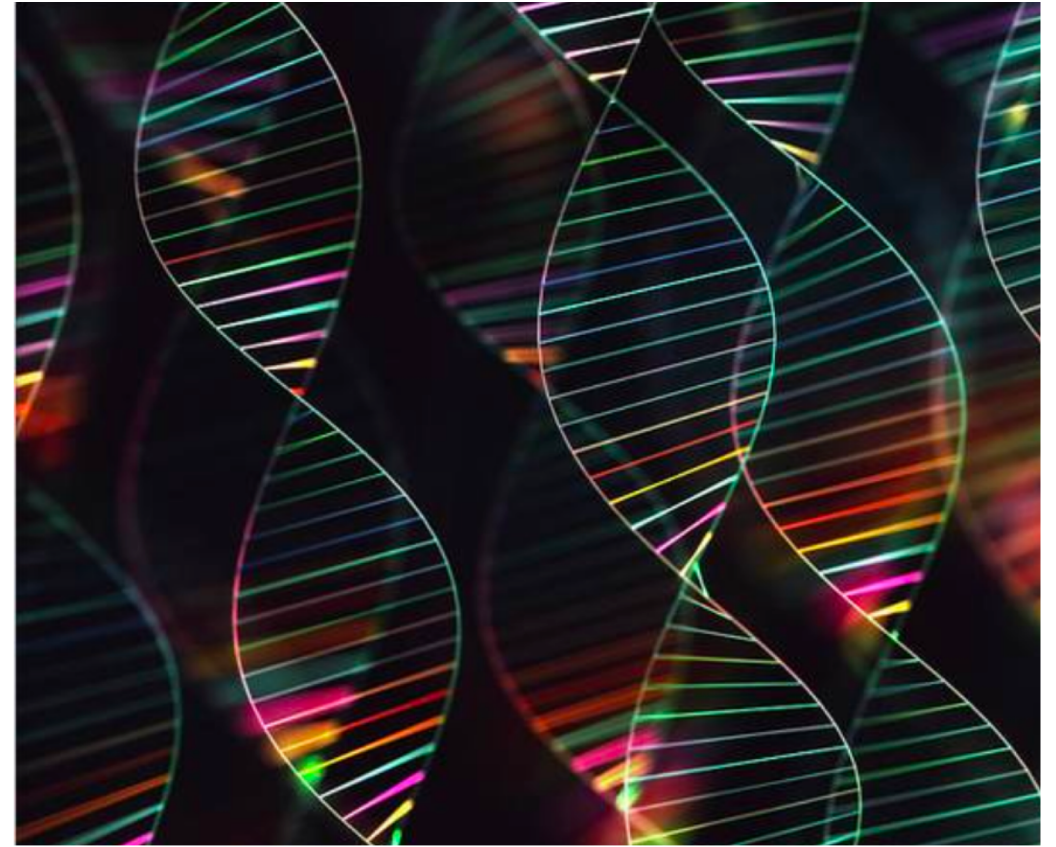


Lesson 10

DNA replication

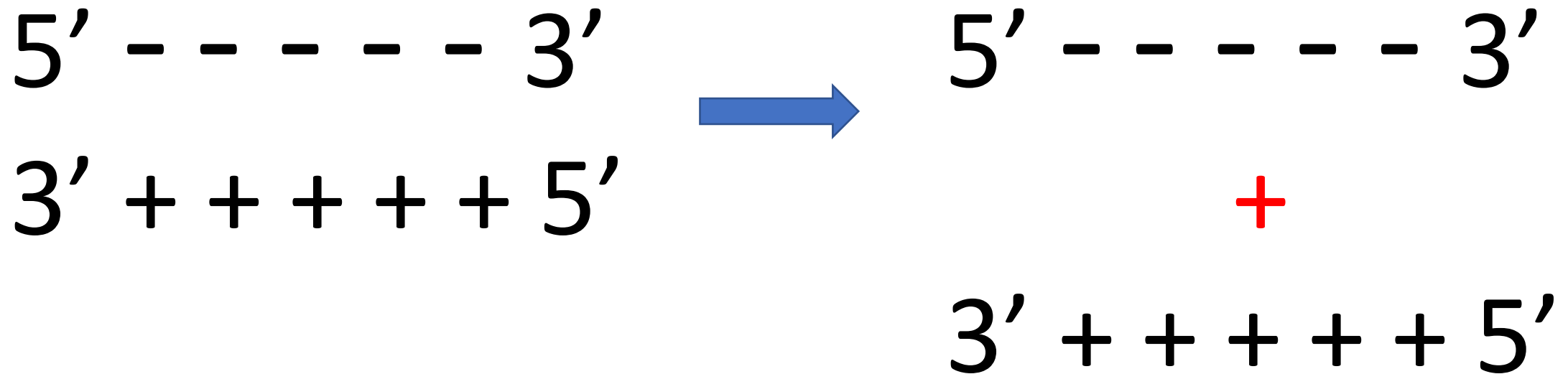


DNA replication

- **DNA replication** is a process that produces a DNA from a DNA template
- Takes place in the cell nucleus
- Mechanism by which genes (DNA) make more of themselves before they undergo cell division (mitosis or meiosis)

