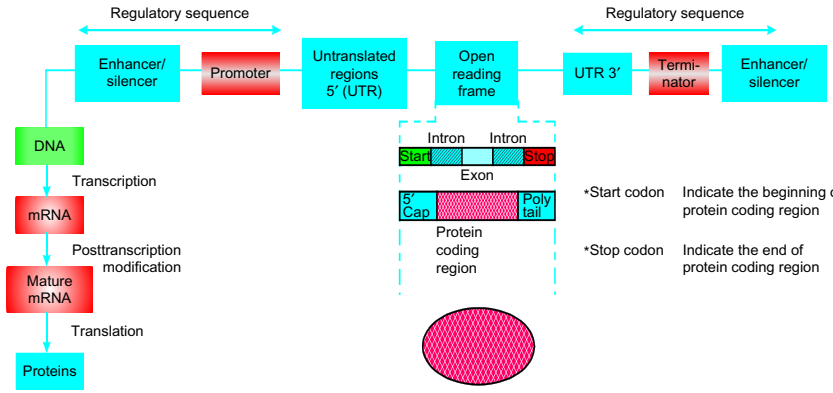

FIG. 6.2 Structure of protein coding genes for the prokaryotes.

regions of the transcript are known as exons. Exons are protein-coding regions which produce mRNA. Sometimes genes may acquire mutations in their sequence, which leads to the formation of alleles, different variants in the population. Different phenotype traits are obtained due to mutations because alleles encode a slightly different version of proteins.

6.3 GENE EXPRESSION

The DNA molecules in genes contain information that produces the specific proteins. For encoding the information, transcription and translation are imperative processes. If the gene is RNA coding, then only transcription is required because no further translation to protein is required (Fig. 6.3). When biologically functional molecules like RNA or proteins are produced to get the resulting gene product, the process is known as gene expression. The cell's fate is decided by the thousands of genes expressed. Every DNA contains a genetic code through codons. Codons are sets of three nucleotides specifying a particular amino acid. The starting and ending of protein coding regions is indicated by the “start codon” and “stop codon,” respectively. Genes are inherited from the parents that is, sexual organisms inherit one complete set of chromosomes from each parent resulting in two copies of each chromosome, whereas asexual organisms inherit the complete set of the parents’ genome.

For the eukaryotes, the transcription occurs in the nucleus (DNA is stored in the nucleus). In prokaryotes, the transcription process occurs in the cytoplasm. Fig. 6.4 depicts the flow of information from DNA to protein for a eukaryote. The coding and noncoding regions of the DNA are transcribed into RNA. This is followed by mRNA processing, where introns are removed. The splicing of the remaining exons results in an mRNA molecule, which is then exported to the cytoplasm. The expected mRNA contains an end cap and a poly-A tail,