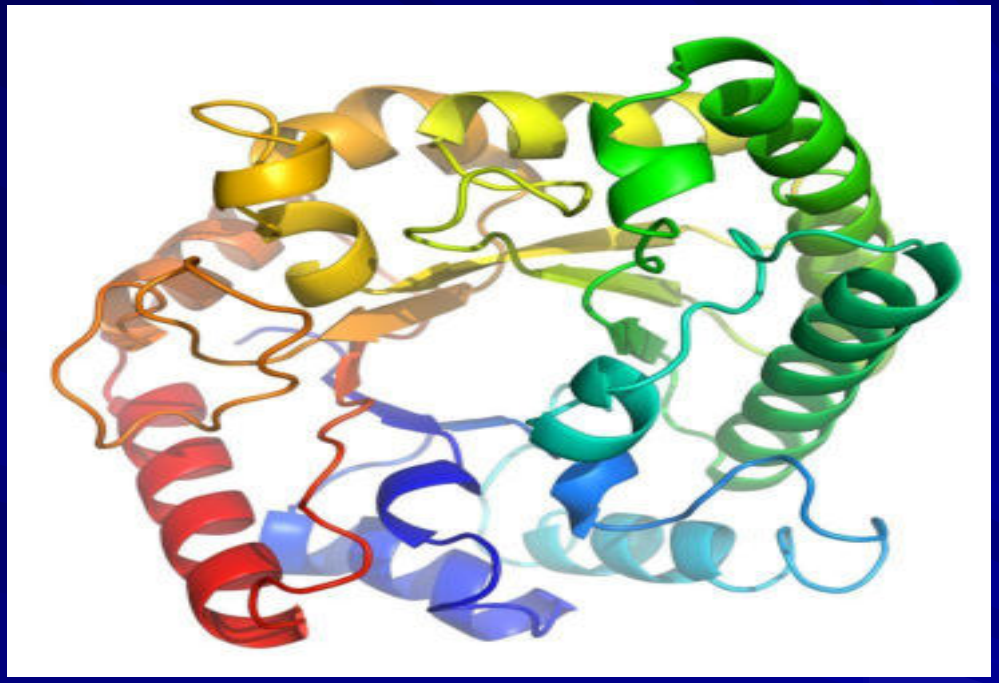
Cell cycle. Proteins. Chromatin.



Cell cycle

A cell cycle is a series of events that takes place in a cell as it grows and divides.The cell then leaves interphase, undergoes mitosis, and completes its division. The resulting cells, known as daughter cells, each enter their own interphase and begin a new round of the cell cycle.

Cell cycle

Fundamentals of cell biology include the processes of mitosis and meiosis. Through these processes cells replicate genetic material in preparation for cell division, endowing future cells with instructions for life.

