that you read last night and get ready to discuss

UTAH GENOME PROJECT

Today, scientists are racing to discover the genes that cause diseases like cancer, heart disease, diabetes and more. Tomorrow your doctor will be able to examine your Genomic Electronic Health Record (GEHR) to determine:

- Conditions for which you and your family are at risk**
- How you and your family can minimize the chances of getting a disease**
- Personalized drugs that work the best to fight your disease**

A HUMAN GENOME LOOKS LIKE THIS...

ACGTTGCAAATTCAGTCGGTACTTTAACGTACGTACGGTACTGGTATTGTCAGGTTGTTCAACT
CATGACACTGACAGATAGACAGATTGTCGTGTTATVTGACTTGGAAGTGTAGGCCCTTGAATCT
TGGCAGTCCCTACGTACCGTTCGGTACTGGTAACGTGAGGTCAGGTTGTTCAACTCATCCAGGA
GAAATATCTCGGATAATTAACAGATACACACCCCTTAGACCATTTAATCCCTGGGAAAGGCAACTA
CGTACCAGTCTTTCCAGGCACTGACAGATAGACAGATTGTCGTGTTATVTGACTTGGAAGTGT
GGCCCTTGAATCTTGGCAGTCGTAACGTACGTACGGTACTGGTAACGTGAGGTCAGGTTGTT
AACTCATCGTGACTGATTACCAGGATCCTAGCGGATCCTACTGACCTGACGTACGTAATGCAGT
GGTCAGGTTGTTCAACTCGATGACTAGAAATATATCCAGGAAAATCCCTGGGAAAAATTGGGCC
TACGTGTCGTAACGTACGTACGGTACTGGTAACGTGAGCCAGGAAAATCCCTGGGAAAAATTG
GGCCCTATCGTGACTGATTACCAGGATCCTAGCGGATCCTACTGACCTGACGTACGTAATGCAG
TGGTCAGGTTGTTCAACTCGATGACTAGAAATATATCCAGGAAAAAAAAAATTGGGCCCTACGTACC
GTAACGTTGCAAATTCAGTCGGTACGTTTCCAGGCTACACATTGTCGTGTTATVTGACTTGGA
CTGTAGCURLYHAIRGCCCTTGAATCTTGGCAGTCGTAACGTACGTACTGAGGTCAGGTTGTT
AACTCATCCAGGAATGGGCCCTACGTACCGTAACGTTGCAAATTCAGTCGGTACGTTTCCAGG
CTACACACACACTGACAGATAGACAGATTGTCGTGTTATVTGACTTGGAAGTGTAGGCCCTTGA
ATCTTGGCAGTCGTAACGTACGTACGGTACTGGTAACGTGAGGTCAGGTTGTTCAATACCAGGA
TCTACTAGAAGAAAAATTGGGCCCTACGTACCGTAACGTTGCAAATTCAGTCGGTACGTTTCCA
GGCTACACACACACTGACAGATAGACAGATTGTCGTGTTATVTGACTTGGAAGTGTAGGCCCTT
GAATCTTGGCAGTCGTAACGTACGTACGGTACTGHEARTDISETGTTCAACTCATCCAGGAAAT
CCCTGGGAAAAATTGGGCCCTACGTACCGTAACGTTGCAAATTCAGTCGGTACGTTTCCAGGC
TACACACACACTGACAGATAGACAGATTGTCGTGTTATVTGACAGGCTACACACACACTGACAG
ATGTAATGCAGTGGTCAGGTTGTTCAACTCGATGACTAGAAATATATCCAGGAAAATCCCTGGGA

X 100,000,000!!

LIKE FINDING A MISSPELLED WORD IN THE LIBRARY OF CONGRESS

Over 530 miles of bookshelves



UTAH GENOME PROJECT

Scientists at University of Utah Health Sciences have already globally revolutionized personalized and population medicine by discovering genes responsible for 30+ diseases including:

- **BRCA1 and BRCA2** - Preventing breast cancer worldwide
- **APC** - Preventing colon cancer and developing personalized drugs to treat cancer
- **HERG** - Tested in every FDA drug approval in the U.S.A, Europe and China.
- **AND 30 OTHER GENES** - Responsible for Melanoma, Atrial Fibrillation, Hypertension, Macular Degeneration and Neurofibromatosis to name a few.

