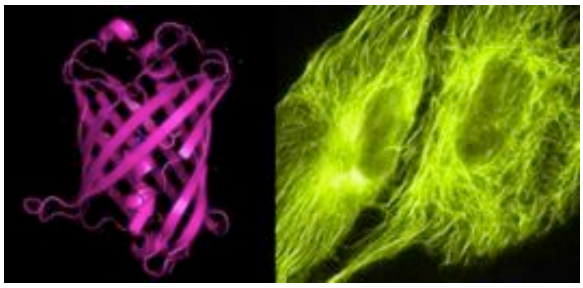
WESTERN SYDNEY
UNIVERSITY

Seminar Title: Building the next generation of fluorescent proteins for imaging in cell biology

Dr Nathan C. Shaner, Scintillon Institute, San Diego



Date: 17 Nov 2015

Time: 13:00-14:00

Location: CA-30.G.213
School of Medicine
Campbelltown Campus
Western Sydney University

Abstract:

Since the advent of molecular cloning and recombinant DNA technology, fluorescent proteins (FPs) have made arguably the most significant impact on biological research of any technology in recent history. The most widely studied and exploited class of FPs by far has been those related to avGFP, which are characterized by intrinsic chromophores generated by autocatalytic peptide backbone cyclization and embedded within a compact β-barrel fold. FPs from this family are found in a wide range of marine invertebrates including jellyfish, corals, anemones, copepods and lancelets. These proteins function as self-contained fluorophores, readily expressed in practically any heterologous organism, and can be genetically fused to a protein of interest to track its localization in living cells. Over the decades since the discovery of GFP in the jellyfish *Aequorea victoria*, FPs with excitation and emission wavelengths spanning virtually the entire visible spectrum have been cloned and engineered. In addition to traditional fluorescence imaging of living cells, novel techniques such as optical superresolution imaging take advantage of unique optical properties of specialized FP variants, such as photoactivation, photoconversion and photoswitching. Researchers around the world have cloned hundreds of wild-type FPs spanning most of the visible spectrum, and thousands more are likely awaiting discovery. Despite this, all FPs commonly used for imaging purposes in the laboratory are derived from only a handful of species. Our current research focuses on expanding the base from which to engineer useful new FP variants, including those with properties optimized for live-cell superresolution imaging. Investigations into the structure of some of these newly-cloned FPs are helping to guide the development of these new genetically encoded tools.

Biography:

Dr. Shaner received his undergraduate degree in Physics from Oberlin College in 1999. Afterwards he worked as a research technician at the University of Pennsylvania, where he discovered his love of fluorescence microscopy. Dr. Shaner then entered the Biomedical Sciences graduate program at the University of California, San Diego, working under Dr. Roger Tsien. During his Ph.D. work in Dr. Tsien's lab, Dr. Shaner developed a series of monomeric fluorescent protein variants that would become known as the "mFruits," several of which are still used commonly by thousands of researchers worldwide. After completing his doctoral degree in 2006, Dr. Shaner held postdoctoral fellowship positions at the Salk Institute and at the Monterey Bay Aquarium Research Institute. In 2012, he co-founded a new research institute in San Diego, the Scintillon Institute, dedicated to fostering innovative biological tool-builders. Dr. Shaner's research continues to focus on improving and diversifying the "optical toolkit" for biological imaging.