Asam Nukleat

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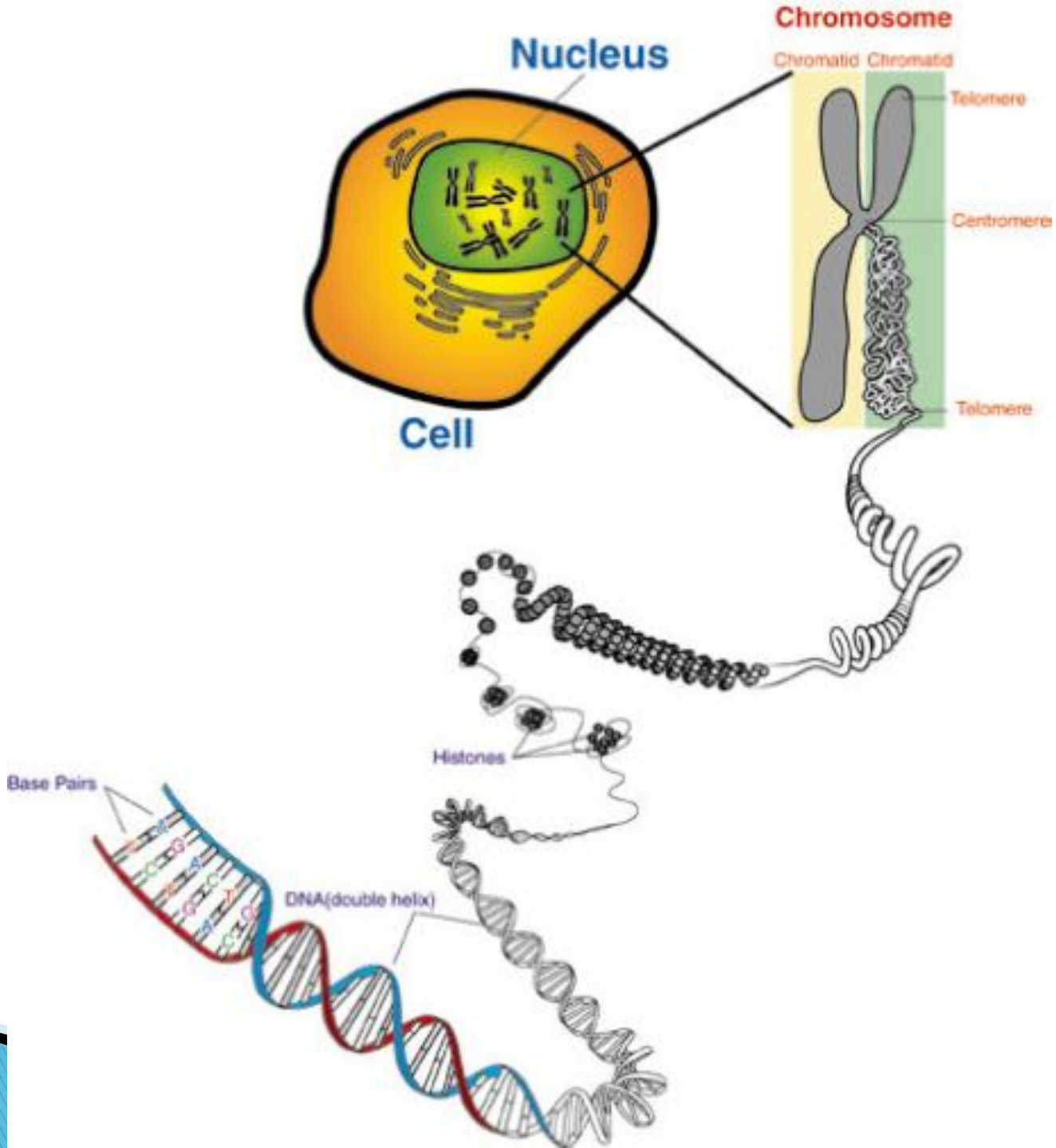
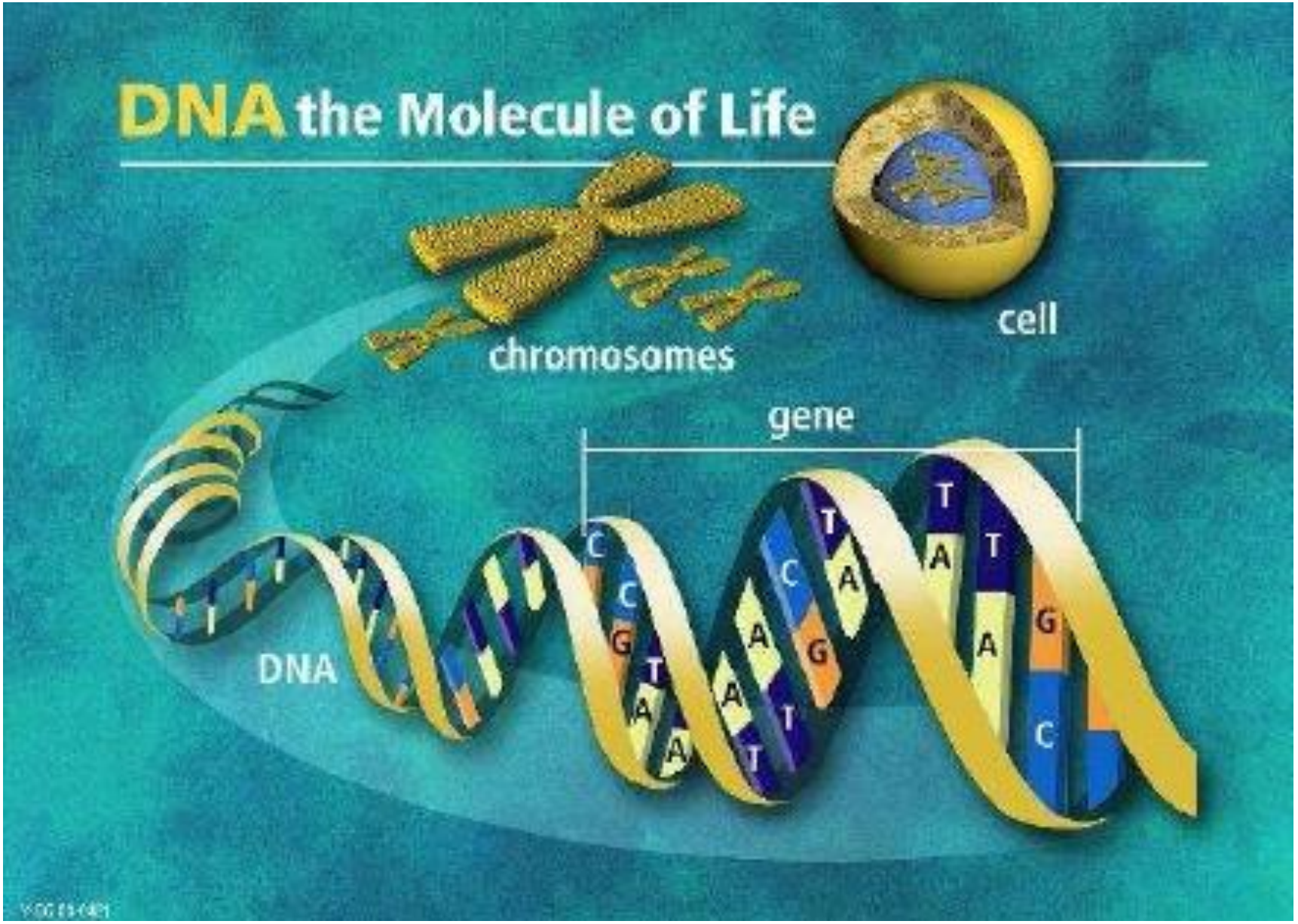
Chromosomes