YOU CAN ORDER A DNA TEST TODAY...

http://dna.ancestry.com/?s_kwcid=human+dna+test&gclid=CjwKEAiA9c-2BRC_vaaJ0Ybps30SJABlqxDeFkRagiqvqFFaLo3UAfY7RCdG0SPOCKw7iP3R-DIYdxoCog_w_wcB&o_xid=55307&o_lid=55307&o_sch=Paid+Search+-+NonBrand

<https://www.23andme.com>



WHAT IS GENETIC ENGINEERING?

Changing the DNA of one organism using another organism's DNA

Can happen naturally when a bacteria or virus invades a host cell and takes over its DNA and manipulates it to do what it wants.

Also called:

- Recombinant DNA Technology
- Genetic manipulation
- **Gene splicing**

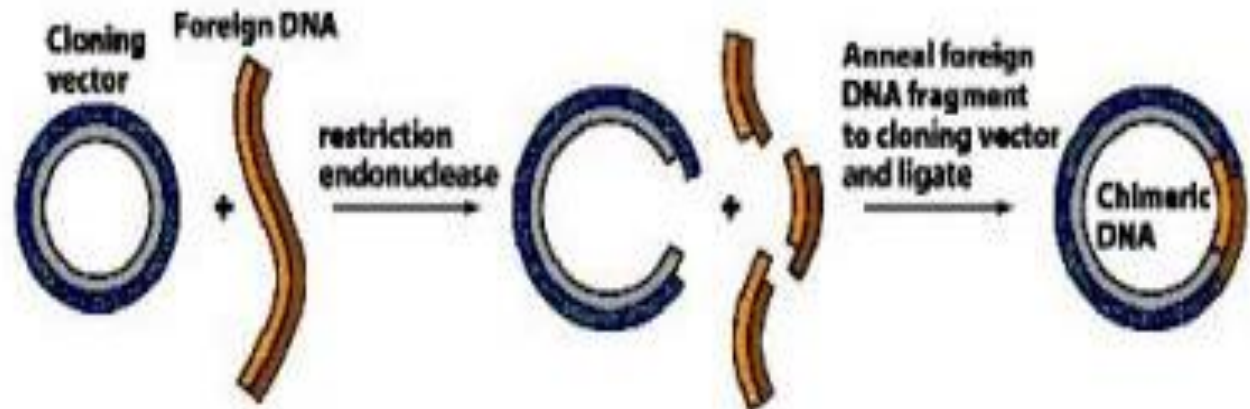
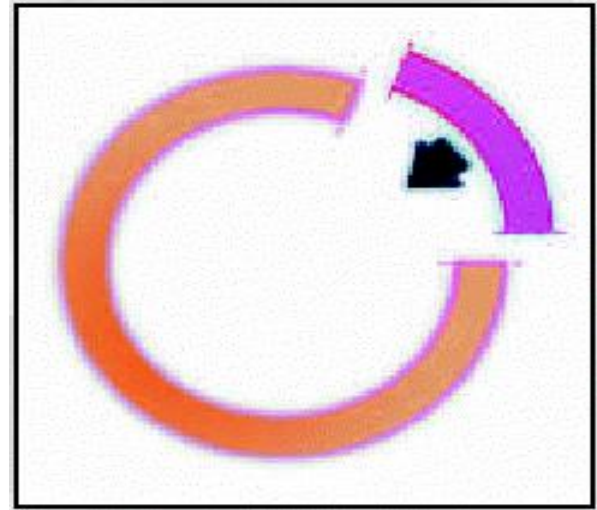


Figure 3-27 Fundamentals of Biochemistry, 2/e
© 2004 John Wiley & Sons

WHAT IS GENETIC ENGINEERING?



DNA is split into fragments and new DNA pieces are inserted

Restriction enzymes cut DNA at certain places

Plasmids are then used to insert DNA splices

Now referred to as recombinant DNA or transgenic

WHAT IS GENE THERAPY?

