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Life with Molecular Biology and Mechanism of DNA and RNA

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Introduction

Molecular biology is study of structure function, and makeup of molecular building blocks of life. It focuses on the interactions between the various systems of a cell. Including the interrelationship of DNA, RNA and protein synthesis and how these interactions are regulated. The youngest of the biosciences, molecular biology is closely inter related with fields of biochemistry, genetics and cell biology.

It traces the origins to the 1930s, when scientists focused on explaining the phenomena of life by studying the macromolecules that generatelife.Thechiefdiscoveriesofmolecularbiologytookplaceina period of only about 25 years, starting in 1940s, when George Beadle and Edward Tatum established existence of precise relationship between genes and proteins. Another 15 years were required before new and more sophisticated technologies, united today under name of genetic engineering, would permit isolation and characterization of genes.

Truly fundamental discovery during the first 25 years of molecular biology took place in1953, James Watson and Francis Crick discovered the double helical structure of the DNA molecule. So 30 years later, Kary Mullis jump-started in the field of genetic engineering when he invented polymerase chain reaction, an elegantly simple "biological copy machine" that rapidly can produce many copies of specific piece of DNA in lab. Mullis and Michael Smith shared the 1993 Nobel Prize in Chemistry for devising this technological milestone in the molecularbiology.

Discovery of mechanism of heredity has proven to be major breakthrough in modern science. Important advance came in understanding how molecules conduct metabolism, or how they process energy needed to sustain life. Techniques of genetic engineering enable molecular biologists to study higher plants and animals, opening up possibility of manipulating plant and animal genes to achieve greater agricultural productivity. These techniques also opened way for development of gene therapy.

An ambitious international effort in molecular biology began in 1990 with initiation of now-completed Human Genome Project (HGP). Its goal was to discover all estimated 20,000 to 25,000 human genes and make them accessible for further biological study. Another project goal was to determine complete sequence of three billion DNA subunits (bases in the human genome). Parallel studies were carried out on selected model organisms such as bacterium E.coli and mouse to help develop technology and interpret human the genefunction.

It overlaps with other areas of biological-chemistry, particularly genetics and biochemistry. Molecular biology chiefly concerns itself with understanding with interactions between various systems of cell, including interrelationship of DNA, RNA and protein synthesis and learning how these interactions are regulated.

Researchers in molecular biology use specific techniques native to molecular biology, but increasingly combine these with techniquesand ideas from genetics and biochemistry. There is not a hardline between these disciplines as there once was. It is study of molecular underpinnings of process of replication, transcription and translation of genetic material. Central dogma of molecular biology where genetic material is transcribed into RNA and then translated into protein, despite being an oversimplified picture of molecular biology, still provides a good starting point for understanding the field.

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