DNA -- Teacher Notes

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This discussion/worksheet activity can be used to introduce your students to DNA structure and DNA replication or to review these topics. The first version of the Student Handout is designed as a review for students who are already familiar with DNA structure and replication. The second version of the Student Handout includes explanatory material and can be used to introduce students to the double helix structure of DNA and the process of replication.

Teaching Points

- DNA is a nucleic acid made of two strands of nucleotides wound together in a spiral called a double helix.
- Each nucleotide is composed of a sugar molecule known as deoxyribose, a phosphate group, and one of four different nitrogenous bases: adenine (**A**), thymine (**T**), guanine (**G**), or cytosine (**C**).
- The phosphate and sugar parts of the nucleotides form the backbone of each strand in the DNA double helix.
- The bases extend toward the center of the double helix, and each base in one strand is matched with a complementary base in the other strand, in accord with the base-pairing rules: **A** pairs with **T** and **G** pairs with **C**.
- These characteristics are the same for the DNA of all organisms. The DNA of different organisms differs in the sequence of nucleotides, and these differences in nucleotide sequence are responsible for the genetic differences between different organisms.
- DNA replication produces two new DNA molecules that are identical to the original DNA molecule, so each of the new DNA molecules carries the same genetic information as the original DNA molecule.
- During DNA replication, the two strands of the original DNA double helix are separated and each old strand is used as a template to form a new DNA strand. The enzyme DNA polymerase adds nucleotides one-at-a-time, using the base-pairing rules to match each nucleotide in the old DNA strand with a complementary nucleotide in the new DNA strand. Thus, each new DNA double helix contains one strand from the original DNA molecule, together with a newly synthesized matching DNA strand.

Instructional Suggestions, Alternative Versions and Supplementary Biological Information

As background for this activity, students should know that DNA is the genetic material. "Understanding the Functions of Proteins and DNA" (available at http://serendip.brynmawr.edu/exchange/bioactivities/proteins) provides a suggested sequence of activities for introducing students to DNA as the genetic material.

As mentioned above, we have provided two versions of the Student Handout for this DNA activity. The first version is designed for students who are familiar with DNA structure and replication. To maximize student participation and learning you may want to have your students complete the questions individually or in pairs, followed by a whole class discussion.

The second version of the Student Handout includes explanatory material to introduce students to DNA structure and replication. This version also provides a hands-on simulation version of question 11 on page 4. Students use nucleotide diagram pieces and tape to carry out DNA replication (adapted from Instructor Guide to Biology -- A Guide to the Natural World by Jennifer Warner). Templates for making enough nucleotide pieces for nine students or pairs of students are provided on the last page of

[1] These Teacher Preparation Notes, the related Student Handout and additional activities are available at http://serendip.brynmawr.edu/exchange/bioactivities/DNA.