RAMA UNIVERSITY

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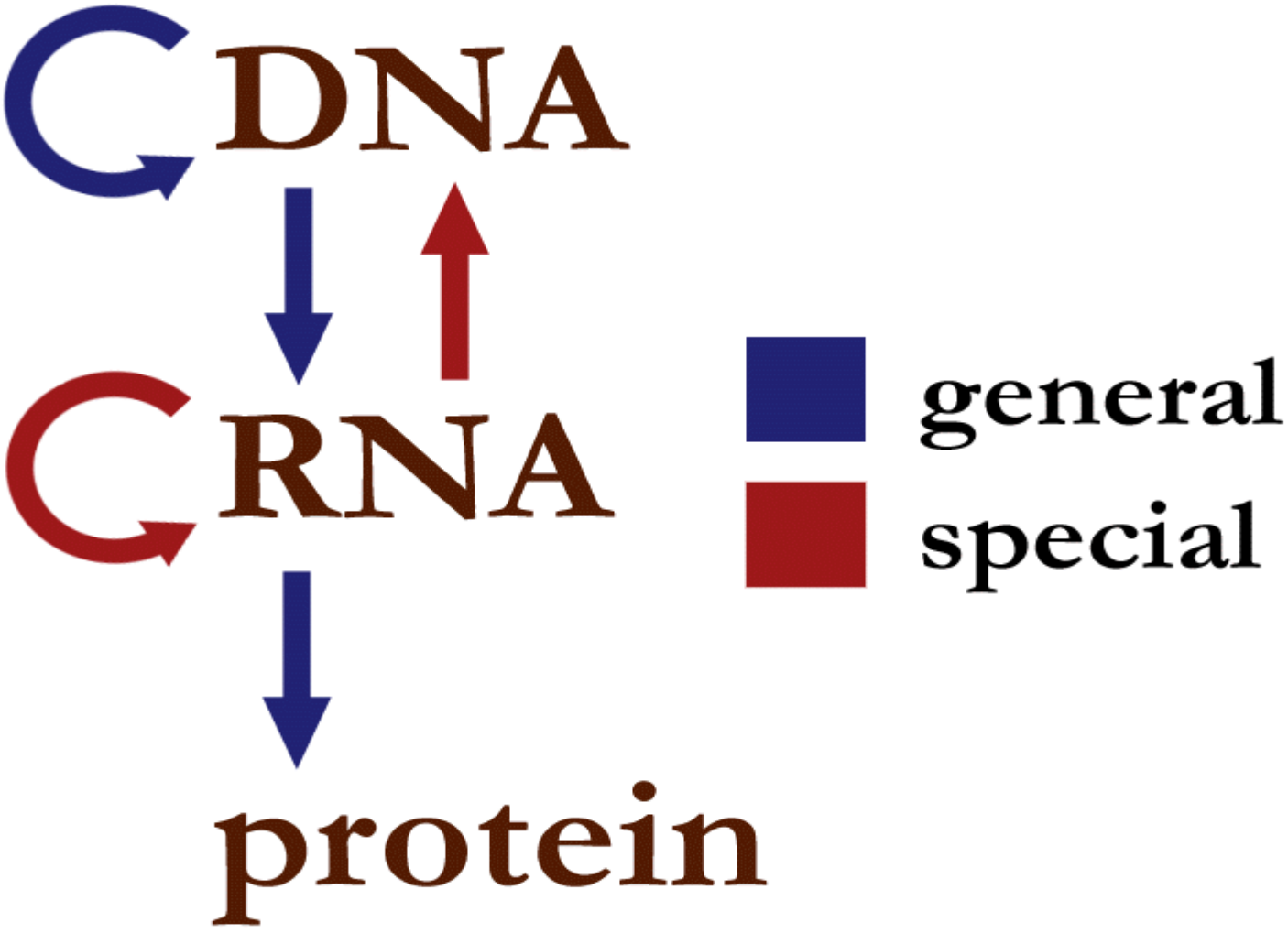
FACULTY OF ENGINEERING &TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

Central dogma of molecular biology

The **central dogma of molecular biology** is an explanation of the flow of genetic information within a biological system. it is often stated as "DNA makes RNA, and RNA makes protein", although this is not its original meaning. It was first stated by Francis Crick in 1957, then published in 1958.

The Central Dogma. This states that once "information" has passed into protein it cannot get out again. In more detail, the transfer of information from nucleic acid to nucleic acid, or from nucleic acid to protein may be possible, but transfer from protein to protein, or from protein to nucleic acid is impossible.


DNA
RNA
protein
general
special

Information means here the precise determination of sequence, either of bases in the nucleic acid or of amino acid residues in the protein.
— *Francis Crick, 1958*
and re-stated in a *Nature* paper published in 1970:
Information flow in biological systems
The central dogma of molecular biology deals with the detailed residue-by-residue transfer of sequential information. It states that such information cannot be transferred back from protein to either protein or nucleic acid.
— *Francis Crick*
A second version of the central dogma is popular but incorrect. This is the simplistic DNA → RNA → protein pathway published by James Watson in the first edition of *The Molecular Biology of the Gene* (1965). Watson's version differs from Crick's because Watson describes a two-step (DNA → RNA and RNA → protein) process as the central dogma. While the dogma, as originally stated by Crick, remains valid today, Watson's version does not.
The dogma is a framework for understanding the transfer of sequence information between information-carrying biopolymers, in the most common or general case, in living organisms.

There are 3 major classes of such biopolymers: DNA and RNA (both nucleic acids), and protein.
There are 3 × 3 = 9 conceivable direct transfers of information that can occur between these.
The dogma classes these into 3 groups of 3: three general transfers (believed to occur normally in most cells), three special transfers (known to occur, but only under specific conditions in case of some viruses or in a laboratory), and three unknown transfers (believed never to occur).
The general transfers describe the normal flow of biological information: DNA can be copied to DNA (DNA replication), DNA information can be copied into mRNA (transcription), and proteins can be synthesized using the information in mRNA as a template (translation).
The special transfers describe: RNA being copied from RNA (RNA replication), DNA being synthesised using an RNA template (reverse transcription), and proteins being synthesised directly from a DNA template without the use of mRNA.
The unknown transfers describe: a protein being copied from a protein, synthesis of RNA using the primary structure of a protein as a template, and DNA synthesis using the primary structure of a protein as a template - these are not thought to naturally occur