The 2000 GSA Honors and Awards

The Genetics Society of America annually honors members who have made outstanding contributions to genetics. The Thomas Hunt Morgan Medal recognizes a lifetime contribution to the science of genetics. The Genetics Society of America Medal recognizes particularly outstanding contributions to the science of genetics within the past fifteen years. The George W. Beadle Medal recognizes distinguished service to the field of genetics and the community of geneticists. We are pleased to announce the 2000 awards.

Evelyn M. Witkin

The 2000 Thomas Hunt Morgan Medal

Evelyn M. Witkin

WHEN one meets Evelyn Witkin, one is struck both by her intellectual boldness and her personal modesty. From the beginning, Evelyn was propelled by a desire to answer big questions; her achievements are a testimony to the power of that approach. Evelyn decided on graduate work in genetics because she felt it important to test Trofim Lysenko's now largely discredited ideas on how heredity could be altered by the environment. After a few months of study, she realized that his theory had no merit. However, her scientific course was set. She devoted her career to an understanding of DNA mutagenesis and the nature of DNA repair mechanisms. For over 40 years, Evelyn not only made seminal discoveries but also played an absolutely crucial role in defining and establishing the field of "biological responses to DNA damage," which was the topic of the millenium Cold Spring Harbor Symposium on Quantitative Biology. Her infectious enthusiasm and personal encouragement stimulated many younger scientists to work in the field. Her generosity of spirit and willingness to share ideas and unpublished results helped to unify the field and give it cohesion. Despite her extreme importance to this field, if Evelyn herself were writing this perspective, it would be a bare-bones account indeed, the very antithesis of a self-promotional document.

Evelyn's Ph.D. studies on induced mutagenesis immediately established her intellectual independence. Although working with Theodosius Dobzhansky, she chose to use *E. coli* rather than Drosophila as her experimental organism, having been influenced by the 1943 publication of Luria and Delbruck that demonstrated the feasibility of studying genes in bacteria. Happily, Dobzhansky arranged for Evelyn to spend a summer at the Carnegie Institute of Washington in Cold Spring Harbor, studying bacteria with his friend Milislav Demerec, and her career was launched. With her very first experiment, Evelyn made history, identifying a strain of *E. coli*, B/r, that was more resistant to radiation than the parental *E. coli* B strain. For the first time, mutations conferring increased resistance to radiation had been isolated. Understanding the genetics of this radiation resistance became the subject of her Ph.D. dissertation.

Evelyn returned to Cold Spring Harbor in 1945 to finish her thesis research and remained there for the next 10 years, first as a postdoctoral fellow with Demerec and Salvador Luria and then as a Staff Scientist. At that time, experiments demonstrating that bacteria could repair DNA damage were just emerging. Evelyn bolstered the notion of a repair process in bacteria by observing that slowing the growth rate of bacteria cultured in the dark prevented the accumulation of a class of UV-induced mutants. These pioneering experiments eventually led her to speculate on the existence of an enzymatic "dark repair" mechanism complementary to photorepair by visible light and then to isolate a mutant defective in this process. Many years later, this mutant was shown by Asiz Sancar to be defective in transcription-repair coupling factor. Evelyn carried out the early portion of this work while raising her two small children, aided by the foresight of Dr. Vannevar Bush, then President of the Carnegie Institution of Washington, who allowed her a flexible work schedule so she could pursue both science and child rearing.

In 1955 Evelyn moved to the Department of Medicine at Downstate Medical Center in the State University of New York where she remained until 1971. Working alone, she began the experiments that eventually culminated in the idea that bacteria carry out a multifaceted response to UV irradiation, which includes not only DNA repair, but also filamentation of cells, UV-induced mutagenesis, and prophage induction. Her initial experiments were published in several articles, which she at first thought were unrelated. In one, she showed that the same conditions that induce prophage also caused filamentation, leading her to propose that DNA damage generates an inducing signal that coordinately inactivates both a cellular repressor controlling a division inhibitor and a prophage repressor. In the others, she showed that both the *lexA* and *recA* genes were required for UV mutagenesis and speculated that this phenomenon was due to error-prone translesion replication by either a new or modified DNA polymerase. Together these articles were amazingly prescient, foreshadowing the correct solution to this regulatory puzzle. A decade later, it was finally shown that DNA damage generates a signal sensed by RecA, which then acts as a coprotease to facilitate destruction of several repressors, including the cellular LexA repressor, which controls the cell division inhibitor SulA and the prophage repressor. Just recently, the predicted error-prone DNA polymerases were identified.

Evelyn moved to Rutgers in 1971 where her research efforts continued to lead her down the tortuous path that led finally to an understanding of the cellular response to UV. In that year, Miroslav Radman, then a postdoctoral fellow at Harvard, sent her a memorandum suggesting that both the "Weigle phenomenon" (whereby UV irradiation of phage is only mutagenic when the host has been UV irradiated) and UV mutagenesis of bacteria are caused by a mutagenic form of replication, which he called "SOS replication." Evelyn was excited by this idea because it fit so well with her own ideas of attributing diverse UV-induced phenomena to a common mechanistic basis. Initially unconvinced by Radman's experiments, Evelyn did additional experiments that converted her to a believer. In 1973 and 1974 Witkin and Radman expanded the list of putative UV-inducible functions whose regulated expression depended upon *recA* and *lexA*. These functions were collectively called the "SOS response," to convey the idea of coordinate control of disparate events that together respond to a lifestyle crisis. Evelyn continued to study various aspects of the SOS response until she retired in 1991.

Evelyn has received many awards recognizing her extensive accomplishments. Among these was election to the National Academy of Sciences in 1977. Evelyn was one of the first women to be so honored and at the time, the Diploma announcing this honor used only masculine pronouns, crediting her election to "his accomplishments." Evelyn politely inquired of David R. Goddard, then The Home Secretary of the National Academy of Sciences, whether this wording could be changed. After some back and forth, Evelyn prevailed and that missive is now devoid of references to gender.

Since retiring, Evelyn's intellectual life has continued to expand. She is on the Advisory Board of the Molecular Biology Department at Princeton University and has active connections with many of the young people at the University, providing them with encouragement and wisdom. She is involved in science education in the public schools. She often joins with a group of humanities scholars for discussions about science and has become entranced with cosmology.

A last vignette testifies to the range and richness of Evelyn's intellectual forays: she has initiated a program of study on the poet Robert Browning, who was a contemporary of her beloved Darwin. Amazingly, Evelyn has managed to find a very likely intellectual connection between these two. Browning is known to have used "The Wonders of the Little World," written by Nathaniel Wanley, as a continual source of ideas for his poetry. Evelyn has now provided strong evidence that, as a child, Charles Darwin was also strongly influenced by this same book. This collection of brief excerpts of writings on the history and scope of human beings provides many examples of heritable diversity among people, coupled with tidbits on faraway places. Evelyn suggests that early imprinting by this book not only stimulated Darwin's desire to travel, leading to his voyage on the Beagle, but also predisposed him to look for heritable variation within other species, thus influencing the cornerstone of his theory of evolution by natural selection. As a testament to her growing stature in the Browning field, Evelyn has been elected Vice President of the New York Browning Society. Evelyn Witkin is an inspiration to us all.

Carol A. Gross