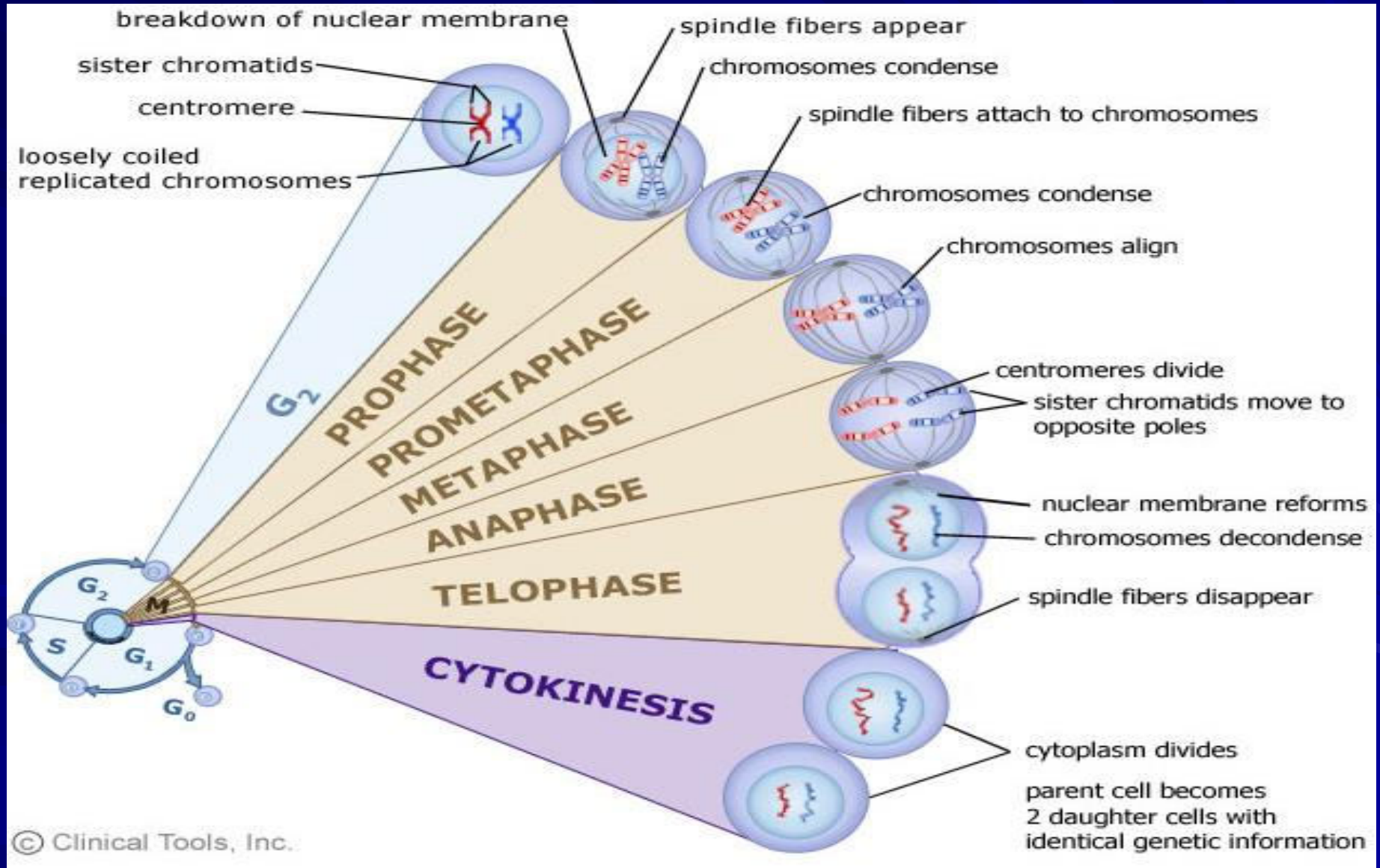
Mitosis

Mitosis is a form of eukaryotic cell division that produces two daughter cells with the same genetic component as the parent cell. Chromosomes replicated during the S phase are divided in such a way as to ensure that each daughter cell receives a copy of every chromosome. In actively dividing animal cells, the whole process takes about one hour.

Cell cycle

Mitosis or somatic cell division consists of two processes: **Karyokinesis and Cytokinesis.**

