

## MEDICAL PHILATELY

# Ragnar Granit - Sensory Structure of Retina and Vision

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**Granit and retina with ERG.  
Sweden, 1996**



**Granit and Tiegelstedt with sensory  
structure of retina and blood-  
flowmeter. Finland, 1989**



**75<sup>TH</sup> year of Geneeskundige School  
shows retina with rods and cones &  
action potential Stamp-Suriname**

**R**agnar Granit (1900-1991) was a Finnish-born Swedish physiologist, who shared 1967 Nobel Prize for Physiology and Medicine along with George Wald and Haldman Hartline from USA. They received the award for their discovery concerning "The primary physiological and chemical visual process in the eye". Granit analyzed the internal electrical changes that take place when the eye is exposed to light. George Wald worked on eye pigments and identified vitamin A and rhodopsin in the retina while Haldman Hartline went into deeper anatomical studies showing how rods and cones are connected to the brain.

Granit entered the University of Helsinki in 1919 and earned an MS degree in Experimental Physiology in 1922, and his MD in 1928. Soon he travelled to Oxford University to meet Professor Edgar Adrian who had been the first to measure the electric impulse of a single nerve. Charles Sherrington was then working at Oxford. Granit wanted to understand vision and realized that the underlying fact was that the retina itself functions as a nerve centre which processes the visual information and transmits it to the occipital cortex. As a researcher in Medical Physics at the University

of Pennsylvania (1929-32), he continued bioelectric research using the electric measuring technique of Edgar Adrian. He was back again at Sherrington's lab during the years 1932-33. He continued his electroretinogram (ERG) and bioelectric research on the optic nerve and the retina at Helsinki from 1935 to 1940. Granit's book "Sensory Mechanism of the Retina", published in 1947, is one of the classics in the field of electrophysiology of the eye.

Granit proposed a theory of color vision, that the retina contains three kinds of photosensitive cone cells, each of which responds to different types of wave lengths. Most optic nerve fibers ("dominators") are sensitive to the whole spectrum, whereas few others ("modulators") respond to a narrow band of light wavelength and are color-specific. He also proved that light could inhibit as well as stimulate impulses along the optic nerve. In 1950, Wald isolated the three cone pigments and provided biochemical proof for Granit's theory of spectral sensitivity of the three types of

cone cells (red, green and blue). This provided the first biological demonstration in support of the Young-Helmholtz three color theories.

Granit then turned his attention to the study of the control of movement, especially the role of muscle sense organ called muscle spindles and tendon organs. He helped to determine the neural pathways and processes by which this internal receptor regulate and coordinate muscle action (the gamma motor system).

Granit was appointed Professor of Physiology at the University of Helsinki in 1937. A naturalized Swede, he joined the medical school Karolinska Institute at Stockholm in 1940. He was named Chairman of the Institutes. A year earlier he had become the Director of the Nobel Institute for Neurophysiology in Stockholm. In the 20 yrs from 1956 to 1976, he also served as visiting professor/researcher at numerous institutions. Granit died in 1991 at the age of 90 years and was honored on the stamp issued by Sweden and his native Finland.

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