

The central dogma of molecular biology, DNA makes RNA makes protein. Here the process begins.

Transcription factors assemble at a specific promoter region along the DNA. The length of DNA following the promoter is a gene and it contains the recipe for a protein.

A mediator protein complex arises, carrying the enzyme RNA polymerase. It maneuvers the RNA polymerase into place, inserting it, with the help of other factors, between the strands of the DNA double helix.

The assembled collection of all these factors is referred to as the transcription initiation complex. And now, it is ready to be activated.

The initiation complex requires contact with activator proteins, which bind to specific sequences of DNA known as enhancer regions. These regions may be thousands of base pairs distant from the start of the gene.

Contact between the activator proteins and the initiation complex releases the copying mechanism. The RNA polymerase unzips a small portion of the DNA helix, exposing the bases on each strand. Only one of the strands is copied. It acts as a template for the synthesis of an RNA molecule, which is assembled one subunit at a time by matching the DNA letter code on the template strand.

The subunits can be seen here entering the enzyme through its intake hole. And they are joined together to form the long messenger RNA chain snaking out of the top.