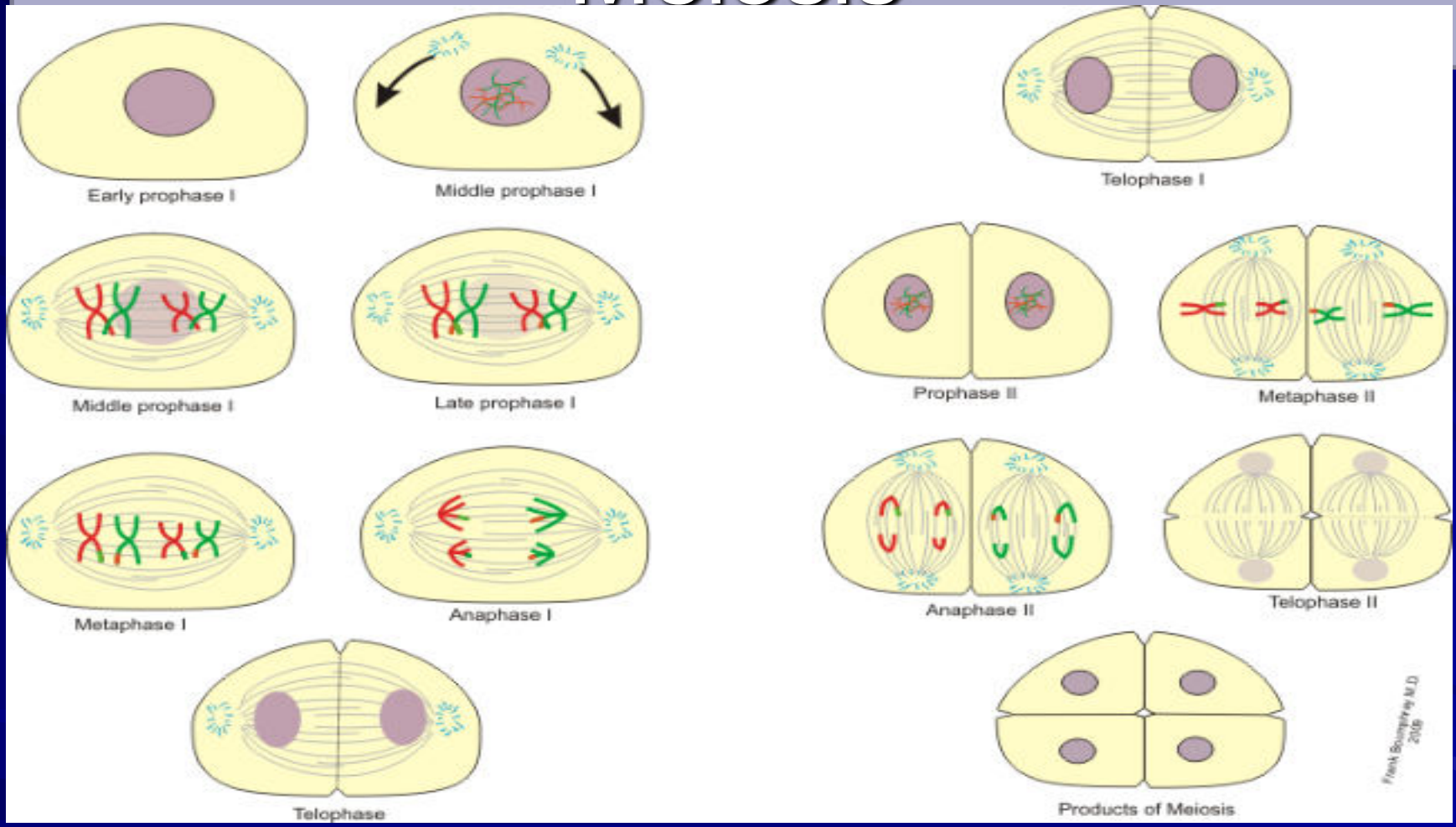
The phases of mitosis



Meiosis

Meiosis is the form of eukaryotic cell division that produces **haploid** sex cells or gametes (which contain a single copy of each chromosome) from **diploid** cells (which contain two copies of each chromosome). The process takes the form of one DNA replication followed by two successive nuclear and cellular divisions (Meiosis I and Meiosis II). As in mitosis, meiosis is preceded by a process of DNA replication that converts each chromosome into two sister chromatids.

Meiosis



During meiosis, 1 diploid cell undergoes 2 cycles of cell division but only 1 round of DNA replication. The result is 4 haploid daughter cells known as gametes.

Proteins

- **Protein**, highly complex substance that is present in all living organisms. The importance of proteins was recognized by chemists in the early 19th century, including Swedish chemist Jöns Jacob Berzelius, who in 1838 coined the term *protein*, a word derived from the Greek *prōteios*, meaning “holding first place.” They are also organ-specific, for instance, within a single organism, muscle proteins differ from those of the brain and liver.

