

Fluorescent Proteins: Aequorin And Luciferase

University of Georgia Research Foundation



Bioluminescent animals possess special enzymes, pigments and other compounds that, when present in sufficient concentrations, can produce flashes of dazzling blue and green light that they use to communicate, attract mates, distract predators or lure unsuspecting prey.

Many researchers imagined using the naturally glowing substance to track important processes in the human body, harnessing the proteins for medical research, diagnostics and therapeutics. But the only reliable sources for the light-emitting substances were the animals themselves, making them both difficult to acquire and prohibitively expensive.

“ A group of scientists from the University of Georgia tackled this problem by studying light-emitting proteins harvested from *Renilla* and *Aequorea*, better known as the sea pansy and crystal jellyfish.

After years of experimentation, Milton Cormier, Douglas Prasher, Richard McCann and William Lorenz found a way to produce two proteins—Aequorin and Luciferase—using *E. coli*.

Their discoveries enabled the industrial-scale production of these critical proteins, and now, less than 30 years later, bioluminescent proteins are used in many branches of medicine and industry. They serve as indicators for reporter genes, a kind of tag used to see the expression of certain genes in an organism. Their fluorescent glow makes it possible to trace infections, cancer progression, brain function and the development of nerve cells. Bioluminescent proteins are also used to evaluate the effectiveness of new cancer treatments designed to limit blood flow to tumors.

The scientists did their work during the 1980s, well before the aid of the now ubiquitous computational and robotic tools, as part of UGA's newly formed department of biochemistry and molecular biology.

Aequorin is cited in nearly 3,800 U.S. patents, and luciferase in 2,000.

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