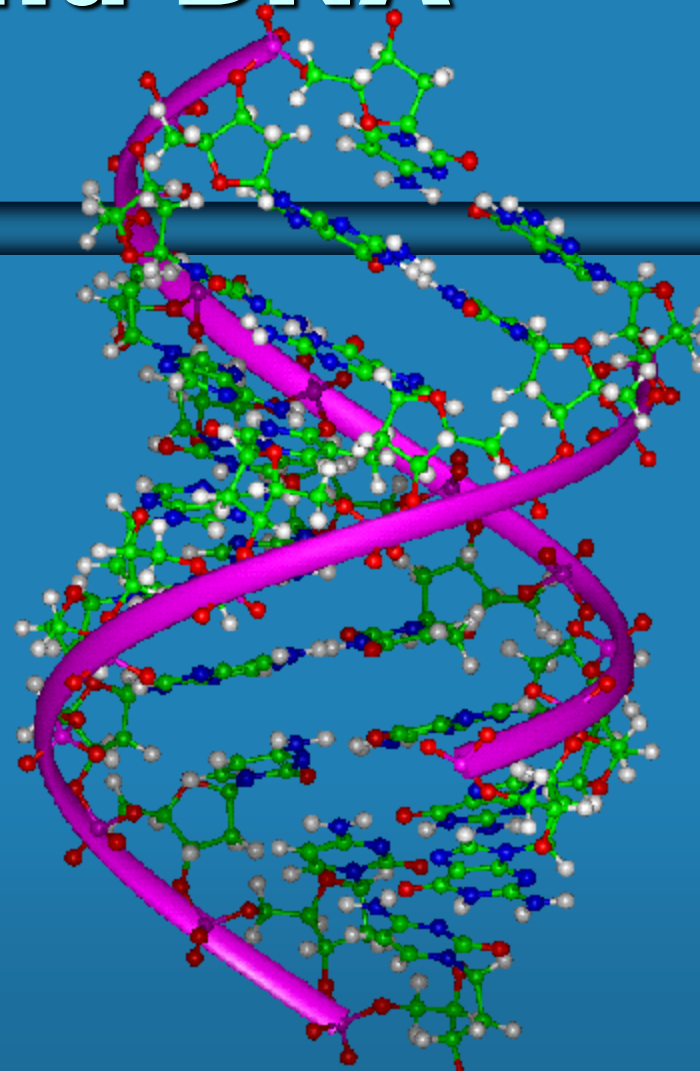


**Unit: Genetics**  
**Lesson: DNA and DNA**  
**Replication**

**Agricultural Biology**  
**Instructor:**



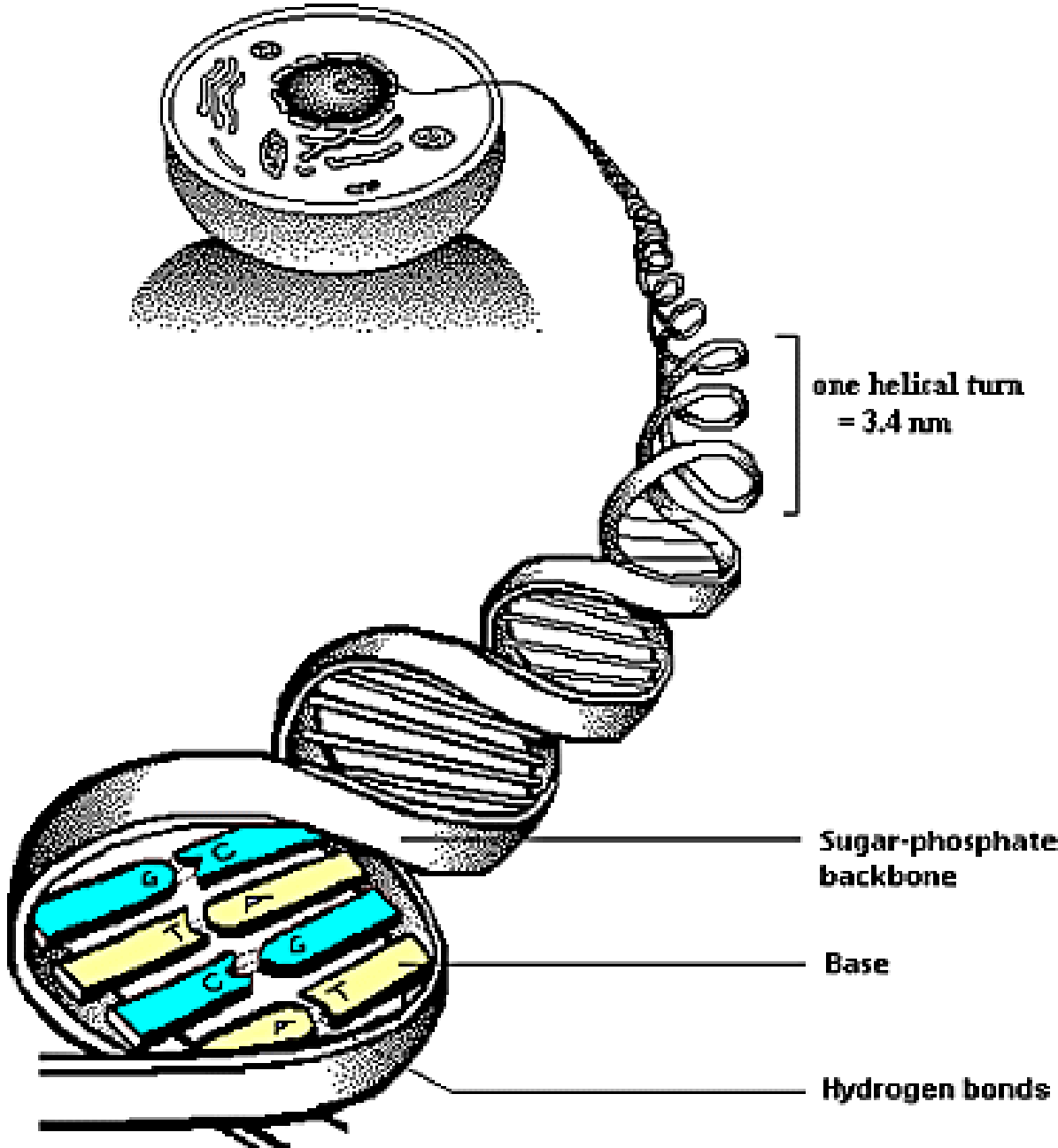


# **Student Objectives**

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- **Students will be able to identify and explain DNA structure.**
- **Students will understand how DNA pairs with specific bases and the process of DNA replication.**
- **Students will comprehend the importance of checking for errors**

# THE STRUCTURE OF DNA





# I. DNA Structure

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- **A) Double helix held together by weak hydrogen bonds**
- **B) Nucleotides**
  - **1. Subunits that make up DNA**
  - **2. Made of 3 components**
    - **A) phosphate group**
    - **B) deoxyribose = 5-carbon sugar**
    - **C) nitrogen containing base**