Insertion of normal gene to correct genetic disorders

“Bad” gene is cut with restriction enzymes & removed

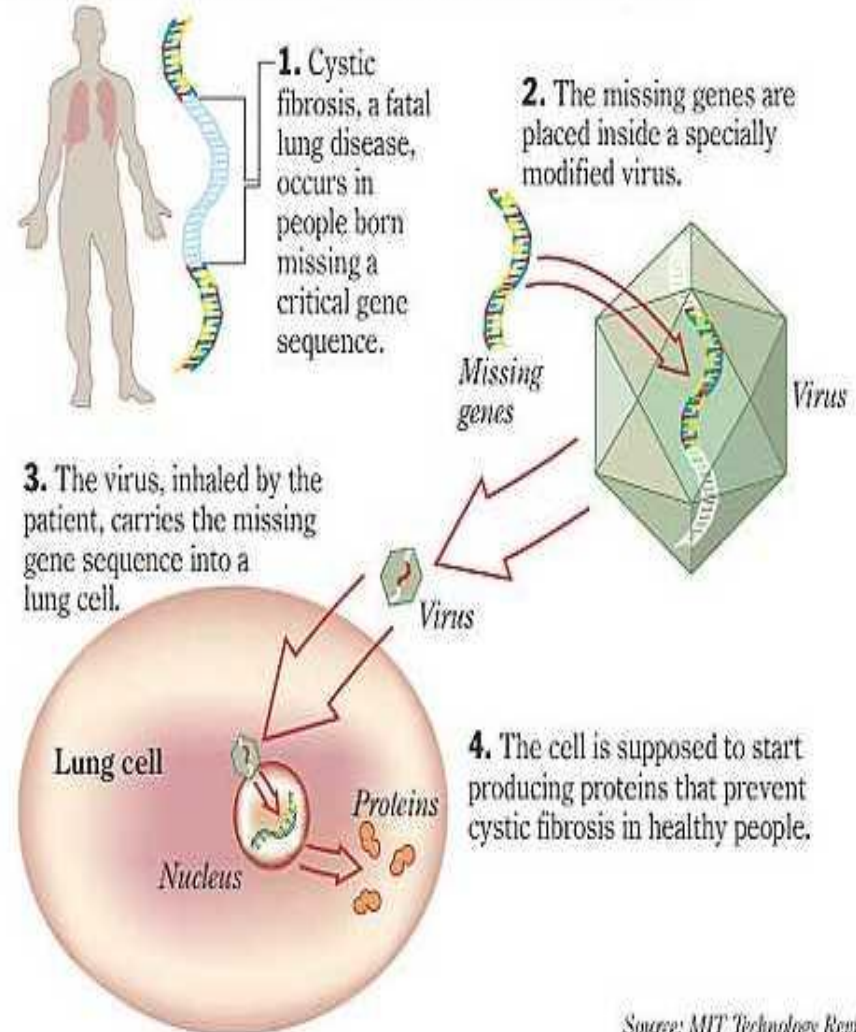
Plasmids from healthy person are added

Plasmid DNA fuses to patient’s DNA & changes its functioning

Being used now to treat cystic fibrosis

A gene-repairing virus

Seattle biotech company Targeted Genetics reports success in early trials treating cystic fibrosis using viruses to deliver correct genes.



SOME BASIC TERMS:

Transgenic or Recombinant- scientifically altered specimen with two different DNA types spliced together

Genetically modified- the DNA is changed in some way (bacteria & insulin)

Restriction enzyme- cuts DNA

Plasmid- a piece of DNA from another source that you want add to another organism's DNA

