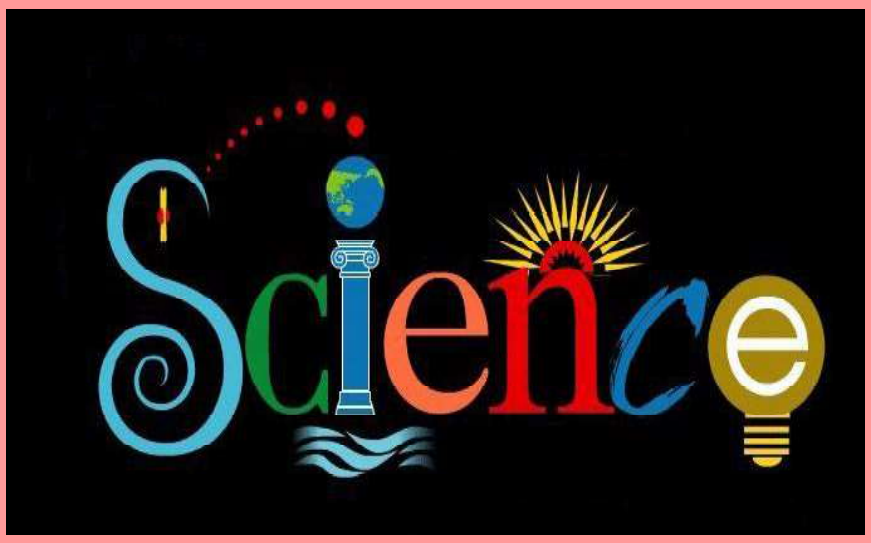
Ravindra's IAS

Science

(for prelims)



UPSC & STATE PSC'S

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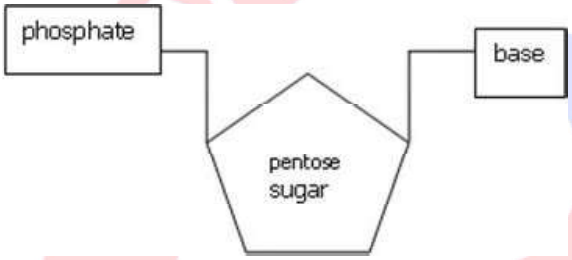
Nucleic Acids

- DNA (deoxyribonucleic acid) and RNA (ribonucleic acid) are nucleic acids. Nucleic acids are molecules comprised of monomers known as nucleotides. These molecules may be relatively small (as in the case of certain kinds of RNA) or quite large (a single DNA strand may have millions of monomer units) individual nucleotides and their derivatives are important in living organisms. ATP, the molecule that transfers energy in cells is built from a nucleotide as are a number of other molecules crucial to metabolism.
- DNA and RNA molecules are responsible for hereditary information that controls the protein synthesis in living organisms. They are called nucleic acids because they were first discovered within the nucleus of the cell by a Swiss biochemist Friedrich Miescher.

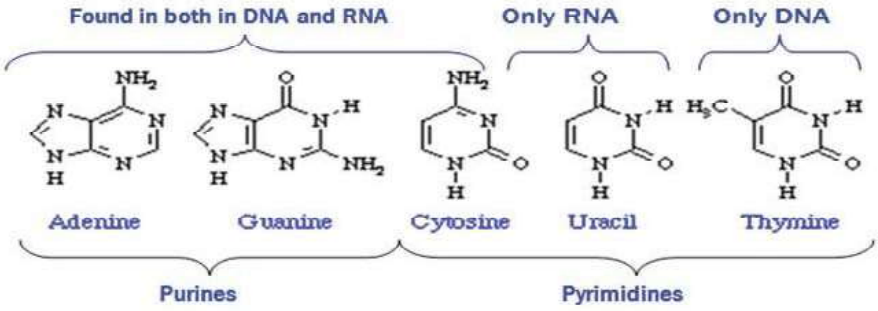
Location of DNA and RNA

- In prokaryotic cells, DNA and RNA are found dispersed in the cytosol, the fluid space inside the cell.
- In eukaryotic cells, DNA and RNA are found within the cell nucleus and also in mitochondria and chloroplats. Further, RNA is also the main component of nucleolus and ribosome in eukaryotic cells.

Composition of DNA and RNA



- Both DNA and RNA are formed by sequences of nucleotides. A Nucleotide is made of one molecule of a pentose sugar (Deoxyribose in DNA and Ribose in RNA) bound to one molecule of phosphate and to one nitrogenous base.
- While remaining things are same, the nitrogenous bases are of five types viz. Adenine (A), Guanine (G), Cytosine (C), Thymine (T) and Uracil (U).



- Out of them, adenine and guanine are called Purines (because they have fused ringed structure), while cytosine, thymine and uracil are called Pyrimidines (because they have single ring structure). Further, while both DNA and RNA consist of adenine, guanine and cytosine; thymine is only found in DNA and uracil in RNA. This is shown in below image:
- The nucleotides are joined together supported by the backbone of the sugar and phosphate. These nucleotide chains are long and may be either single stranded, or single stranded folded onto itself or double stranded. Whenever the strand folds onto itself or two strands come together for making a double stranded structure, the nucleotides are joined together with hydrogen bond between nitrogenous bases. This is called base pairing. The rule of base pairing is such that: