

The basics concepts of DNA: Part I Basic Structure

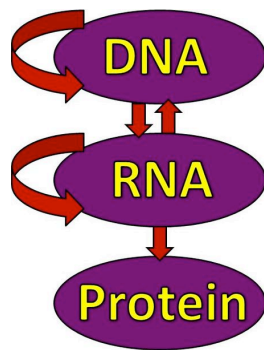
US275 Scientific Ethics
John R. Hoffman
Arcadia University



1

Three types of biological molecules control the activity of the cell.

- DNA
 - deoxyribonucleic acid
- RNA
 - ribonucleic acid
- Proteins

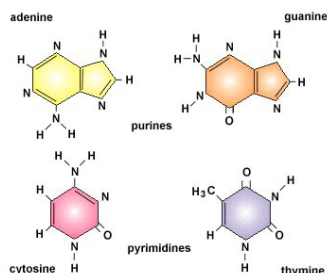


Central dogma of biology
Wikimedia Commons

2

Nucleotides are the basic subunits in DNA.

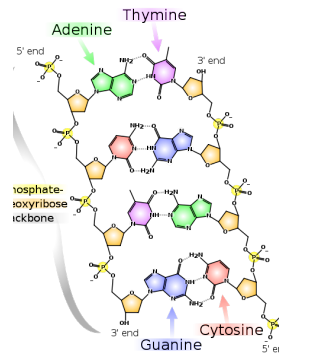
- chemical building blocks are linked in long chains
- 4 different nucleotides
 - Portion of the molecule is unique
 - A = adenine
 - T = thymine
 - G = guanine
 - C = cytosine



3

The DNA molecule is double stranded.

- two chains of nucleotides
- organized like a ladder
 - vertical sides
 - rungs
- strands are complementary to the other
 - A binds to T
 - G binds to C

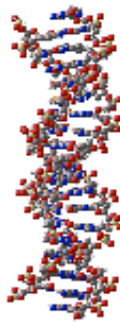


Chemical Structure of DNA
 Madeleine Price Ball (2007)
 Wikimedia Commons

4

The DNA molecule is organized as a double helix.

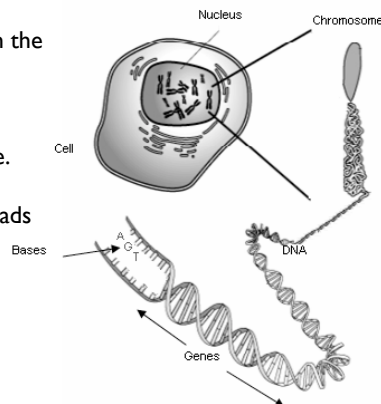
- molecule is twisted around it self
- binding sites of nucleotides toward the center
 - A binds to T
 - G binds to C



5

The chromosomes are made of DNA molecules and associated proteins.

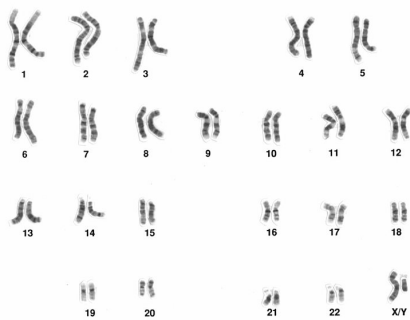
- Within the cell, DNA is packed in the nucleus
 - Each DNA molecule is organized as a chromosome.
 - wrapped around protein beads
 - only exposed as double stranded molecule when information is needed



6

Karyotyping is a way of looking at an individual's chromosomes

- A human cell has 23 pairs of chromosomes



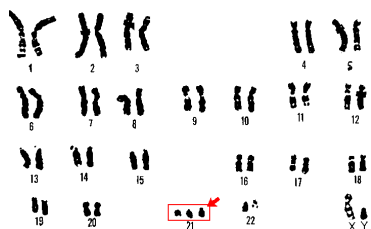
- 22 autosomes
- sex chromosomes
 - XX = female
 - XY = male

Karyotype of a human male.
National Human Genome Research Institute.

7

Down syndrome is an example of a chromosomal disorder.

- Some genetic conditions can be identified by studying the chromosomes



- Down syndrome
 - 3 copies of chromosome 21
- Fragile X syndrome
 - X chromosome has defects

Karyotype of 21 trisomy (Down syndrome)
U.S. Dept of Energy Human Genome Program.

8

TO BE CONTINUED

- in Basic Concepts of DNA:
Part II Genetic Properties

9

Any Questions?

Email me at:
hoffmanj@arcadia.edu



<http://www.vipitbullkennels.com/images/animated-question-mark.gif>