- Chromosomes are made up of Proteins and DNA
- DNA carries the genetic information
- This information is similar to digital information


Chromosome
Nucleus
Chromatid Chromatid
Telomere
Centromere
Telomere
Cell
Histones
Base Pairs
DNA(double helix)


DNA the Molecule of Life
chromosomes
cell
gene
DNA

Essential Molecules

- Proteins make up the cell matrix as well as carry out all biochemical reactions which sustain life as we know it
- So DNA & Proteins are both essential molecules of life

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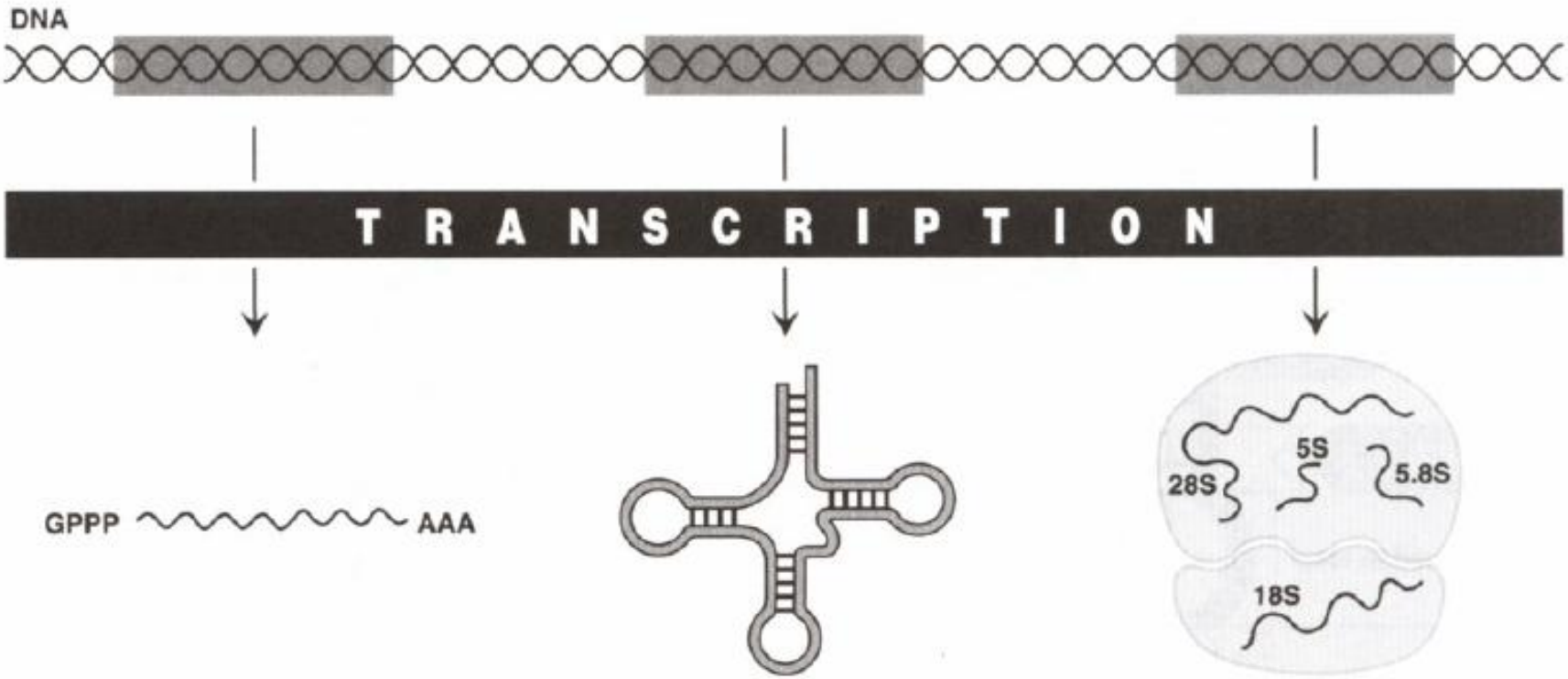
- RNA (Ribonucleic Acid)
- DNA (Deoxyribonucleic Acid)

