DNA (deoxyribonucleic acid) Structure. [Figure 21.1]

DNA is made up of two polymers of nucleotides wound together in a double helix.

Nucleotide structure:
- One phosphate group (PO₄)
- Deoxyribose – a sugar containing five carbon atoms.
- One of four nitrogenous (nitrogen containing) bases: adenine (A), thymine (T), guanine (G), cytosine (C).
  - Adenine pairs with thymine (AT) and guanine pairs with cytosine (GC).

The arrangement of nitrogenous bases in DNA molecules constitutes a code for the assembly of amino acids into proteins.
The replication of DNA – A semiconservative process.

[Figure 21.2] [Figure 21.3]

RNA (ribonucleic acid) Structure. [Figure 21.4]

RNA is made up of a single-stranded polymer of nucleotides.

RNA Nucleotide structure:
- Phosphate group
- Ribose – another five-carbon sugar.
- One of four nitrogenous (nitrogen containing) bases: adenine (A), uracil (U), guanine (G), cytosine (C).

Gene expression.
Protein structure and function.
Proteins are polymers of amino acids and have many functions in cells — Primarily they function in the structural makeup of cells and as enzymes.
Translating the genetic code in DNA to an amino acid sequence in a protein.

Basic materials:
- DNA.
- Messenger RNA – m-RNA.
- Ribosomes containing ribosomal RNA (r-RNA).
- Transfer RNA – t-RNA.
- Amino acids
- Many different enzymes.

The basic process:
DNA → (transcription) → m-RNA → (translation) → Protein
DNA segment
TTAACGGGCTCTATTATCATAG
AATTGCCCGATAATAGTATC

Nucleus
Cytoplasm

 Ribosome

Amino acids
S R N M Z
O E I Y L
T P

t-RNA molecules with attached amino acids
M A M
U A C
A A C
T A G
S A G
L GA U

DNA double helix
DNA Transcription
mRNA
mRNA Translation
tRNA
polypeptide
Cytoplasm
DNA Technology – Gene cloning.

1. Restriction enzyme cleaves DNA.

DNA ligase seals the insulin gene into the plasmid.

recombinant DNA

Host cell takes up recombined plasmid.

Gene cloning occurs.

Bacteria produce a product.