



Biography of Professor Dr. Saul Roseman



Professor Dr. Saul Roseman was born in Brooklyn, New York, in 1921. He received his Bachelor of Science in Chemistry, with minors in Biology and Physics, from the City College of New York. He began his graduate studies in the Biochemistry Department at the University of Wisconsin, earning his masters degree prior to a hiatus serving as an infantryman in Europe in World War II. Following the end of the war, Dr. Roseman returned to the University of Wisconsin and finished his Ph.D. under Professor Karl Link. His graduate work concentrated on the synthesis and metabolism of coumarin derivatives, which Dr. Link had discovered, and which remain the most common anticoagulants used in the U.S. today. During his graduate studies, his life-long interest with carbohydrates began with the development of novel cyclic esters of glucose. A growing interest in complex carbohydrates led to postdoctoral studies with Professor Albert Dorfman at the University of Chicago, where he developed new methods of glycan radioisotopic labeling to study hyaluronic acid and chondroitin sulfate biosynthesis. In 1953, he joined the University of Michigan Medical School as an Associate Professor and Research Associate of the Rackham Arthritis Research Unit, where he continued this study in his new independent laboratory.

While at the University of Michigan, Dr. Roseman rose to the rank of Professor and became a world-renowned biochemist by discovering the correct chemical structure of sialic acid by using the synthetic enzyme, nanaldolase. The researchers in his group discovered the structure of the activated Sialic acid, CMP-Sialic acid (CMP-Neu5Ac) and by 1963 the world came to know the name of the first sialyltransferase (which used CMP-NeuAC as donor) isolated from rat mammary tissues.

Until now genes for more than 13 sialyltransferases are cloned, and it was in Dr. Roseman's laboratory that the first six sialyltransferases were characterized and purified. These six sialyltransferases are responsible for biosynthesis of glycoproteins, mucins and brain gangliosides. In addition to several sialyltransferases, his associates discovered at least ten different glycosyltransferases (galactosyl-, *N*-acetylglucosaminyl-, *N*-acetylgalactosaminyl, and fucosyl-transferases) that are involved in the chain elongation of N-linked and O-linked oligosaccharides of cell surface glycoproteins.

The fundamental discoveries of Dr. Roseman and his team of researchers gave rise to the understanding of molecular mechanisms of intercellular adhesion and cell signaling, which is the theme of research in this decade. His idea in the mid-1960s of "one gene one enzyme" has been proven to be correct when the researchers established the amino acid sequence of each glycosyltransferase in the biosynthetic pathway of glycoproteins and gangliosides to be different.

In addition to the discoveries of different eukaryotic glycosyltransferases, Dr. Roseman and his team were pioneers in the discovery of the Phosphotransferases System (PTS) when it was reported for the first time in 1962. They gave an account that the activity of a bacterial kinase system required PEP for phosphorylation of sugars instead of ATP. This discovery inspired hundreds of researchers around the world to work in the field of "Bacterial Sugar Transport Systems." During the last decade Dr. Roseman's laboratory has been heavily involved in the elucidation of degradation pathway for chitin by bacteria. Chitin is the highest biopolymer synthesized in the sea world.

In 1965 Dr. Roseman moved to the Johns Hopkins University Biology Department from Rackham Arthritis Unit of the University of Michigan; there he later served two terms as Director and Chairman of the Biology Department. His nonstop research career is documented in hundreds of publications in the top journals, and his laboratory is a training center for many currently famous glycobiologists around the world. He holds the Ralph O'Conner chair in Biology at the Homewood campus of the Johns Hopkins University. He is the recipient of many national and international awards. He was elected to the National Academy of Sciences in 1972 and received an honorary doctorate degree from the University of Lund. His trainees hold top positions in academics and industrial research worldwide.