RNA



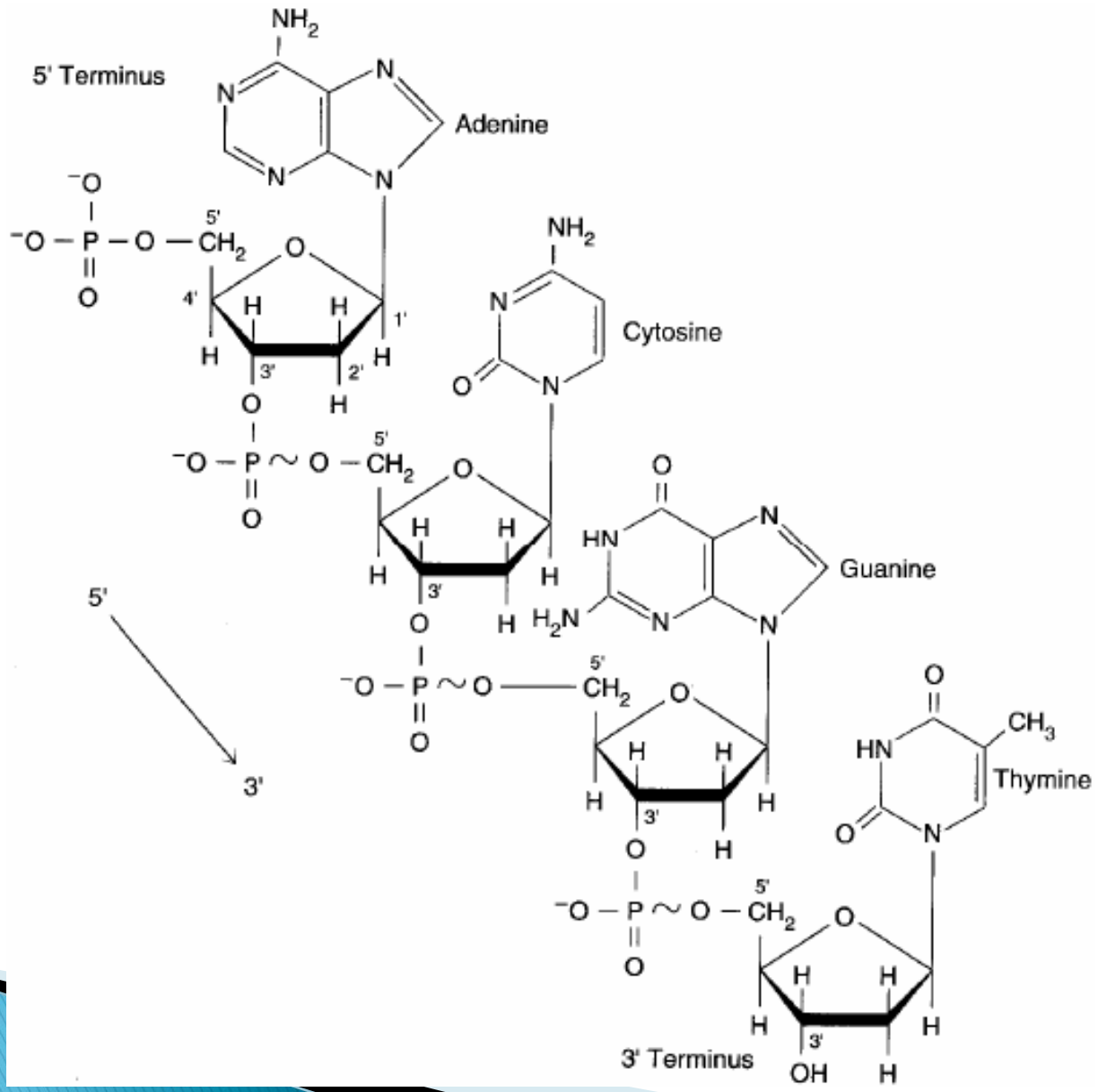
DNA

- The carrier of genetic information for all complex organisms.
- • Long polymer consisting of 4 bases