THE HUNGER GAMES



JABBERJAY +

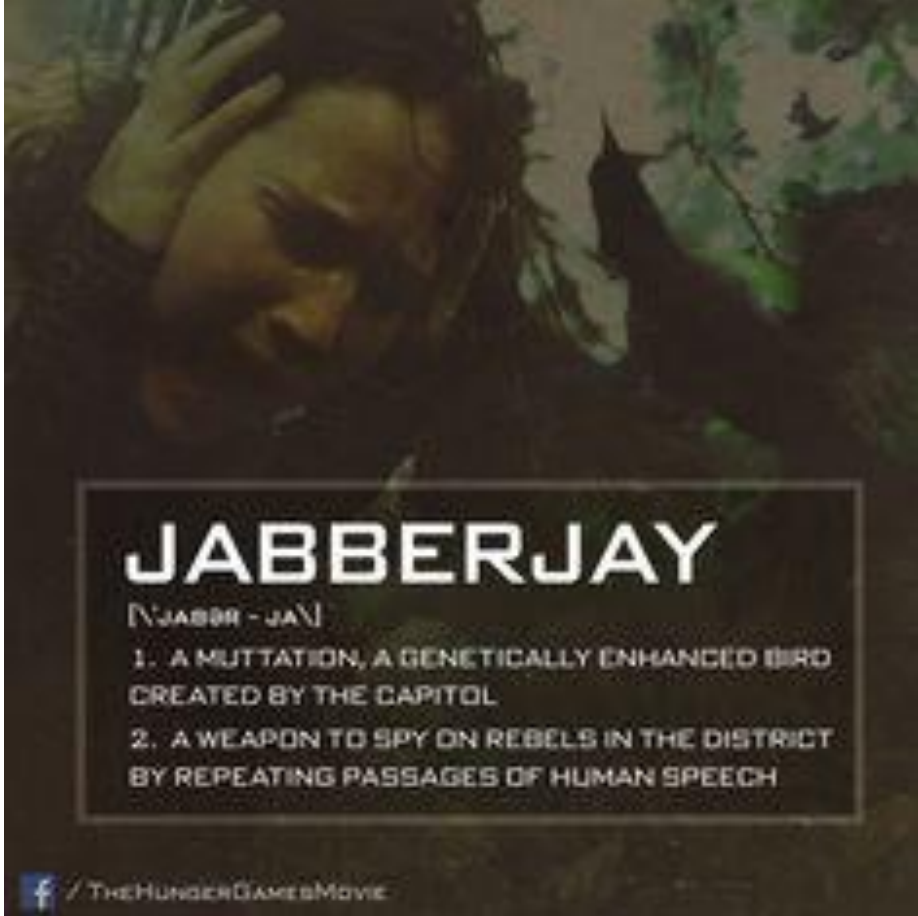


MOCKING BIRD=



MATED AND CREATED THE... MOCKINGJAY





Led to...

Rebel Symbol of The Mockingjay



(Jokes on the Capitol)

TODAYS AGENDA:



Zika Virus and GM mosquitos Controversy

EVERYONE first answer in your groups:

1. What is a genetically modified organism?
2. What is the value of creating genetically modified organisms?
What are some of the concerns surrounding G.M.O.'s?
3. What predictions can you make for what might happen if the tools of biotechnology spread to everyone, and lead to “an explosion of diversity of new living creatures”?

GROUP ROLES:

1 person mediator and time keeper (keeps people in line)

3 people main researchers (use QR codes and look up own)

2 people put together presentation on a laptop (with pictures and possible video clips)

2 presenters (can be more, not less)

Oral Presentation Rubric

	4—Excellent	3—Good	2—Fair	1—Needs Improvement
Delivery	<ul style="list-style-type: none"> • Holds attention of entire audience with the use of direct eye contact, seldom looking at notes • Speaks with fluctuation in volume and inflection to maintain audience interest and emphasize key points 	<ul style="list-style-type: none"> • Consistent use of direct eye contact with audience, but still returns to notes • Speaks with satisfactory variation of volume and inflection 	<ul style="list-style-type: none"> • Displays minimal eye contact with audience, while reading mostly from the notes • Speaks in uneven volume with little or no inflection 	<ul style="list-style-type: none"> • Holds no eye contact with audience, as entire report is read from notes • Speaks in low volume and/or monotonous tone, which causes audience to disengage
Content/ Organization	<ul style="list-style-type: none"> • Demonstrates full knowledge by answering all class questions with explanations and elaboration • Provides clear purpose and subject; pertinent examples, facts, and/or statistics; supports conclusions/ideas with evidence 	<ul style="list-style-type: none"> • Is at ease with expected answers to all questions, without elaboration • Has somewhat clear purpose and subject; some examples, facts, and/or statistics that support the subject; includes some data or evidence that supports conclusions 	<ul style="list-style-type: none"> • Is uncomfortable with information and is able to answer only rudimentary questions • Attempts to define purpose and subject; provides weak examples, facts, and/or statistics, which do not adequately support the subject; includes very thin data or evidence 	<ul style="list-style-type: none"> • Does not have grasp of information and cannot answer questions about subject • Does not clearly define subject and purpose; provides weak or no support of subject; gives insufficient support for ideas or conclusions
Enthusiasm/ Audience Awareness	<ul style="list-style-type: none"> • Demonstrates strong enthusiasm about topic during entire presentation • Significantly increases audience understanding and knowledge of topic; convinces an audience to recognize the validity and importance of the subject 	<ul style="list-style-type: none"> • Shows some enthusiastic feelings about topic • Raises audience understanding and awareness of most points 	<ul style="list-style-type: none"> • Shows little or mixed feelings about the topic being presented • Raises audience understanding and knowledge of some points 	<ul style="list-style-type: none"> • Shows no interest in topic presented • Fails to increase audience understanding of knowledge of topic
Comments				

