

# Protein Structures in the Sea of Genes

Birch Aquarium  
La Jolla, CA  
Fall 2006 – Spring 2007

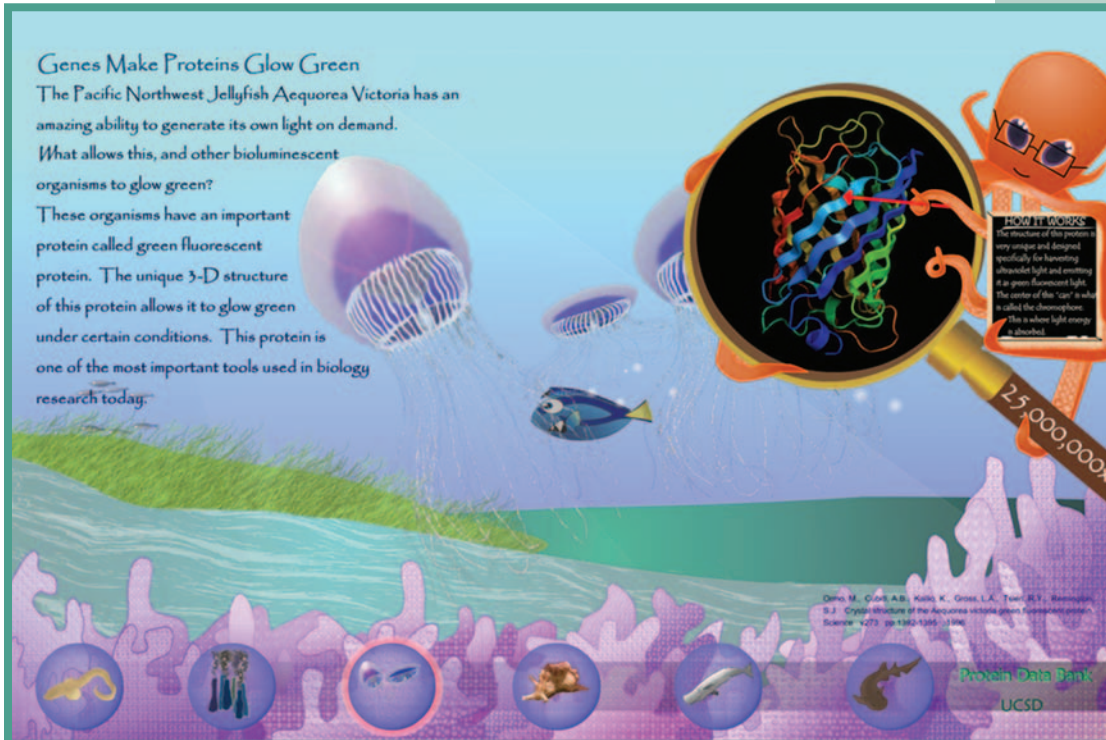
The Sea of Genes exhibit helps to unravel the genetic secrets of life in the ocean through interactive displays highlighting the exciting discoveries of Scripps researchers.

One feature of this exhibition is an interactive kiosk that invites the user to display information about specific proteins found in marine organisms. Detailed information about these protein structures is found online in the Protein Data Bank.

This kiosk is the result of a collaboration between the RCSB PDB and the Birch Aquarium (Scripps Institution of Oceanography at University of California, San Diego).

## Kiosk Screen:

**Genes Make Proteins Glow Green**  
The Pacific Northwest Jellyfish *Aequorea Victoria* has an amazing ability to generate its own light on demand. What allows this, and other bioluminescent organisms to glow green? These organisms have an important protein called green fluorescent protein. The unique 3-D structure of this protein allows it to glow green under certain conditions. This protein is one of the most important tools used in biology research today.



**HOW IT WORKS**  
A chromophore is a part of a molecule that is very unique and designed specifically for harvesting ultraviolet light and emitting it as green fluorescent light. The center of this 'cave' is what is called the chromophore. This is where light energy is absorbed.

25,000,000x

Orino, M., Glover, A.B., Kallio, K., Gross, L.A., Tsien, R.Y., Remington, S.J. Crystal structure of the Aequorea victoria green fluorescent protein. *Science* 273 (pp.1362-1365) - 1996

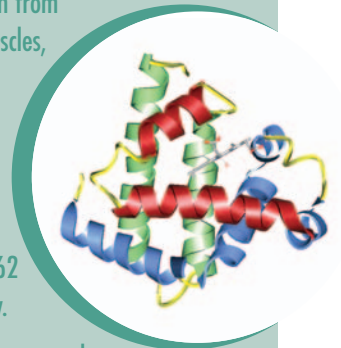
Protein Data Bank  
UCSD

RCSB **PDB**  
PROTEIN DATA BANK  
www.pdb.org • info@rcsb.org

## Proteins Highlighted:

### THE FIRST PROTEIN STRUCTURE DETERMINED

Myoglobin, taken from sperm whale muscles, was the first reported protein structure and resulted in the Nobel Prize in Chemistry in 1962 to John Kendrew.



Why is it so important to know the 3-D structure of a protein? The 3-D structure tells scientists a lot about the biological function and how it interacts with other molecules in the body.

### SEA GENES COULD PRODUCE ANTITUMOR DRUGS

This protein, called actin-apyronine A is found in the Japanese Sea Hare. Scientists studying aplyronine A have observed potent antitumor effects in laboratory research and some day hope it will lead to an anticancer treatment. By looking at the 3-D structure of this protein, scientists can make suggestions on how it works.