Base, Nucleoside & Nucleotide

- • Nitrogenous bases: **Adenine**
  Guanine
  Cytosin
  Thymine
  uracil
- Nucleoside: **Base** + **Sugar**
- Nucleotide: **Base** + **Sugar** + **Phosphate**

DNA Chain

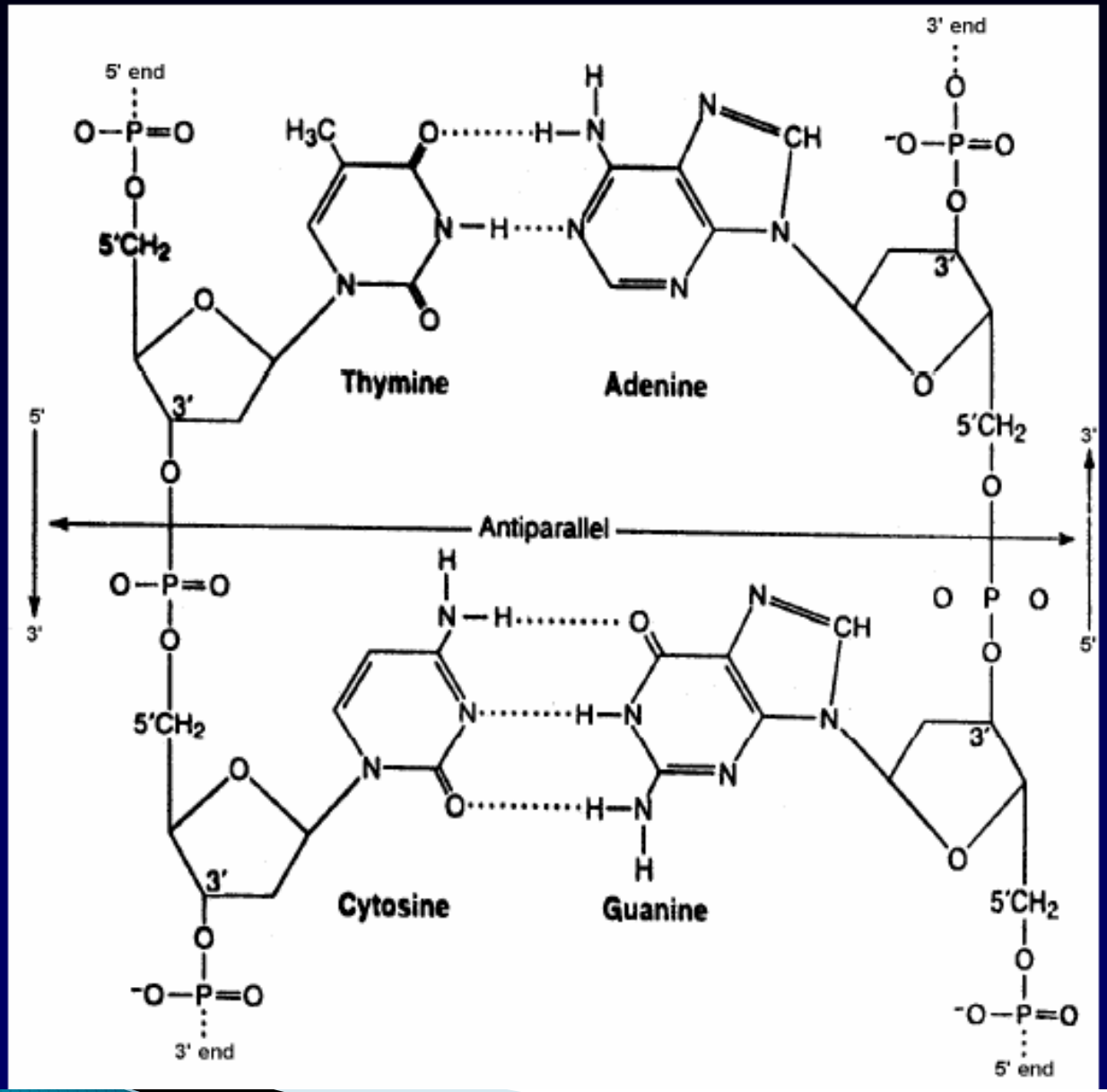

5' Terminus
Adenine
Cytosine
Guanine
Thymine
5'
3'
3' Terminus
OH

Base pairing in DNA double helix

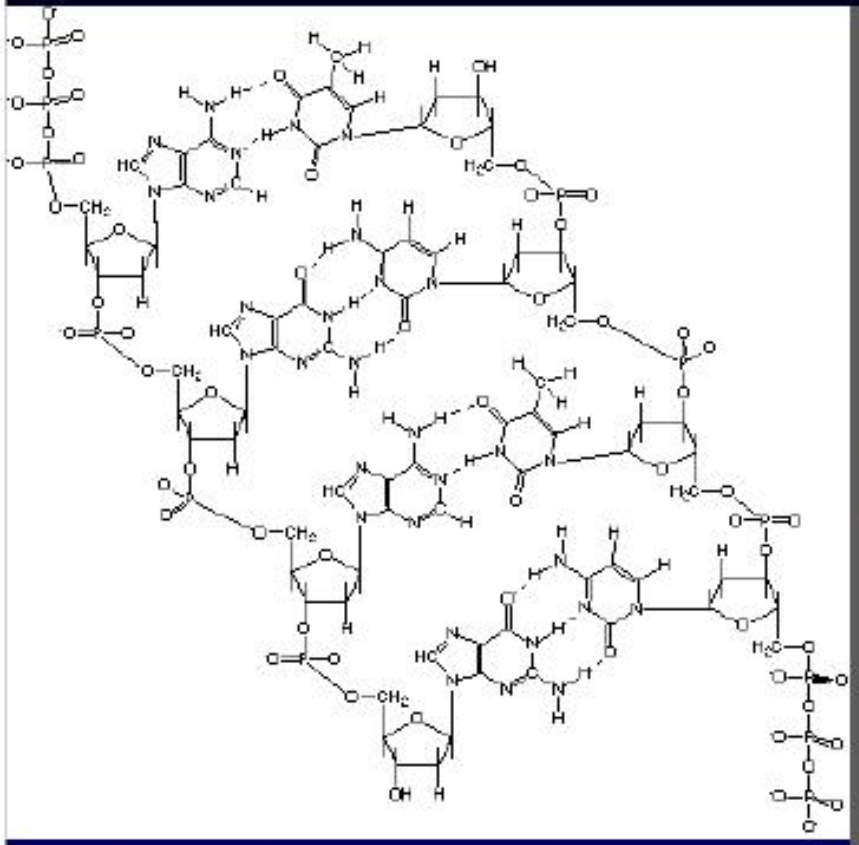
A – T
C – G
G – C
A – T
T – A
G – C
G – C
G – C
T – A