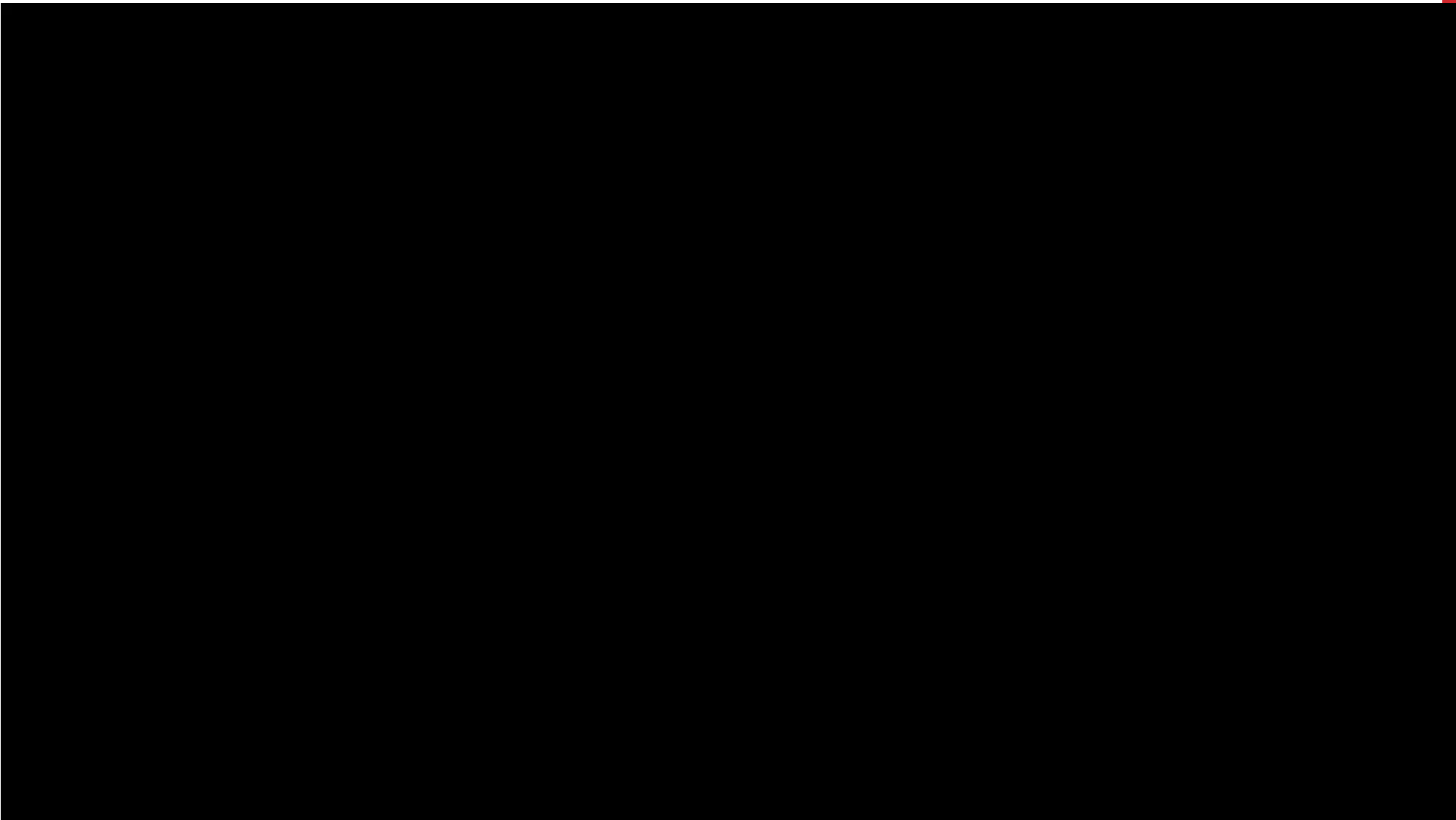
WHAT ARE SOME APPLICATIONS FOR RECOMBINANT DNA?

Bacteria: break down pollutants, make them produce hormones (insulin) and antibiotics

Plants: resistant to herbicides, increase protein content in grains

Animals: cloning of endangered species; adding special trait genes (glow genes)





QUIZ 3

- 1. In genetic ? DNA is split and new fragments of DNA are inserted.**
 - a. deletion**
 - b. engineering**
 - c. mutation**
- 2. Gene ? Involves the insertion of normal genes in the place of genes which control genetic disorders.**
 - a. cloning**
 - b. mutation**
 - c. therapy**
- 3. DNA fingerprinting works because everyone's DNA is different except for ?**
 - a. fraternal twins**
 - b. identical twins**
- 4. The structure of DNA was discovered by ?**
 - a. Watson & Crick**
 - b. Wilson & Crockett**
 - c. Schleiden & Schwann**
- 5. DNA gels can be used for ?**
 - a. determination of parents**
 - b. elimination of suspects**
 - c. identification of body**
 - d. all of these**