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Biochemistry and its Molecular Mechanisms

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Commentary

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DESCRIPTION

Biochemistry, often known as biological chemistry, is the study of chemical processes within and relating to living organisms. The three branches of biochemistry are structural biology, enzymology, and metabolism. It is both a chemical and a biology sub-discipline. In the latter decades of the twentieth century, biochemistry was effective in comprehending life processes through these three disciplines.

Biochemical methods and study are being used to explore and develop almost every aspect of the biological sciences. Biochemistry is concerned with the chemical base that allows biological molecules to give rise to the processes that

occur within live cells and between cells, and hence has a strong link to the study of tissues and organs, as well as the structure and function of organisms. Biochemistry is intimately linked to molecular biology, which is the study of biological phenomena molecular mechanisms.

Biochemistry, in its broadest sense, is the study of the components and composition of living things, as well as how they join together to form life. In this respect, biochemistry can be traced all the way back to the ancient Greeks. However, depending on which element of biochemistry is being focused on, biochemistry as a specific scientific subject emerged sometime in the 19th century, or a little earlier. Some argue that Anselme Payen's discovery of the first enzyme, diastase (now known as amylase), in 1833 was the beginning of biochemistry, while others argue that Eduard Buchner's first demonstration of a complex biochemical process, alcoholic fermentation in cell-free extracts in 1897, and was the beginning of biochemistry.

The name biochemistry was coined by combining the terms biology and chemistry. In the prologue to the first issue of Zeitschrift für Physiologische Chemie Journal of Physiological Chemistry, Felix Hoppe-Seyler coined the term (biochemie in German) as a synonym for physiological chemistry, arguing for the establishment of institutes dedicated to this field of study. While some attributed it to Franz Hofmeister, others did not.

Life and its elements were originally supposed to have some essential feature or substance (sometimes referred to as the vital principle) that was separated from that found in non-living matter and that only living entities could manufacture the molecules of life. Friedrich Wöhler released a paper in 1828 detailing his serendipitous urea synthesis using potassium cyanate and ammonium sulphate, which some saw as a direct challenge to vitalism and the birth of organic chemistry.

However, the Wöhler synthesis has stirred debate. Since then, new techniques like as chromatography, X-ray diffraction, dual polarisation interferometry, NMR spectroscopy, radioisotopic labelling, electron microscopy, and molecular dynamics simulations have enhanced biochemistry, particularly since the mid-20th century. Many chemicals and metabolic pathways of the cell, such as glycolysis and the Krebs cycle (citric acid cycle), were discovered and fully analysed using these techniques, leading to a molecular understanding of biochemistry.

Approximately two dozen chemical components are required for different types of biological life. The majority of uncommon elements on Earth are not required for life (exceptions being selenium and iodine), whereas only a few common ones (aluminium and titanium). Although most organisms have similar element requirements, plants and animals have some variances. Bromine is used by sea algae, but it does not appear to be required by land plants or animals. Plants, on the other hand, do not require salt. Plants and animals both require boron and silicon, while animals may not or may only require minute amounts.