

DNA and Genes

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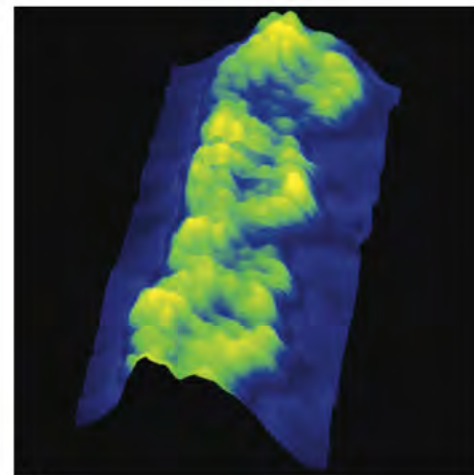
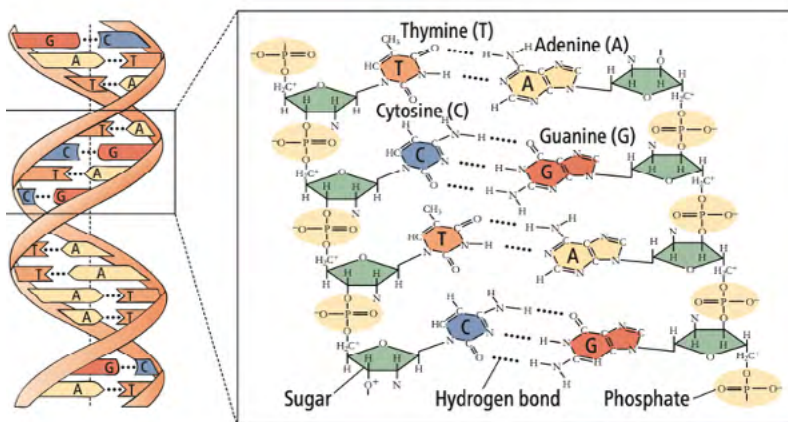


Photo credit: Geoff Gallice

5.3 The Structure of DNA

Now that we know genes are found in DNA, let's look more closely at DNA itself. A molecule of **deoxyribonucleic acid**, or **DNA**, consists of two strands. Together, the two strands make a spiral ladder with two "sides" and a series of "rungs" (Figure 5.4). Because DNA is made up of two strands twisted into a spiral or helix, it is called a double helix.

Let's look at a single strand of DNA, and then consider how DNA's two strands fit together. A DNA strand is a chain of nucleotides, each of which includes a nitrogenous base, a sugar molecule, and a phosphate group. The sugar in DNA nucleotides is deoxyribose. So, a DNA strand has a backbone (or "side" of the ladder) made up of alternating molecules of deoxyribose sugar and phosphate. Sticking out from this backbone is a series of nitrogenous bases. Each nitrogenous base is half of a "rung" of the DNA ladder. The four nitrogenous bases found in DNA are adenine (A), cytosine (C), guanine (G), and thymine (T)



(a)

(b)

Figure 5.4

(a) DNA is shaped like a spiral ladder with two sugar–phosphate strands as the "sides" of the ladder and paired bases as the "rungs." Hydrogen bonds hold the paired nitrogenous bases together.

(b) This photograph of DNA shows that it has the shape of a double helix.



Now let's put two strands of DNA together. Each nitrogenous base binds with a base on the other strand using chemical bonds called hydrogen bonds. Because each nitrogenous base can best form hydrogen bonds with another specific nitrogenous base, the binding of bases always happens in a specific way. Adenine always pairs with thymine (A–T), and guanine always pairs with cytosine (G–C).

READING CHECK

If one strand of DNA contains the nucleotides ACCTGA, what are the nucleotides on the opposite strand?

CHECK YOUR ANSWERS

Because of the way the nitrogenous bases pair, the opposite strand must have TGGACT.

You can read more about DNA structure here:

<https://www.visiblebody.com/learn/biology/dna-chromosomes/dna-structure>

