Proctor Award and Lecture

William H. Miller
On Presentation of the Proctor Medal of the Association for Research in Vision and Ophthalmology to Dr. William H. Miller

Joy Hirsch

It is a very special honor for me to introduce William H. Miller as the 1989 recipient of the Proctor Medal Award. Bill began his scientific career in medical school working with Kefler Hartline, and after a medical internship, he joined the Hartline and Ratliff Laboratory at The Rockefeller University (then The Rockefeller Institute). He attributes the education he received at the hands of Hartline and Ratliff as the main influence on his development as a scientist. Particularly influential was Hartline's reductionist philosophy where the goal was to understand the simple eye, the single fiber response, and the basic neural network. This philosophy was important in shaping Bill's scientific philosophy which is also focused on the fundamental optical and molecular properties of the photoreceptor cell.

After Rockefeller, Bill joined Carl Gustaf Bernhard for 1 year in the Physiology Department at Karolinska Institute in Sweden where they worked on the structure and function of the insect corneal nipple array—which they had discovered. As a result of those studies, they determined that the corneal nipple array functions as a broad-band antireflection device. This study was the beginning of a series of investigations on the optics and physiology of arthropod and vertebrate eyes which Bill continued at Yale University School of Medicine in collaboration with Gary Bernard, Allan Snyder, Tsuneo Tomita and his colleagues, and the group eventually included me. These investigations yielded many creative solutions to a wide range of optical problems. For example, with Snyder and Bernard, he explained the colors of the green rod and corneal and tapetal reflectors. Furthermore, he and Snyder discovered the telephoto-lens effect in the eyes of birds of prey. They showed that the hemispheric pit of the deep fovea may function as the negative element of a telephoto-lens system, which may explain the high visual acuity of birds of prey. Based on his studies of the primate and bird foveal cone mosaics, Bill helped to define the minimum spacings and apertures of the foveal cones and to initiate many of the current issues of visual sampling.

Not only is Bill distinguished for his insightful and critical investigations of the optical properties of photoreceptors, he is similarly distinguished for his investigations of cellular mechanisms. In 1971 Bill and Mark Bitensky spawned the cyclic nucleotide hypothesis of phototransduction; with other colleagues he has continued the development of that hypothesis.

One of the hallmarks of Bill's scientific and personal style that I admire most is his ability to identify the essential elements in a question and to develop the unifying principles. His pivotal contribution to our understanding of the molecular processes of phototransduction is a leading example and, as you know, is the topic of his lecture today. I am very fortunate that Bill Miller has been my mentor, my colleague, and my friend, and I am very proud to introduce him to you as the 1989 recipient of the ARVO Proctor Award.