Severo Ochoa

Luarca, Spain, 24 Sep. 1905 - Madrid, Spain, 1 Nov. 1993

Title Professor of Biology, Universidad Autónoma, Madrid, Spain.
Nobel laureate in Physiology or Medicine, 1959

Nomination 24 June 1974

Summary of scientific research

Ochoa's work has been in the area of enzymology almost from the outset. With R.A. Peters, in Oxford, he established the role of thiamin pyrophosphate (cocarboxylase) as a coenzyme of pyruvate oxidation in animal cells. At New York University, Ochoa and his students discovered and studied enzymes of CO2 fixation, carbohydrate, and fatti acid metabolism in animals, plants, and bacteria. The citrate condensing enzyme, the key enzyme of the Krebs citric acid cycle, was crystallized and the nature of the condensing reaction elucidated.

1955 marked the discovery of polynucleotide phosphorylase, a bacterial enzyme that synthesizes RNA-like polynucleotides from nucleoside-5'-diphosphates. This was the first time that a nucleic acid was synthesized outside of the cell. For this discovery, Ochoa was awarded the 1959 Nobel Prize in Medicine. He shared this award with his former student Arthur Kornberg who discovered DNA polymerase, a DNA synthesizing enzyme.

The use of synthetic polynucleotides of various base compositions (prepared with polynucleotide phosphorylase) as messenger RNAs in cell-free systems of protein synthesis was the key to the early deciphering of the genetic code in the laboratories of Nirenberg, Ochoa, and Khorana. Later, Ochoa directed his attention to the mechanism of synthesis of viral RNA and protein biosynthesis. The former work established the formation of a double-stranded RNA intermediate, or replicative form, the latter was highlighted by the discovery of the polypeptide chain initiation factors.

More recently, at the Roche Institute, Ochoa studied the role of protein phosphorylation in the control of gene expression at the translational level in eukaryotic cells. This work led to the discovery of a new eukaryotic chain initiation factor and to the finding that control is exerted by modulation of its activity.