

## **Biotechnology Research Assignment – Genetics**

You will be working with a small group to create a class PowerPoint presentation about various biotechnology issues prevalent in the news today. We will be researching: recombinant DNA technology, stem cells, cloning, gene therapy, and genetically modified organisms (GMOs).

Each group has been given a topic to research. You are to gather up as much information as you can, being certain to cover the "Focus Questions" assigned to your group. You may use the website suggestions below for further research.

You should email your slides to [Kenneth.smikahl@canyonsdistrict.org](mailto:Kenneth.smikahl@canyonsdistrict.org) or share your presentation with [Kenneth.smikahl@csddocs.org](mailto:Kenneth.smikahl@csddocs.org) by the end of the day on February 17.

### **Group 1: Recombinant DNA Technology**

#### *Focus Questions*

- 1 What is recombinant DNA? What is recombinant protein?
- 2 What is a plasmid? A vector?
- 3 What is the difference between Recombinant DNA and Genetic recombination?
- 4 How is recombinant DNA technology related to cloning?
- 5 What are some uses for recombinant DNA technology?
- 6 What is a "sticky end"?
- 7 What are the enzymes involved in recombining DNA?

#### *Suggested websites for information*

[http://en.wikipedia.org/wiki/Recombinant\\_DNA](http://en.wikipedia.org/wiki/Recombinant_DNA)

<http://www.follistim.com/Consumer/FollistimAQCartridge/RecombinantDNatechnology/index.asp?guid={021E579E-4A79-4A8B-A666-2009227E1379}&sid=812967281>

<http://www.bioteach.ubc.ca/TeachingResources/Applications/GMOpkgJKloseGLampard2.swf> (watch the Flash animation...it's awesome!)

## **Groups 2 & 3: Stem Cells**

### *Focus Questions*

- 1 What are stem cells?
- 2 What are the differences between: embryonic vs. adult stem cells?
- 3 Define a pluripotent cell.
- 4 How can stem cells be used as treatments for medical conditions?
- 5 What are some of the controversies surrounding the use of stem cells?
- 6 What are the potential uses of human stem cells and the obstacles that must be overcome before these potential uses will be realized?
- 7 How does President Obama's opinion in regard to stem cell research differ from Former President Bush?

### *Suggested websites for information*

[http://en.wikipedia.org/wiki/Stem\\_cell](http://en.wikipedia.org/wiki/Stem_cell)

<http://learn.genetics.utah.edu/content/tech/stemcells/>

<http://stemcells.nih.gov/info/basics/>

<http://www.pbs.org/wgbh/nova/sciencenow/3209/04.html>

<http://www.kqed.org/quest/television/view/326?gclid=CO6bscKTyZkCFR0SagodYV2eug> (watch the video)

## **Groups 4 & 5: Cloning**

### *Focus Questions*

- 1 What is cloning EXACTLY?
- 2 What are the differences between: Reproductive vs. therapeutic cloning?
- 3 Describe Nuclear transfer & the rest of the process of creating a clone.
- 4 What animals have been cloned?
- 5 Should humans be cloned?
- 6 What are the ethical concerns (prior problems) with cloned living organisms?
- 7 What are some of the moral and ethical concerns about cloning?

### *Suggested websites for information*

<http://science.howstuffworks.com/genetic-science/human-cloning.htm> (watch video clip)

<http://science.howstuffworks.com/genetic-science/cloning.htm> (watch video clip)

[http://www.ornl.gov/sci/techresources/Human\\_Genome/elsi/cloning.shtml#whatis](http://www.ornl.gov/sci/techresources/Human_Genome/elsi/cloning.shtml#whatis)

<http://www.guardian.co.uk/flash/0,5860,534450,00.html>

<http://www.demcak.com/cloning.htm>

<http://library.thinkquest.org/28599/application.shtml>

<http://estercabral.googlepages.com/CLONINGWebQuestfinalversion.doc>

<http://oncampus.richmond.edu/academics/education/projects/webquests/genes/>

[\[education.nih.gov/home2.nsf/Educational+ResourcesTopicsGenetics/BC5086E34E4DBA0085256CCD006F01CB?OpenDocument&Highlight=0,cloned\]\(http://education.nih.gov/home2.nsf/Educational+ResourcesTopicsGenetics/BC5086E34E4DBA0085256CCD006F01CB?OpenDocument&Highlight=0,cloned\)](http://science-</a></p></div><div data-bbox=)

## **Group 6: Gene Therapy**

### *Focus Questions*

- 1 What is gene therapy?
- 2 How does gene therapy work?
- 3 What are the vectors used in gene therapy? Provide details of 2 of them.
- 4 What is the current status of gene therapy research?
- 5 What factors have kept gene therapy from becoming an effective treatment for genetic disease?
- 6 What are some recent developments in gene therapy research?
- 7 What are some of the ethical considerations for using gene therapy?

### *Suggested websites for information*

[http://www.ornl.gov/sci/techresources/Human\\_Genome/medicine/genetherapy.shtml](http://www.ornl.gov/sci/techresources/Human_Genome/medicine/genetherapy.shtml)

[http://en.wikipedia.org/wiki/Gene\\_therapy#Vectors\\_in\\_gene\\_therapy](http://en.wikipedia.org/wiki/Gene_therapy#Vectors_in_gene_therapy)

<http://ghr.nlm.nih.gov/handbook/therapy/genetherapy>

[http://www.accessexcellence.org/RC/AB/BA/Gene\\_Therapy\\_Overview.php](http://www.accessexcellence.org/RC/AB/BA/Gene_Therapy_Overview.php)

<http://library.thinkquest.org/28599/application.shtml>

## **Groups 7 & 8: Genetically Modified Organisms (GMOs)**

### *Focus Questions*

- 1 What are they?
- 2 How are they created?
- 3 What are the impacts on Human Health?
- 4 How are they used? (Provide at least 5 specific examples of GMO's that have been created in the past...be careful! Some of the Internet examples are FAKE!)
- 5 Are GMOs harmful or helpful?

### *Suggested websites for*

*information* [http://en.wikipedia.org/wiki/Genetically\\_modified\\_organism](http://en.wikipedia.org/wiki/Genetically_modified_organism)

[http://www.ornl.gov/sci/techresources/Human\\_Genome/elsi/gmfood.shtml](http://www.ornl.gov/sci/techresources/Human_Genome/elsi/gmfood.shtml)

<http://ohioline.osu.edu/hyg-Fact/5000/5058.html>

<http://www.nytimes.com/library/national/science/health/gm-index.html>

<http://www.csa.com/discoveryguides/gmfood/overview.php>

<http://www.newscientist.com/topic/gm-food>

<http://library.thinkquest.org/28599/application.shtml>