Proteins

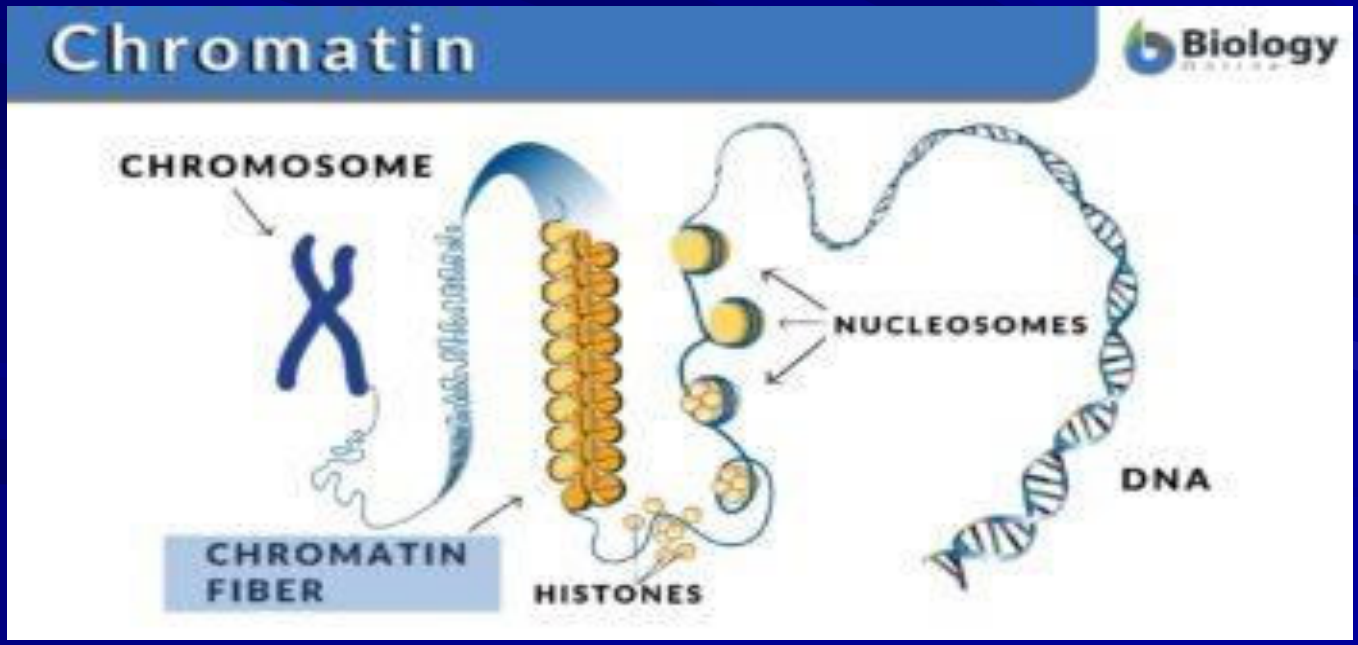
Plants can synthesize all of the amino acids, animals cannot, even though all of them are essential for life. Plants can grow in a medium containing inorganic nutrients that provide nitrogen, potassium, and other substances essential for growth. They utilize the carbon dioxide in the air during the process of photosynthesis to form organic compounds such as carbohydrates.

Proteins

- The protein content of animal organs is usually much higher than that of the blood plasma. Muscles, for example, contain about 30 percent protein, the liver 20 to 30 percent, and red blood cells 30 percent. Higher percentages of protein are found in hair, bones, and other organs and tissues with a low water content.