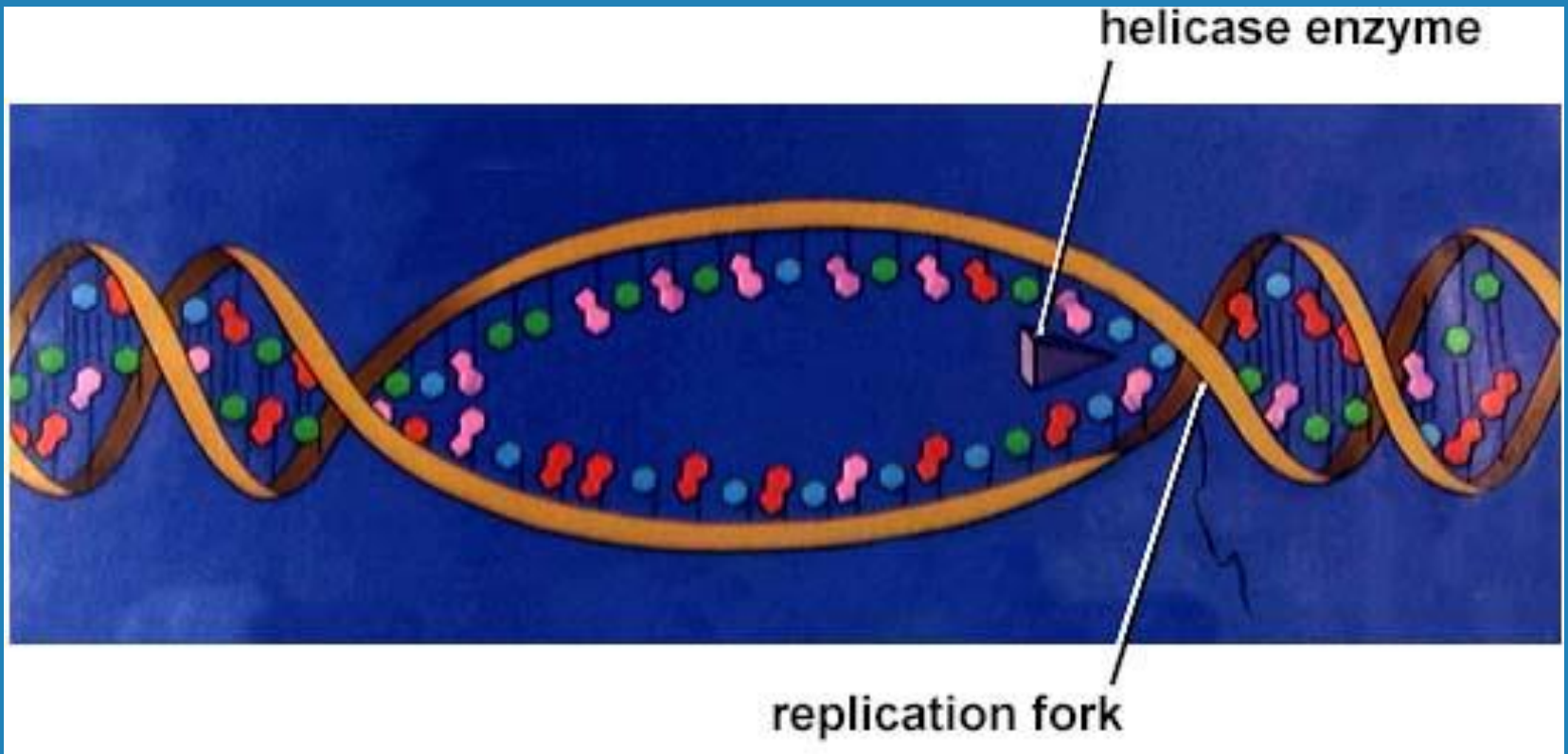


# I. DNA Structure

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- **C) Four nitrogen bases**
  - **1. Purines**
    - **A) Adenine**
    - **B) Guanine**
  - **2. Pyrimidines**
    - **A) Thiamine**
    - **B) Cytosine**

