Princeton University

Honors Faculty Members Receiving Emeritus Status

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for Receiving Emeritus Status

Shirley Marie Tilghman

Shirley Marie Tilghman, president of Princeton University emerita and professor of molecular biology and public affairs, will retire after 34 years at Princeton.

Shirley grew up in Canada where she attended high school in Winnipeg, Manitoba, and obtained her B.Sc. degree from Queen's University in Kingston in 1968. She next worked for two years as a secondary school teacher in Sierra Leone, Africa, in the Canadian University Services Overseas Program. Afterwards, she moved to the U.S. to begin her Ph.D. studies at Temple University in the laboratory of Richard Hanson. There, she characterized the regulation of the production of phosphoenolpyruvate carboxykinase, a gluconeogenic enzyme, by insulin and cyclic AMP. For her postdoctoral work, she joined the laboratory of Philip Leder at the National Institutes of Health. She was instrumental in the molecular cloning of the first mammalian genes, in particular the mouse beta-globin gene. She described large intervening sequences in the genomic portion of the gene, and she proposed that many genes might contain such intervening sequences. This hypothesis was soon shown to be correct, and it provided significant insight into the regulation of gene expression. Indeed, moving to the Institute for Cancer Research at the Fox Chase Cancer Center in Philadelphia, she demonstrated that the mouse alpha-Fetoprotein (AFP) gene also contained such intervening sequences. Apart from AFP, Shirley and her co-workers also cloned the albumin gene from the mouse and showed that the two genes are located in tandem in the genome. Notably, the team went on to characterize enhancer sequences in the DNA that allow tissue specific regulation of the expression of the two genes, which was another important step in the understanding of eukaryotic gene regulation.

In 1986, Shirley moved to Princeton as the Howard A. Prior Professor in the Life Sciences, soon after the newly built Lewis Thomas Laboratory opened. In 1988, she also became a member of the Howard Hughes Medical Institute.

At Princeton, Shirley focused further on her long-standing interest in the control of gene expression in developing mouse embryos. In addition to her work on AFP, Shirley soon launched her now textbook analysis of parental imprinting in mice. This research theme began with

the identification and characterization of H19, a noncoding gene that is expressed at high levels in a variety of embryonic tissues. She and her associates showed that H19 exhibits parental imprinting: the maternal copy of the gene is inherited in an active state, while the paternal copy is silent. One of her major breakthroughs in this area came in 1995 when she found that a common enhancer regulates both H19 and the neighboring Igf2 gene, which encodes an insulin-like growth factor that influences growth of the mouse embryo. Subsequent studies identified the ICR/DMD (imprinting control region/differentially methylated DNA domain) located in the intergenic interval separating the Igf2 and H19 transcription units. The work culminated in the publication of a landmark paper, Hark et al., in *Nature* (2000), which documented the first example of epigenetic regulation of a chromosomal boundary element. The paternal copy of the Igf2/H19 locus is methylated in the ICR/DMD region, thereby permitting shared enhancers to activate Igf2 but not H19. Conversely, the maternal copy of the locus lacks this methylation pattern, and consequently, the insulator/boundary protein CTCF binds to the ICR/DMD to silence it. CTCF inhibits expression of Igf2 and fosters activation of H19. This epigenetic regulatory switch provided an elegant insight into the mechanisms of parental imprinting and has withstood the test of time. It is included in all of the major textbooks as one of the paradigmatic examples of gene regulation in development. These studies also foreshadowed the importance of CTCF in the organization of animal genomes into higher order chromosomal domains.

Shirley was one of the founding members of the National Advisory Council of the Human Genome Project for the National Institutes of Health. She served on the National Research Council's committee that set the blueprint for the U.S. effort in the Human Genome Project. Launched in 1990, this multinational project resulted in the publication of the first draft of the human genome in 2000, a watershed moment that provided an extremely valuable resource for biologists working in many fields, ranging from evolution to development to cancer. Throughout her career, Shirley was exemplary in serving the larger scientific community, for instance, chairing the Molecular Biology Study Section at the National Institutes of Health; joining scientific advisory boards and committees of the Jackson Lab, the Whitehead Institute, and Genentech; serving as a trustee of the Cold Spring Harbor Laboratory, and Rockefeller University, as well as King Abdullah University of Science and Technology; and becoming the founding chair of Princeton's Lewis-Sigler Institute.

Aside from her stellar scientific contributions, Shirley was also an excellent and highly praised teacher. In 1996, she received Princeton's President's Award for Distinguished Teaching. She initially taught classes in her favorite subject, developmental biology, but she also became fascinated with interdisciplinary teaching on public health policy, which she pursued rigorously and to consistent high accolades from the students, in collaboration with the Woodrow Wilson School of Public and International Affairs. She also enjoyed teaching Freshman Seminars, where she could pass on the excitement for modern approaches in biology to the next generation of aspiring scientists.

In the fall of 2000, following Harold T. Shapiro's announcement of his intention to retire from the Princeton presidency at the end of the 2000–01 academic year, Shirley was one of five faculty members elected to the presidential search committee. In late March 2001, when Shirley left a search committee meeting early to teach, the rest of the committee decided to ask her to withdraw from the committee to become a candidate. On May 5, acting on a unanimous recommendation from the search committee, the board of trustees elected her as the 19th president of Princeton University.

Shirley took office on June 15, 2001 as the first woman president at Princeton. She immediately set a tone for her presidency by being Shirley rather than President Tilghman. In her time as president, she gained the trust and admiration of faculty, students, and staff, who felt that she was doing the right things for the university while also looking out for their welfare. This proved invaluable during the financial crisis of 2008–09 when she was called upon to implement difficult budget cuts.

The Tilghman presidency was distinguished by major achievements in many areas: an 11 percent increase in the size of the undergraduate student body; the launch of the four-year residential college system, with the new Whitman College coming on line in 2007, and a significantly transformed Butler College in 2009; a major increase in the number of undergraduates on financial aid and in the amount of aid awarded to them; the establishment of important new academic programs and facilities, including the Lewis Science Library, the Lewis Center for the Arts, the Princeton Neuroscience Institute, the new Frick Laboratory for the dramatically strengthened Department of Chemistry, the Princeton Institute for the Science and Technology of Materials (PRISM), the Andlinger Center for Energy and the Environment, and the Center for (now Department of) African American Studies.

Another focus of her administration was the development of international programs. This work began with the creation of the

Princeton Institute for International and Regional Studies (PIIRS). Among other efforts were the creation of the Bridge Year Program and the Global Seminars, the expansion of other opportunities for undergraduates to engage in study and work abroad, and programs to build ties between faculty members and their colleagues at foreign universities.

Having accomplished the completion of the five-year Aspire Campaign in 2012, which raised a record $1.88 billion, Shirley retired from the presidency in June 2013 and returned to the faculty in the Department of Molecular Biology and the Woodrow Wilson School.

Shirley is a member of the American Philosophical Society, the National Academy of Sciences, the National Academy of Medicine, and the Royal Society of London. She has served as a member of the Harvard Corporation, a trustee of Amherst College, the Carnegie Endowment for International Peace, and Leadership Enterprise for a Diverse America, and as a director of Google Inc. Among her many honors are the L'Oréal-UNESCO Award for Women in Science (2002), the Lifetime Achievement Award from the Society for Developmental Biology (2003), and in 2007, she was awarded the Genetics Society of America Medal for outstanding contributions to her field.

Shirley's friends and colleagues on the Princeton campus thank her for her outstanding contributions to science and Princeton University.