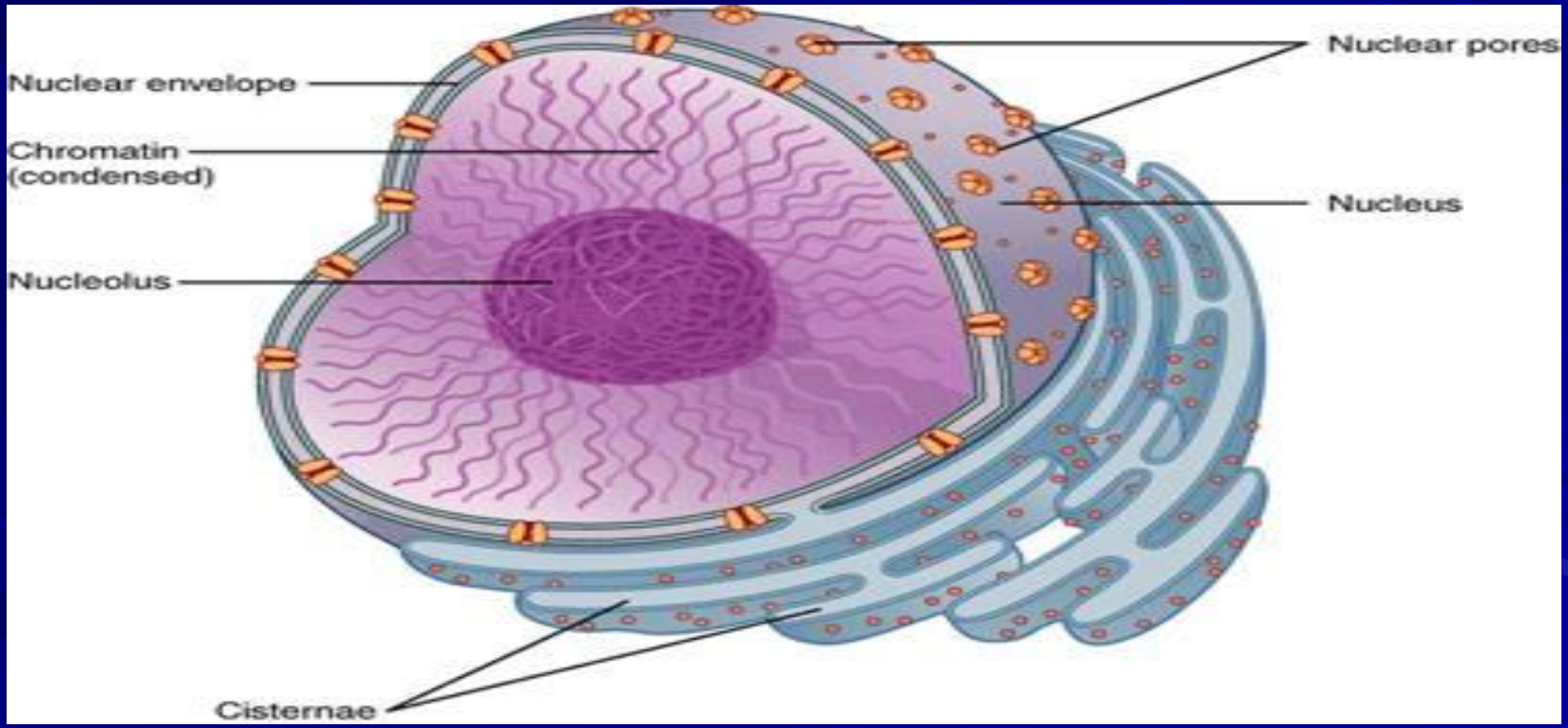
Chromatin

Chromatin is a complex of nucleic acids. It was identified in 1882. Initially, it was thought of as just a colored substance in a nucleus, however, later it was found that chromatin is characterized as proteins attached to DNA, and DNA was identified as the carrier of genetic information. Thus, we can define chromatin as a substance consisting of DNA and associated proteins (known as *histones*).



Chromatin

Where is the chromatin located? In eukaryotic cells, chromatin is found within the nucleus. Here is an illustration that will help you understand its location within the cell nucleus.



The following scientists were recognized for their contributions to chromatin research with Nobel Prizes:

1910 Albrecht Kossel (University of Heidelberg): for his discovery of the five nuclear bases: adenine, cytosine, guanine, thymine, and uracil.

1982 Aaron Klug was a British biophysicist and chemist: for his development of crystallographic electron microscopy and his structural elucidation of biologically important nucleic acid-protein complexes.

1993 Richard J. Roberts and Phillip A. Sharp: "for their independent discoveries of split genes," in which DNA sections called exons express proteins, and are interrupted by DNA sections called introns, which do not express proteins.

2006 Roger Kornberg (Stanford University): for his discovery of the mechanism by which DNA is transcribed into messenger RNA.


Thank you