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### DNA Unit: DNA Webquest Part 1 – History, DNA Structure, DNA Replication DNA History

http://www.dnaftb.org/15/index.html

Read the text and answer the following questions.

1. What have people wondered since the beginning of human history?

2. Who discovered that individual traits are passed on from one generation to the next? In what year?

On the menu at the right click on Molecules of Genetics #15 "DNA & proteins are key ...."

3. When was DNA discovered as a major chemical of the nucleus of cells?

4. In the early 1900s what molecule was considered to be a better candidate to transmit hereditary information from one generation to the next?

5. Why was protein considered to be a better candidate as the hereditary molecule than DNA?

**On the menu at the right click on number 16 "one gene makes one protein"** 6. What was the conclusion make by Beadle & Tatum? What year was this?

## On the menu at the right click on number 17 "a gene is made of DNA"

7. What did Oswald Avery's team of scientists conclude from their experiments? In what years?

## On the menu at the right click on number 19 "The DNA is shaped like a twisted ladder"

8. What did earlier work on DNA show?\_\_\_\_\_

9. Who won the race to show the 3-dimensional structure of DNA?

10. What year was this	?
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## Click on animation at the top of your screen (step through the animation and answer the following questions

11. What makes up a nucleotide?

12. How could DNA be an "intelligent molecule" (carry hereditary information)?

13. What was Erwin Chargaff's contribution to the DNA puzzle?

14. What important tool did Linus Pauling use to determine the structure (shape) of proteins?

15 How was this tool used to help discover the shape of DNA?16. Name the two scientists that made the x-ray diffraction patterns that Watson & Crick used?

17. The distinctive "X" meant the DNA had what pattern? \_\_\_\_\_

## Go to the DNAi website: http://www.dnai.org/a/index.html

Click on "Finding the Structure" at the bottom of the page, then click on "putting it together" at the top of the new page. Click on the picture next to "base pairing interactive". Go through the steps to determine how the nitrogen bases pair, and how the sugar phosphate backbone is formed.

## **DNA Replication**

Go to <u>http://www.stolaf.edu/people/giannini/flashanimat/molgenetics/dna-rna2.swf</u> Answer the following questions as you move through the animation of DNA replication. **Before clicking** 

1. What class of proteins are the molecules with –ase endings? \_\_\_\_\_

2. What begins to happen on one of the "unzipped" strands?

## Click several more times slowly and study what happens

3.. What do you think the molecules are with the –ase endings on them?

4. Can you hypothesize what function they could have in this process?

5. Explain in your own words the process of DNA replication (include what you start and end with & what happens in between)

### Go to the DNAi website: http://www.dnai.org/a/index.html

Click on "Copying the Code" at the bottom of the page, then click on "putting it together" at the top of

the new page. Select "replication". Watch the animation

1. What is the job of the blue helicase enzyme?

2. How fast does it unwind DNA? \_\_\_\_\_

# Part 2 – RNA, Transcription, Translation RNA

Go to <u>http://www.dnaftb.org/dnaftb/21/concept/index.html</u> Read the text and answer the following questions 1. Where is RNA commonly found?

2. Describe what is meant by the "central dogma" in biology.

3. Name the 3 types of RNA and the general roles they play in the making of protein.

## **Transcription (DNA and RNA)**

Go to http://www.stolaf.edu/people/giannini/flashanimat/molgenetics/transcription.swf
Answer the following questions as you move through the animation of Transcription
Before clicking
1. The diagram represents what type of molecule?
Click once
2. What type of molecule is the RNA polymerase?
Click again
3. What function does the RNA polymerase have?
4. Where in the cell do you think this is taking place?
5. Explain how the mRNA molecule forms.

## Go to the DNAi website: http://www.dnai.org/a/index.html

# Click on "Copying the Code" at the bottom of the page, then click on "putting it together" at the top of the

new page. Select "transcription". Watch the animation

1. What does the blue molecule do?

2. What is the yellow chain?
3. What is T replaced with in RNA?
Translation (mRNA protein)
Go to http://www.stolaf.edu/people/giannini/flashanimat/molgenetics/translation.swf
Answer the following questions as you move through the animation of Translation
Before clicking
1. The diagram represents what type of molecule?
Click once
2. Where in cell in this taking place?
Click again
3. What type of molecule is the tRNA (transfer RNA) bringing to the mRNA?

4. Explain (in terms of nitrogen bases) how the tRNA docks on the mRNA ?

### Click until the end watching the process of translation

5. As the tRNAs dock on the mRNA bringing amino acids with them what type of molecule is created

### Start the animation over

6. What are the 3 nitrogen bases on the tRNA carrying the amino acid "Met"?

7. What are the 3 nitrogen bases on the mRNA that the "Met"-tRNA docks upon?

8. Check out the next tRNA with its 3 nitrogen bases and see where it docks on the mRNA. Can you detect a

pattern. If there are 20 amino acids then what is the minimum number of tRNAs that must exist.

Go to the DNAi website: http://www.dnai.org/a/index.html

Click on "Reading the Code" at the bottom of the page, then click on "putting it together" at the top of the

#### new page. Select "interactive".

9. Practice translation using the computer animation, and write down the final amino acid sequence here: