

Following the Footsteps of Giants

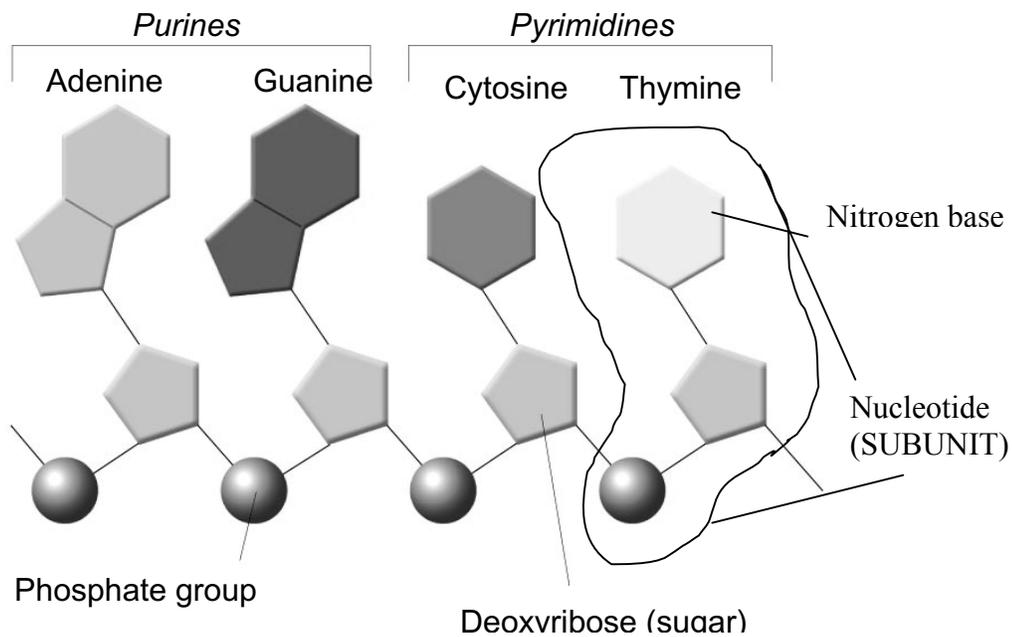
Watson and Crick were two scientists that were awarded the Nobel Prize in 1962, the most prestigious award a scientist can earn. But is what they did so revolutionary? They did little to no research of their own, but rather looked at the research from the scientists around them and using a three dimensional model drew some conclusions. With the information they had, see if you can come to the same conclusions.

1. Existing knowledge at the time:

- DNA is made of four types of subunits called NUCLEOTIDES.
- There are two kinds of nucleotides:

Having TWO RINGS (Purines): Adenine and Guanine

Having only ONE RING (Pyrimidines): Cytosine and Thymine



2. In 1951 the chemist Erwin Chargaff learned that:

- Different organisms have different content of A, C, G or T. However in ALL organisms (bacteria, plants, yeast, animals...):
- DNA contains the same amount of Adenine (**A**) and Thymine (**T**)
- DNA contains the same amount of Guanine (**G**) and Cytosine (**C**)

The CHARGAFF RULES: in all organisms: **A=T; G=C**

3. In 1952 the biochemist Rosalind Franklin's work showed that:

- DNA is made like a TWISTED LADDER, a double helix
- The two sides of this ladder were made of sugar-phosphate groups.
- Nitrogen bases made the steps of the ladder.
- The width of this double helix is constant (the sides are parallel).
- Every 10 steps of the ladder there is a turn of the helix.
(In the model separate every two steps by 1.5 inches)

Use the information above and the provided materials to create your own model of DNA.

1) Copy the following table to your paper and fill in the model parts you will use:

PARTS of DNA	Materials that represent this part
Guanine	
Cytosine	
Adenine	
Thymine	
Deoxyribose-phosphate	

2) Sketch a picture of your model. Label all the parts of DNA.

3) Compare your model to a neighboring group: What is similar, what is different between your models?

4) Which parts probably carry the information that varies between one organism to another? Explain your answer.

5) Try to imagine DNA as structure that can open and close like a zipper. How do you think DNA's structure makes it easy to replicate?

6) According to your answer in 5, what steps (at least 2) should you take with your model in order to demonstrate DNA replication?

7) Do you think that Watson and Crick deserved the Nobel prize for their model building? Explain your answer.