Editor's LETTER

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A Glowing Tribute

Chemical biology seeks to use chemistry to advance knowledge of living organisms. One of the areas in which chemical biology continues to contribute in a big way is in the development of tools used to visualize living cells and the processes and interactions inside. This year, the Nobel Prize in Chemistry recognizes what is arguably one of the most outstanding achievements in this endeavor.

The 2008 Nobel Prize in Chemistry was awarded to Osamu Shimomura at the Marine Biological Laboratory (Woods Hole) and Boston University Medical School, Martin Chalfie at Columbia University, and Roger Y. Tsien, affiliated with the University of California San Diego and the Howard Hughes Medical Institute "for the discovery and development of the green fluorescent protein".

Nowadays, laboratories around the world routinely use this protein, but it has been a long road from the isolation from nature to the development of sophisticated multicolor systems for visualizing increasing biological complexity. The three scientists recognized this year by the Nobel Foundation have been instrumental in bringing this technology to biomedical researchers.

It all began in the early 1960s when Shimomura described a protein that he isolated from the jellyfish *Aequorea victoria*. This protein fluoresced intense green under UV light and would later be known as green fluorescent protein or GFP. Over the next few years, Shimomura described the GFP chromophore in detail.

Early on, it was realized what makes GFP unique. Unlike a host of other bioluminescent proteins, GFP does not require external factors or substrates to fluoresce.

Chalfie recognized the potential for using GFP as a marker for studying gene expression in multicellular organisms. The technique is familiar to us all now and needs no introduction, but when his laboratory first demonstrated that it was possible to light up individual touch receptor neurons in *Caenorhabditis elegans*, it was truly a landmark in modern science.

Tsien, the third recipient of this year's prize, elucidated the mechanism by which the GFP chromophore is formed. Engineering this 238-amino-acid protein made it possible to obtain new variants that glowed in others colors. Different proteins can now be tagged with variants to study how these proteins interact.

Last year in *Nature*, building on these earlier studies, Jeff Lichtman and colleagues published a spectacular demonstration of how different fluorescent proteins can be used to map complex interactions. By creating transgenic mice that produce mixtures of different quantities of fluorescent proteins, the authors created a system that they named "Brainbow". Remarkably, they were able to visualize ~90 different colors in the mouse brain. So it is evident that the Nobel Prize is also an affirmation that this field has a very bright future.

We congratulate Shimomura, Chalfie, and Tsien for their exceptional achievement, and we expect other vibrant applications that build on their pioneering work.

Anirban Mahapatra
Assistant Managing Editor, *ACS Chemical Biology*

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