A → T base pairing
C → G base pairing

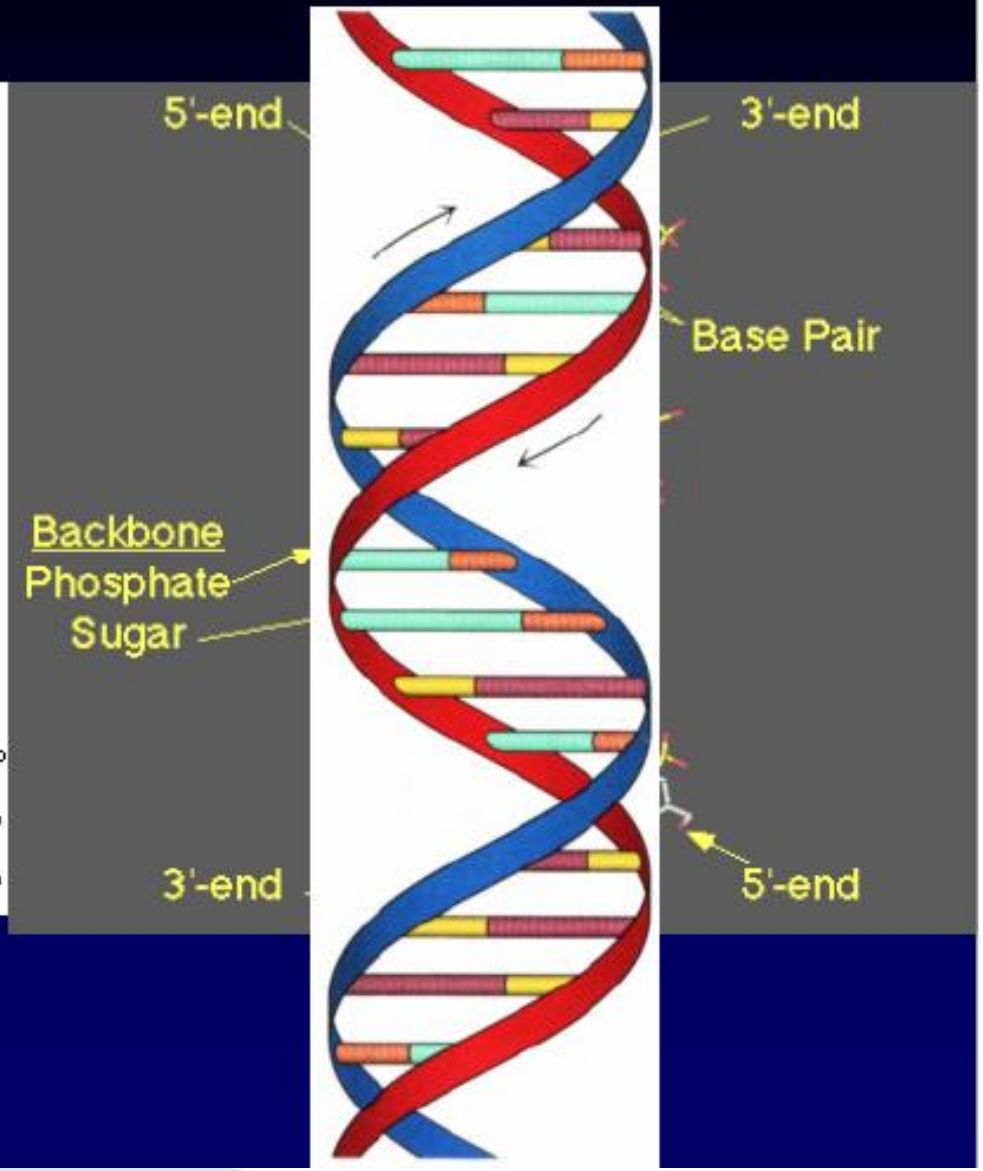
Chargaff (1950)
A/T =1.0
G/C = 1.0



Chemical Structure of DNA

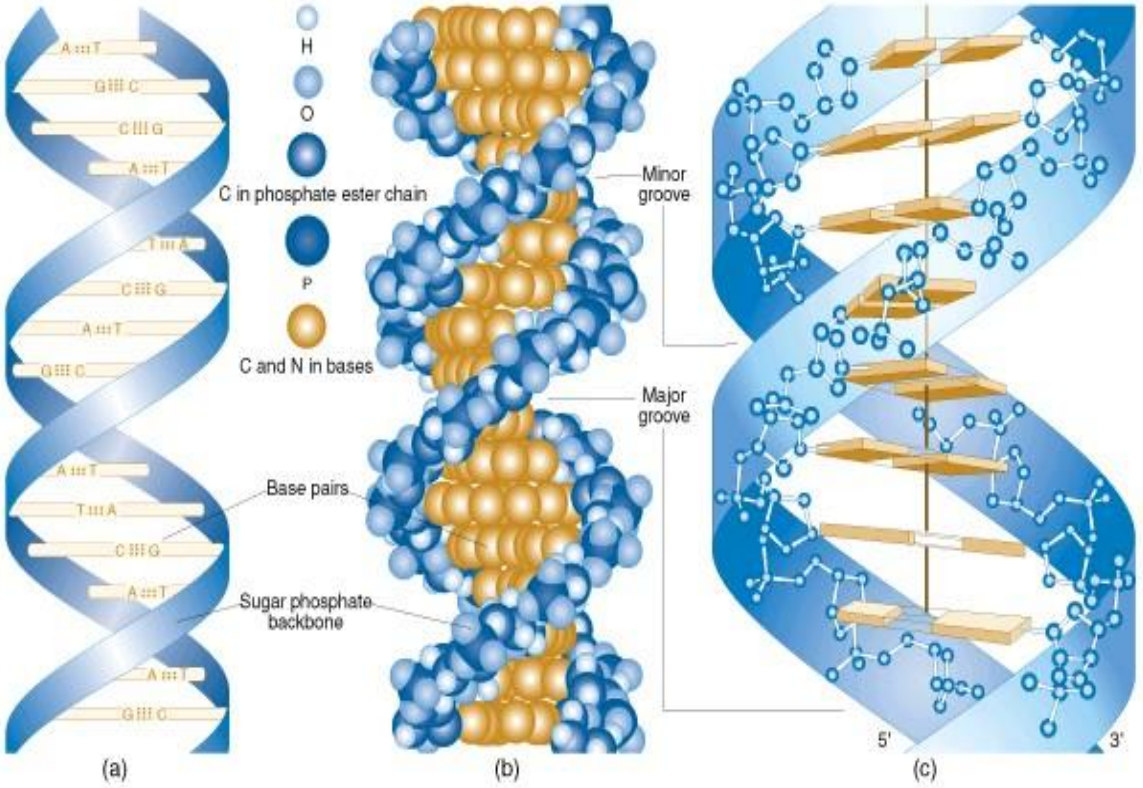


The Double Helix



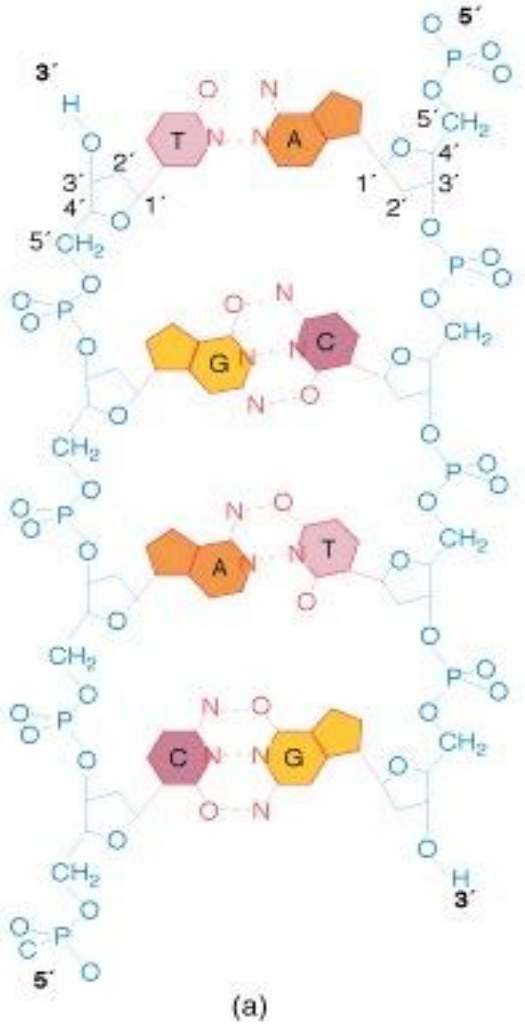
