RNA WORLD

RNA initially served as the primary genetic material. There is evidence to suggest that fundamental life processes, such as metabolism, translation, and splicing, evolved around RNA. RNA acted not only as a genetic material but also as a catalyst for important biochemical reactions in living systems, such as splicing, which are catalyzed by RNA catalysts rather than protein enzymes.

However, RNA's role as a catalyst rendered it reactive and hence unstable. Consequently, DNA evolved from RNA with chemical modifications that enhanced its stability. DNA, being double-stranded and possessing complementary strands, further mitigated changes by evolving a repair mechanism.

RNA serves various functions, acting as an adapter, structural molecule, and, in some cases, a catalyst. Despite this versatility, DNA is considered a better material for transmitting information due to its stability and the presence of complementary strands.

Structure of RNA (Ribonucleic Acid)

RNA, or ribonucleic acid, is a ubiquitous molecule found in all living cells, existing both in the cytoplasm and the nucleus.

In RNA, the sugar component is ribose sugar, and the phosphoric acid is similar to that present in DNA.

The purine bases found in RNA are adenine and guanine, while the pyrimidine bases are cytosine and uracil, with thymine being replaced by uracil.

RNA primarily functions in protein synthesis, although in certain viruses, it also serves as genetic material.

Therefore, RNA can be categorized into two major types:

(a) Genetic RNA: H. Frankle-Conrat's work in 1957 demonstrated that RNA found in TMV (Tobacco Mosaic Virus) serves as genetic material. This type of RNA functions as the genetic material in most plant viruses.

(b) Non-genetic RNA: This form of RNA is present in cells where DNA serves as the genetic material.