

CMACS  
Computational Modeling and Analysis for Complex Systems

## Part I: The Cell Cycle

Ziping Liu  
January 6, 2010

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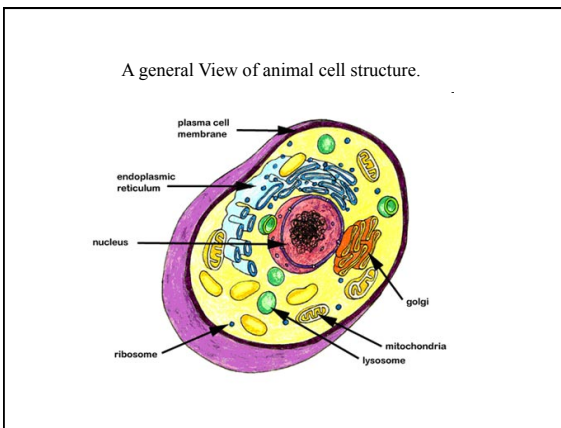
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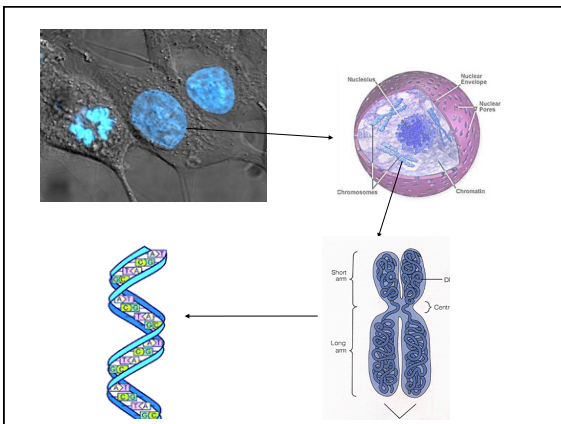
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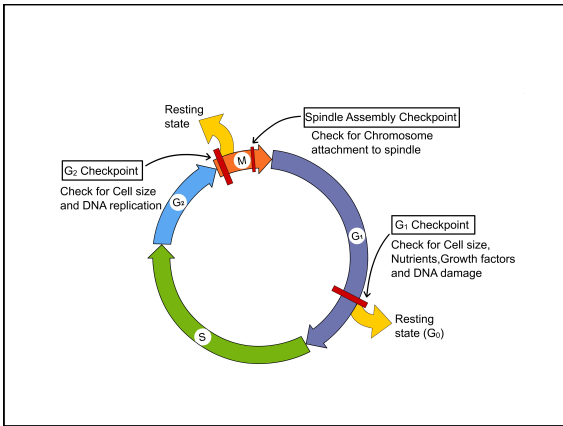
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What is a gene?

A **gene** is a segment of nucleic acid that contains the information necessary to produce a functional product, usually a protein. Genes correspond to units of inheritance.

These "codes" are the information used to produce a protein.

What is the name of the process from DNA to RNA to protein?

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A brief introduction of transcription and translation.

The diagram illustrates the flow of genetic information. On the left, a cell diagram shows DNA in the nucleus undergoing transcription to produce mRNA. The mRNA then moves to the cytoplasm where it is translated by ribosomes (consisting of rRNA and tRNA) into a protein. On the right, a flowchart shows DNA being transcribed into RNA, which is then translated into a protein. A circular arrow labeled 'Replication' indicates the process of copying DNA.

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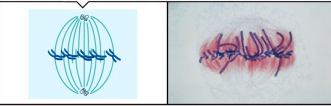
Metaphase	
<ol style="list-style-type: none"><li>1. Chromosomes are aligned along metaphase plate, attached by chromosomal microtubules to both poles.</li></ol>	

Figure 14-11 part 3 Cell and Molecular Biology, 5/e (© 2008 John Wiley & Sons)

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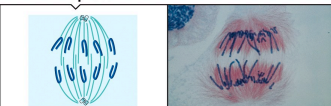
Anaphase	
<ol style="list-style-type: none"><li>1. Centromeres split, and chromatids separate.</li><li>2. Chromosomes move to opposite spindle poles.</li><li>3. Spindle poles move farther apart.</li></ol>	

Figure 14-11 part 4 Cell and Molecular Biology, 5/e (© 2008 John Wiley & Sons)

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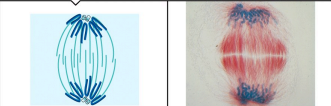
Telophase	
<ol style="list-style-type: none"><li>1. Chromosomes cluster at opposite spindle poles.</li><li>2. Chromosomes become dispersed.</li><li>3. Nuclear envelope assembles around chromosome clusters.</li><li>4. Golgi complex and ER reforms.</li><li>5. Daughter cells formed by cytokinesis.</li></ol>	

Figure 14-11 part 5 Cell and Molecular Biology, 5/e (© 2008 John Wiley & Sons)

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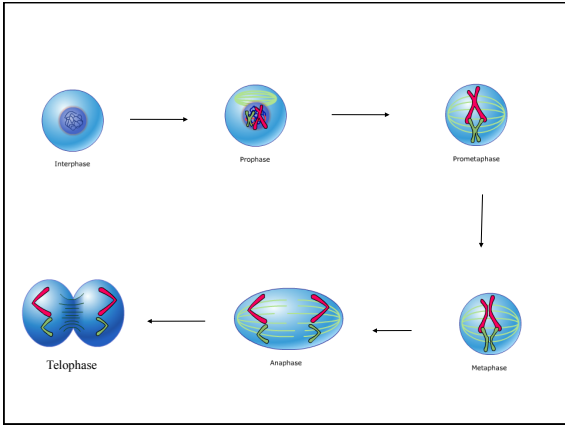
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