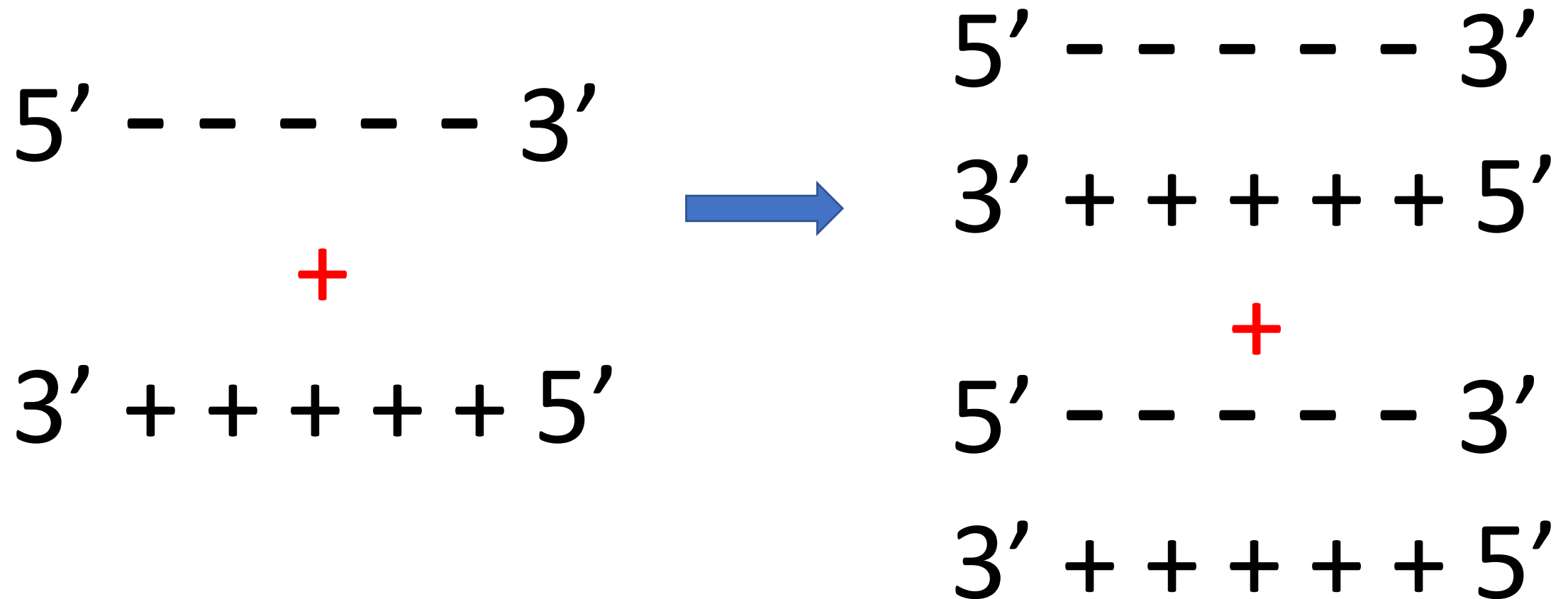
DNA replication main stages

1. DNA strands separate



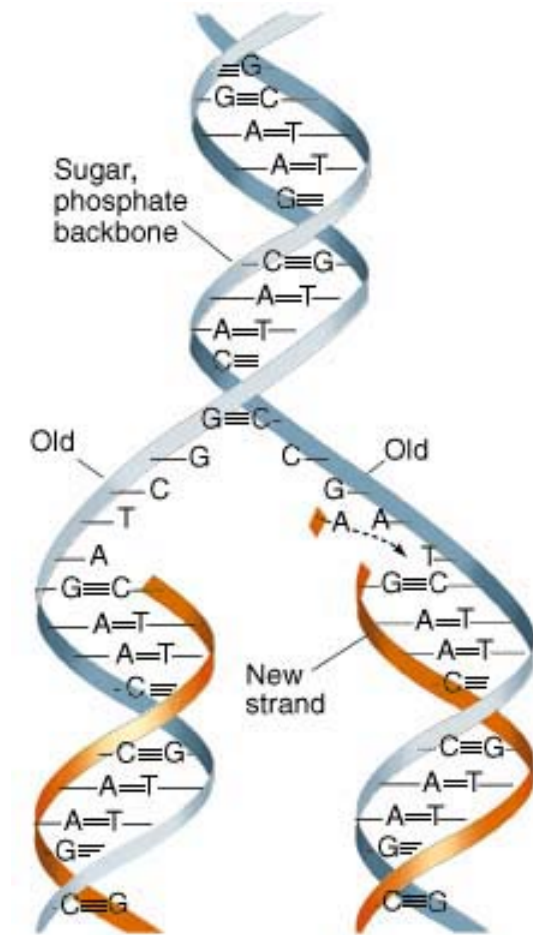
DNA replication main stages

2. Both strands are used as templates and copied



DNA replication

- The process is absolutely dependent on the major DNA rule: **BASE PAIRING (BP)**
 - Only because of BP (complementarity) you can:
 - Take the two DNA strands
 - Fill them in
 - Come up with two new DNA molecules identical to the parent DNA
- DNA replication occurs from each 3' end of each strand



