

Dr. Osamu Shimomura 2005 Émile M. Chamot Award Recipient, 2008 Nobel Prize in Chemistry

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In 2005 the State Microscopical Society of Illinois (SMSI) awarded Dr. Osamu Shimomura the Émile M. Chamot award for his contributions to Fluorescence Microscopy by isolating aequorin and green fluorescent protein (GFP). This year he will share the 2008 Nobel Prize in Chemistry with Martin Chalfie and Roger Tsien. Shimomura was the first person to isolate GFP and determine which part of GFP was responsible for its fluorescence. He was interested in understanding the chemistry and biochemistry involved in the green glow of GFP.

Dr. Shimomura isolated aequorin and GFP from the crystal jellyfish, *Aequorea victoria*. In the jellyfish's multitude of photo-organs, Shimomura isolated a protein he named aequorin which produces blue light that is then converted to green light by GFP.

His work has enabled many scientists studying cell and developmental biology to use GFP as a marker protein. When a GFP gene is joined to the gene of the protein being studied it fluoresces when the appropriate wavelength of light is used to illuminate it. In this way one can follow the protein being studied using a microscope. This method has been used worldwide notably in nerve cell damage research in Alzheimer's disease and also to demonstrate how HIV travels from infected cells to non-infected cells.

Born and raised in Japan, Dr. Shimomura moved to the United States in 1960 after being invited by Dr. Frank Johnson to work in his lab at Princeton University. Dr. Shimomura is now retired and lives in Falmouth, Massachusetts with his wife Akemi.

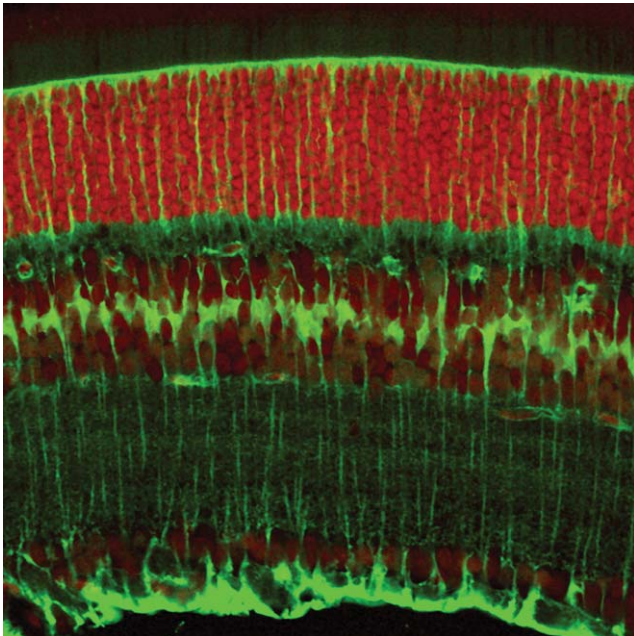


Dr. Osamu Shimomura and wife Akemi after receiving the 2005 Émile M. Chamot Award from SMSI.

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Dr. Osamu Shimomura with Professor Brian Ford and Bill Mikuska (past president of SMSI).



Mouse retina in transverse section using confocal microscopy. The Green shows eYFP-Müller glia cells. Red are nuclei stained with Propidium iodide. eYFP is "enhanced yellow fluorescent protein" which is a modified GFP. Photograph taken by Scott Geller.

Below is a reprint of Dr. Shimomura's abstract for his talk given when receiving the 2005 Émile M. Chamot Award from SMSI.

HOW AEQUORIN AND GREEN FLUORESCENT PROTEIN WERE DISCOVERED

"We discovered aequorin and the green fluorescent protein (GFP) in 1961 from the luminous jellyfish Aequorea. They are unusual proteins; the former emits blue light in the presence of a trace of calcium ions even in the absence of oxygen, and the latter is brilliantly green fluorescent even in day light. By the end of 1970s, we were able to characterize most of the important properties of the two proteins including the chemical structures of their functional chromophores. Helped by the progress in genetic research, both proteins were cloned, apoaequorin in 1985 and GFP in 1992, making it possible to generate them even in live cells. Now both proteins are indispensable research tools, aequorin as a calcium probe and GFP as a marker protein. In retrospect, however, it looks as if my Aequorea project had been programmed by my three mentors for its success. In 1955, a professor of the Nagasaki Pharmacy College, for whom I was working as a teaching assistant, kindly allowed me to do research at the Hirata lab at Nagoya University. Professor Hirata assigned me to do the study of Cypridina luciferin, which eventually gave me the knowledge that is essential to solve the problems of Aequorea. Then, Dr. Frank Johnson invited me to his lab at Princeton University in 1960, and he gave me the subject of Aequorea to study. The guidances given to me were indeed in exact order for solving the difficult problems of aequorin and GFP."