The Double Helix

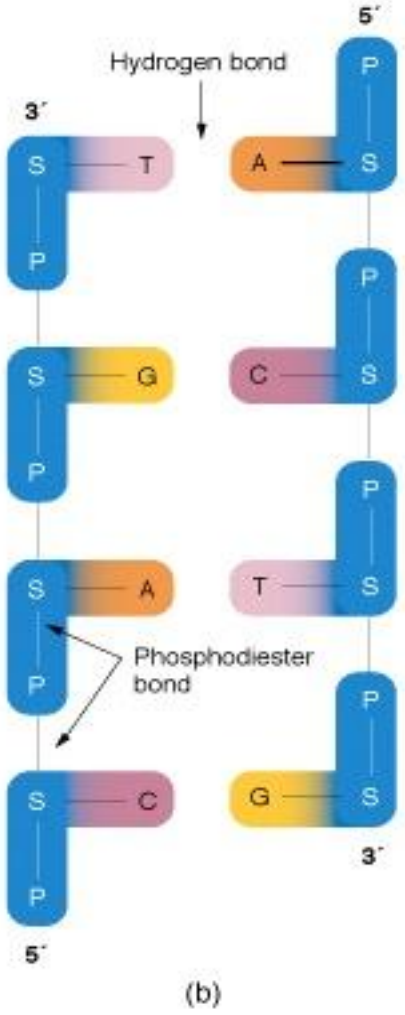
DNA molecules usually consist of two strands arranged in the famous double helix



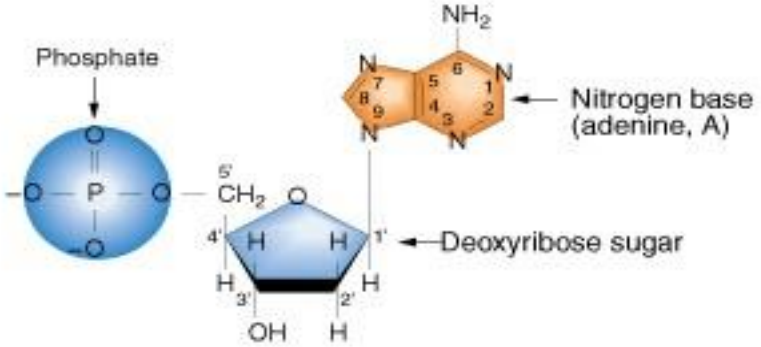
Watson-Crick Base Pairs

- A bonds to T