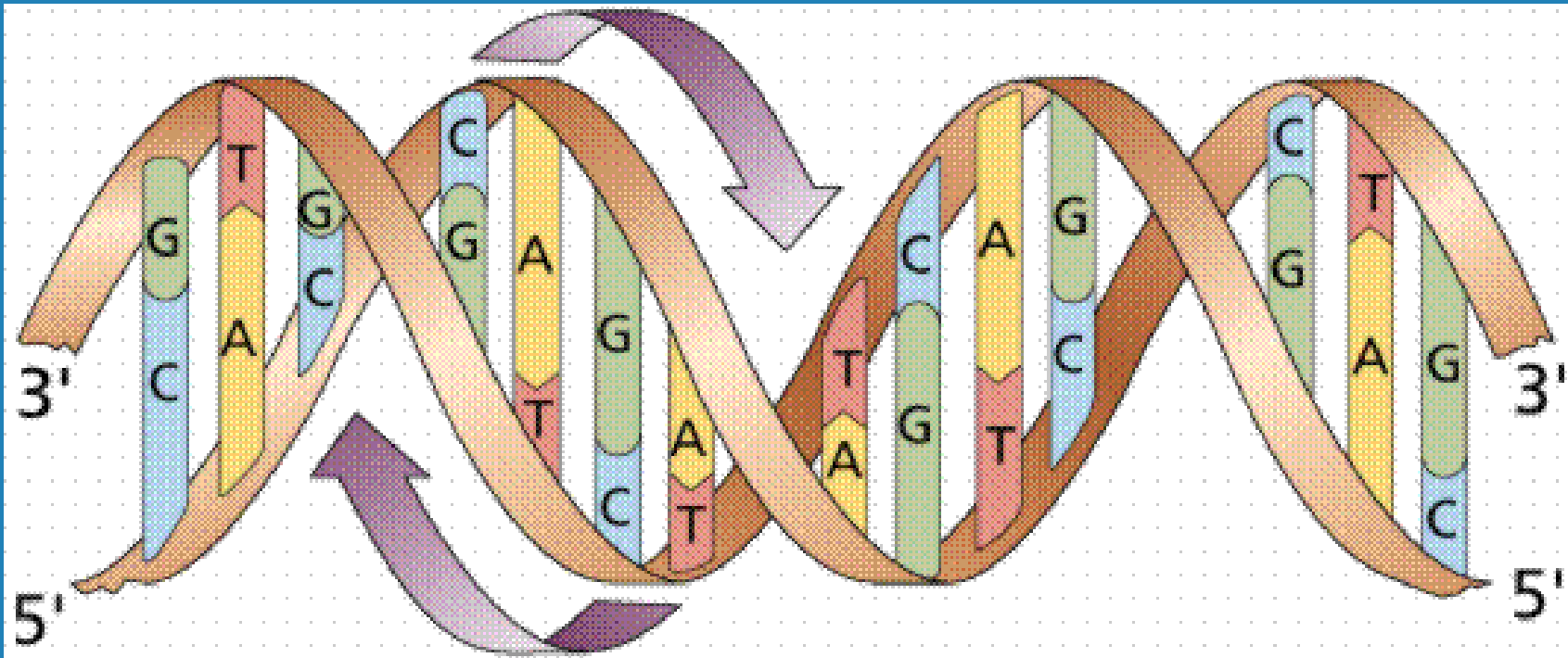
# I. DNA Structure



# II. Pairing Between Bases

- **A) Purines on 1 strand always pair with Pyrimidines on another strand**
  - 1. A pairs with T always
  - 2. G pairs with C always
- **B) Complementary Strands**
  - 1. Sequence of bases on one strand determines the sequence on the other strand.
  - 2. Make up the double helix and serve as a template to build DNA

# II. Pairing Between Bases





# III. DNA Replication

- **A) Step 1 = double helix unwinds**
  - **1. DNA Helicase**
    - **A) an enzyme that breaks apart the hydrogen bonds**
  - **2. Hydrogen Bond**
    - **A) these bonds hold nucleotides together**
  - **3. Proteins**
    - **A) attach to the strands to keep the bonds from reforming**
  - **4. Replication Forks**
    - **A) two areas where the DNA opens up to allow replication to occur**



# III. DNA Replication

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- **B) Step 2 = nucleotides are added**
  - **1. DNA Polymerase**
    - **A) enzyme that moves along each strand adding nucleotides**

# III. DNA Replication

- **C) Step 3 = 2 strands of DNA are formed**
  - **1. Enzyme**
    - A) DNA Polymerase remains attached until all of the DNA is replicated
  - **2. New DNA**
    - A) once process is completed, 2 new strands are completed
  - **3. Nucleotide Sequence**
    - A) identical sequences are present on both strands



# IV. Checking for Errors

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- **A) Proofreading**
  - 1. The Polymerase can only add a nucleotide if the previous one was correctly placed
- **B) Backtracking**
  - 1. DNA can go back and remove the incorrect nucleotide and replace it with the correct one