Frederick Sanger: Winner of Two Nobel Prizes

J V Pai-Dhungat

Frederick Sanger (1918–2013) an English molecular biologist was born in Gloucestershire, England. He graduated from Cambridge in 1939 and earned his PhD in biochemistry in 1943. Sanger’s interest always remained in finding out the exact structure of the amino acid chain in a protein molecule. From 1951, until his retirement in 1983, he remained a researcher for the MRC.

Sanger joined biochemist Albert Chibnall’s team of scientists who were studying the amino groups of the pancreatic hormone insulin, which was isolated earlier, but needed to be used more effectively to treat diabetes.

After 8 years of hard work, Sanger succeeded in elucidating a complete structure of bovine insulin in 1954. It was a stunning achievement. Using the new technique of paper chromatography by Martin and Synge he was able to sequence the amino acids of each chain. Sanger deducted that the complete structure was two chains—one of a phenylalanine chain (21 amino acids) and the other a glycine chain (30 amino acids) held together by two sulfur atoms. He received the 1958 Nobel Prize in Chemistry for determining the structure of the insulin molecule. His work made it possible for other researchers to identify various other important molecules.

Sanger pioneered procedures for sequencing radioactive labeled proteins between 1956 and 1962. He moved to the MRC Laboratory of Molecular Biology in Cambridge in 1958.

Sanger’s interest switched to nucleic acids and he began RNA sequencing using radioactive methods, and the first RNA was fully sequenced in 1967 with t-RNA being successfully sequenced by 1970, Sanger was ready to tackle DNA sequencing. He devised a new DNA sequencing methodology, using acrylamide gel by “read off” methods for sequencing single-stranded DNA of a bacteriophage. Sanger’s group had derived most of the DNA sequence of bacteriophage, the first complete genome to be sequenced; consisting of 5375 nucleotides in 1977. He was awarded the Nobel Prize in Chemistry second time in 1980, this time sharing it with Paul Berg and Walter Gilbert for determining the amino acid sequences of DNA.

He rejected knighthood as he did not want to be addressed as “Sir” but, later accepted the order of Merit in 1986. Frederick Sanger died in 2013 aged 83 years.

How to cite this article: Pai-Dhungat JV. Frederick Sanger: Winner of Two Nobel Prizes. J Assoc Physicians India 2022;70(12):92–92.