- C bonds to G

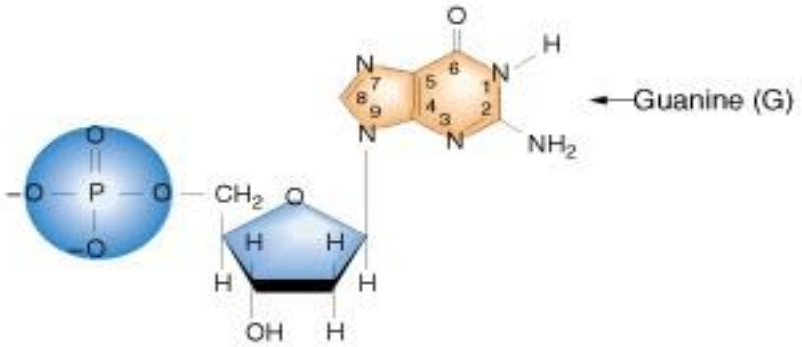




Purine nucleotides

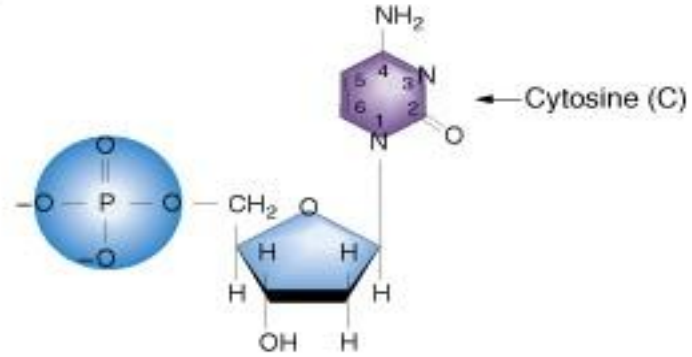


Deoxyadenosine 5'-phosphate (dAMP)

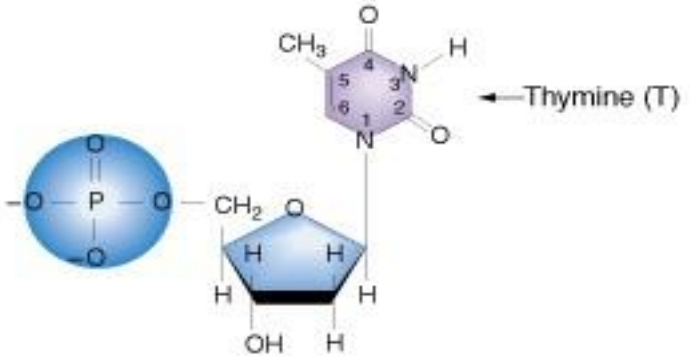


Deoxyguanosine 5'-phosphate (dGMP)

