

## Genomics and Proteomics

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### ABSTARCT

Genomics and proteomics are closely-related fields. The main difference between genomics and proteomics is that genomics is the study of the entire set of genes in the genome of a cell whereas proteomics is the study of the entire set of proteins produced by the cell.

### INTRODUCTION

Genomics is a branch of biology that concentrates on structure, function, evolution, mapping, and editing of genomes. A genome is complete set of DNA of an organism, including its genes. Genomics also involves the sequencing and analysis of genomes through uses of high throughput DNA sequencing and bioinformatics to assemble and analyze the function and structure of entire genomes. Advances in genomics have triggered a revolution in discovery-based research and systems biology to facilitate understanding of even the most complex biological systems such as the brain.

Proteomics is the study of proteins, which are the crucial part body and perform several functions. The proteome is the entire set of proteins produced or modified by an organism or system. Proteomics is used to identify the ever increasing numbers of proteins. After genomics and transcriptomics, proteomics is the next step in the study of biological systems.

DNA in the genome is only one aspect of the complex mechanism that keeps an organism running – so decoding the DNA is one step towards understanding the process. However, by itself, it does not specify everything that happens within the organism. The basic flow of genetic information in a cell is as follows. The DNA is transcribed or copied into a form known as “RNA”. The complete set of RNA is subject to some editing to become messenger-RNA, which carries information to the ribosome, the protein factory of the cell, which then translates

the message into protein.

Frederick Sanger and his colleagues played a key role in the development of DNA sequencing techniques that enabled the establishment of comprehensive genome sequencing projects. In 1975, he and Alan Coulson published a sequencing procedure using DNA polymerase with radiolabelled nucleotides that he called the Plus and minus technique. This involved two closely related methods that generated short oligonucleotides with defined 3' termini. These could be fractionated by electrophoresis on a polyacrylamide gel and visualised using autoradiography.

The advent of these technologies resulted in a rapid intensification in the scope and speed of completion of genome sequencing projects. The first complete genome sequence of a eukaryotic organelle, the human mitochondrion was reported in 1981 and the first chloroplast genomes followed in 1986. 'OMICS' is a coined phrase and refers to a field of study in biology that ends in the suffix - omics, such as genomics, proteomics or metabolomics.

### CONCLUSION

Throughout most of the twentieth century, science has been reductionistic. Reductionism is an approach to understanding complex things by reducing them to simpler or more fundamental things such as individual genes, proteins etc. Researchers worked in their individual labs and only shared or discussed their work once it was published. The 'omics revolution began to characterize individual fundamental things and study their interactions with each other.

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