

## VII.

### Ethical Dilemmas in Genetics

#### **WHERE CAN WE GO FROM HERE?**

Teachers should travel to the following site and read the entire lesson before proceeding.

[http://genome.pfizer.com/docs/hs\\_lesson\\_7.doc](http://genome.pfizer.com/docs/hs_lesson_7.doc)

Look at the lesson step scenarios. Students will be assigned to work in groups at the instructor's discretion. Specific scenarios will be assigned to each group. Internet sources for research are necessary to provide the depth of study necessary for this activity. Both of the "Additional Resources" listed in this lesson are invaluable resources.

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#### **THE CASE OF NATHANIEL WU**

Teachers should also travel to the following site and read the entire lesson of Activity 3, "The Case of Nathaniel Wu" before proceeding.

<http://www.bsccs.org/library/HGN1-Part3.pdf>

The case is on the 19<sup>th</sup> of 35 pages of this document (page number is marked as page 81).

Students will begin this ethical investigation by reading Step 6 with the assigned reading of "The Case of Nathaniel Wu." Students will be instructed to form groups and present lists as described in Steps 7 and 8.

The teacher will take a few moments to have a discussion of the issues presented in "Questions for Discussion." Students could be

given the written "Homework Assignment" to prepare for the subsequent IPC Employment Selection Committee hearing. Copymasters are available from this web site that includes the worksheet for analyzing the case, the employment hearing guidelines and questions.

Extension activities include information regarding the "Americans With Disabilities Act of 1990." Most assuredly, the one page article by Gabrielle Hamilton will impact the students' understanding of the personal nature of Huntington disease.

## Basic Science May Lead Us In Unexpected Directions With Social Consequences

### BACKGROUND INFORMATION

In San Francisco a successful symposium was presented; it was called the DNA Revolution in Biology: Winding Your Way Through DNA. One of the topics was called **DNA on the Witness Stand** by Eric S. Lander, PhD. Travel to the following site to read the description of the talk

[http://www.accessexcellence.org/RC/AB/WYW/lander/lander\\_1.html](http://www.accessexcellence.org/RC/AB/WYW/lander/lander_1.html)

and use the arrows at the bottom of each page to continue with the narrative. As you are reading the description, answer the following questions.

1.) Human beings are \_\_\_\_\_% identical. But in a genome of \_\_\_\_\_ A's, T's, C's and G's, even a tenth of a percent difference translates into \_\_\_\_\_ different spelling sequences.

2.) Since we can't read all three billion nucleotide letters for a DNA comparison, a very small handful of sites are examined; these are sites of \_\_\_\_\_.

3.) In DNA Forensics, the most commonly used "spelling differences" are due to \_\_\_\_\_ of some sequences.

4.) Electrophoresis allows a scientist to separate fragments by \_\_\_\_\_. Often the fragments are probed with a piece of \_\_\_\_\_ DNA.

5.) Why does the diagram schematic "include" Suspect 2? Because with all four probes

\_\_\_\_\_.

6.) What did the scientists do in the court case in New York with the "not-very-good example?" \_\_\_\_\_

\_\_\_\_\_

7.) Polymerase Chain Reaction allows a person to \_\_\_\_\_ the amount of DNA.

**DNA IDENTIFICATION APPLIED TO HUMAN RIGHTS**

8.) Read the introductory paragraphs and quotes regarding the military in Argentina.

The Commission on the Disappearances of Persons found \_\_\_\_\_ documented cases of disappearances.

9.) By 1983, the grandmothers contacted the \_\_\_\_\_ for the \_\_\_\_\_ of \_\_\_\_\_.

10.) Mary Claire King did not use \_\_\_\_\_ typing or \_\_\_\_\_ fingerprinting, she used a more powerful technology involving \_\_\_\_\_ DNA.

11.) What do you find to be the most interesting aspect of the Case of Heidi Llemos?  
\_\_\_\_\_

12.) How did the scientists at Berkeley prepare to study the teeth of the skulls found in the mass graves?  
\_\_\_\_\_

13.) Why would someone want to sequence a corn or tomato plant?  
\_\_\_\_\_

14.) Why did the scientists want to sequence the DNA of the 40-million-year-old termite?  
\_\_\_\_\_

15.) Some of the author's final remarks state that what we must do as a society and as scientists is to apply these technologies with  
\_\_\_\_\_

## Ethical Issues Regarding Huntington Disease

Travel to the site

[http://ehrweb.aaas.org/ehr/books/2\\_priya.html](http://ehrweb.aaas.org/ehr/books/2_priya.html)

and read the first few paragraphs written in bold print.

1.) What does Priya know about Huntington?

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2.) Read through the sections entitled: "Your Unique Genome," "Dominant and Recessive Genes," and "How Genes Instruct Your Body." Discuss with your classmates how you know that the first section of reading listed must be dated before 2003.

### Mutations

3.) A mutation is a \_\_\_\_\_ that occurs to the order of the \_\_\_\_\_ appearing in the DNA inside a cell.

4.) Most mutations occur as \_\_\_\_\_ cells make copies of their chromosomes before dividing to form sperm or eggs.

5.) If a change occurs in the order of the bases, the instructions that direct the production of \_\_\_\_\_ may change.

### Genetic Testing

6.) Genetic tests can be used to predict the chances that a person \_\_\_\_\_ with a particular disease later in life.

7.) While some test results are definite, in other cases, the test results only suggest what the person's \_\_\_\_\_ is for developing a disorder.

### Concerns About Genetic Testing

8.) With Huntington Disease (HD), a mutation in one gene instructs the body to produce an abnormal protein that leads to a breakdown in parts of the brain that control \_\_\_\_\_.

9.) The HD gene is \_\_\_\_\_, and if Priya inherited the HD gene from her mother she will \_\_\_\_\_.

10.) With HD, no \_\_\_\_\_ is available.

11.) Many problems may exist because of results of the HD test for Priya. List at least three problems that may arise.

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### **The Need for Genetic Counseling**

12.) List at least three reasons why genetics counselors are so important

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Huntington's disease is caused by a mutation in a gene on chromosome 4 that causes neurodegenerative disease. Follow this link to a short, detailed description of the disease.

<http://www.compgene.com/hd.htm>

13.) The HD gene was identified in the year 1993; the gene contains a \_\_\_\_\_ repeat at the 5' end of the coding sequences.

14.) A CAG repeat \_\_\_\_\_ is found in "virtually all symptomatic HD individuals." 15.) A normal individual has 10-29 repeats. Individuals with HD usually have at least one HD gene CAG repeat of \_\_\_\_\_ repeats or greater.

16.) There is also an earlier age-of-onset of HD symptoms with increasing CAG \_\_\_\_\_ number.

17.) Look at the table at the bottom of this site. In this study, a person with 39 CAG repeats would exhibit Huntington's Disease at a median age of \_\_\_\_\_, while a person with 50 CAG repeats would exhibit Huntington's Disease at a median age of \_\_\_\_\_.

### Extension

For a very candid description of an individual diagnosed with Huntington's Disease, travel to

<http://www.suite101.com/article.cfm/huntingtons/52990> and read Huntington's/Brain Disease.

18.) Write five topics Phillip J. Hardt discussed that required his attention upon his diagnosis.

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