Pyrimidine nucleotides



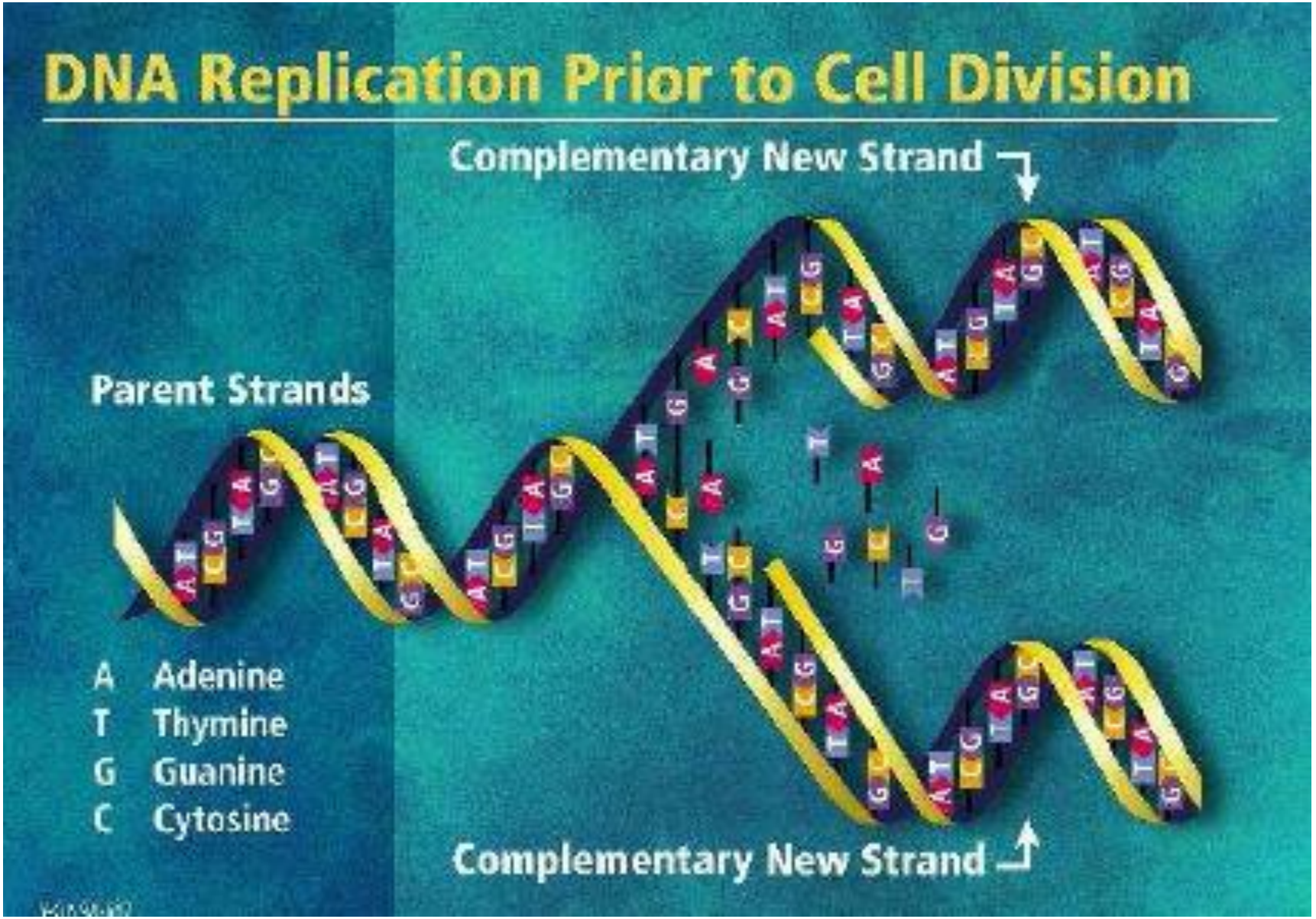
Deoxycytidine 5'-phosphate (dCMP)



Deoxythymidine 5'-phosphate (dTMP)

The Double Helix

- each strand of DNA has a “direction”
  - at one end, the terminal carbon atom in the backbone is the 5’ carbon atom of the terminal sugar
  - at the other end, the terminal carbon atom is the 3’ carbon atom of the terminal sugar
- therefore we can talk about the *5’* and the *3’* ends of a DNA strand
- in a double helix, the strands are *antiparallel* (arrows drawn from the 5’ end to the 3’ end go in opposite directions)


DNA Replication Prior to Cell Division
Complementary New Strand
Parent Strands
A Adenine
T Thymine
G Guanine
C Cytosine
Complementary New Strand

RNA

- RNA is like DNA except:
  - backbone is a little different
  - usually single stranded
  - the base uracil (U) is used in place of thymine (T)
- a strand of RNA can be thought of as a string composed of the four letters: A, C, G, U