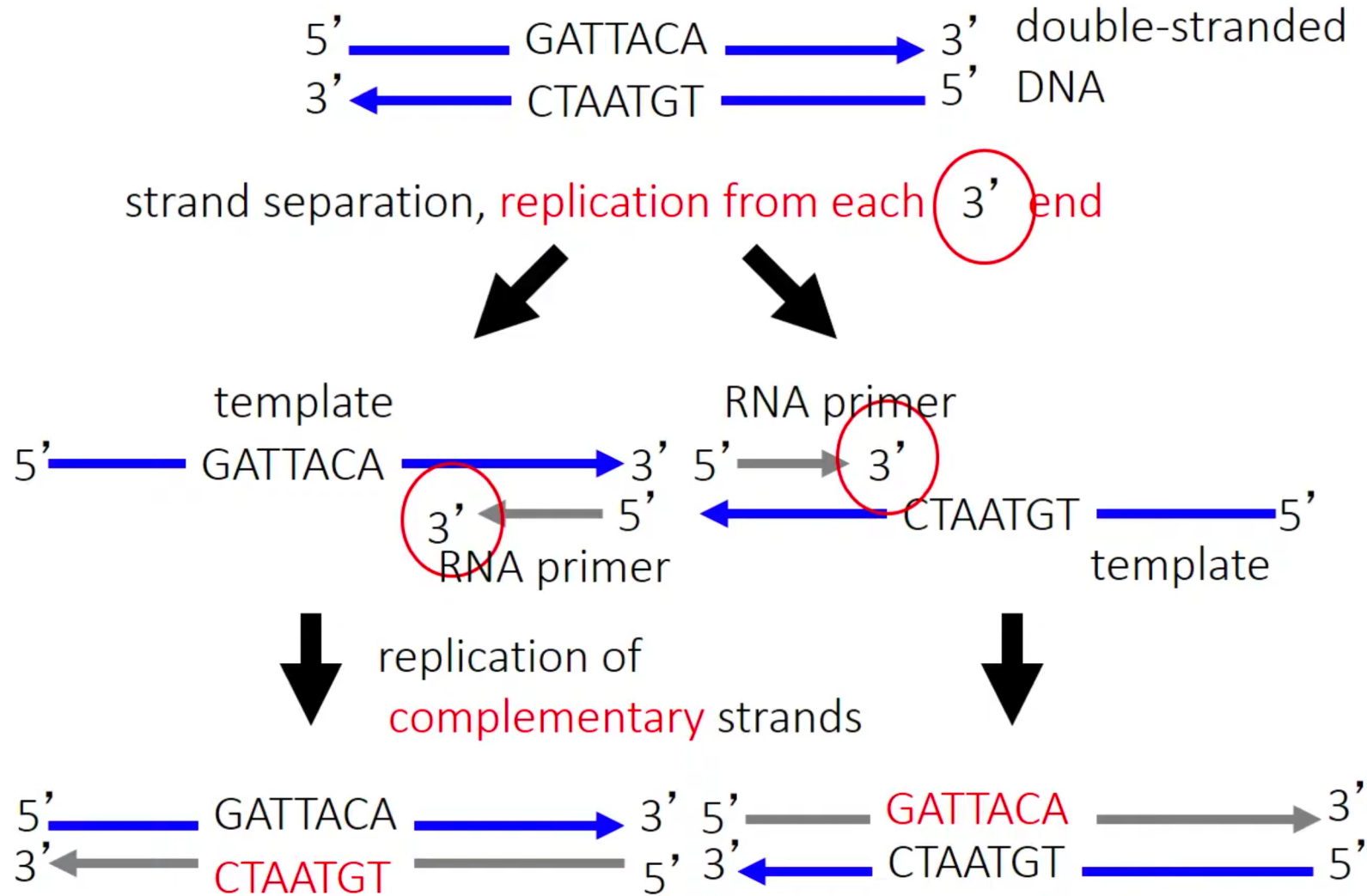
DNA replication – just a brief insight

1. DNA replication requires a “running start”
 - Specific nucleotide sequences called **origins of replication** where replication begins = **DNA PRIMERS**
2. DNA PRIMERS (5-to-10 bp long) are recognized by specific proteins that bind to them
3. Downstream of the DNA primer a protein called **helicase** unwinds the DNA into the two complementary strands by breaking the hydrogen bonds between the base pairs
4. **Single-stranded binding proteins** will bind to these strands to prevent double-helix reformation

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5. The protein **RNA primase**
 - synthesizes two RNA primers that are complementary to the DNA primers
 - attaches (**hybridizes**) the DNA and RNA primers via BP (complementarity)
6. Another group of proteins, called **DNA polymerases**, will then extend the RNA primers, moving along the template strands from the 3' end to the 5' end while adding nucleotides to the previous nucleobase
 - **DNA polymerases can move in only one direction, i.e. from 3' end to 5' end**
 - The parental DNA strand running from 5' to 3' is called **leading strand** while the complementary strand running in the opposite direction is called the **lagging strand**
7. After the new strands are created, the primers are removed by the protein **RNase H**

DNA SEMICONSERVATIVE REPLICATION



DNA replication

- Take assignment 10: **DNA replication**