

*At a Meeting of the Faculty of Arts and Sciences on February 2, 2016, the following Minute was placed upon the records.*

## **WILLIAM M. GELBART**

Born: September 11, 1945

Died: August 11, 2015

Professor William Martin Gelbart cherished Harvard, its Houses, and its traditions. He excelled in research, teaching, and mentoring; reached out to educate Native Americans and minorities; and had a passion for the genetics and development of drosophila flies and the FlyBase data repository of which he was a founder. He was a leader in advisory panels for the National Institutes of Health; the American Cancer Society; and databases of genetics and molecular biology for mice, zebrafish, nematodes, Arabidopsis, and other organisms.

Bill Gelbart thrived in Boston but enjoyed vacationing in Crete and Maui. He was fond of squash and learned to coach and referee soccer. He reveled in good food, good wine, and friendship, and he was devoted to his family, especially his grandchildren, his children, and his wife and best friend, Susan Russo Gelbart. He loved life and lived it with passion, energy, empathy, leadership, and commitment.

Born September 11, 1945, in Brooklyn, NY, Gelbart matriculated at Harpur College at Binghamton University, SUNY, in 1962–1963 and then transferred to Brooklyn College, CUNY, where he was awarded a Bachelor of Science degree in 1966. He attended graduate school in Genetics at the University of Wisconsin–Madison, where he worked with Dr. Allen S. Fox and received his Ph.D. in 1971. He carried out postdoctoral research in developmental genetics at the California Institute of Technology, working with future–Nobel Laureate Dr. Edward B. Lewis (1971–1972), and further postdoctoral research in genetics at the University of Connecticut–Storrs, working with Dr. Arthur Chovnick (1972–1976). He joined the faculty of Harvard University as Assistant Professor of Biology (1976) and was promoted to Associate Professor of Cellular and Developmental Biology (1980) and to Professor of Molecular and Cellular Biology (1983), serving in that capacity until his death.

Professor Gelbart's long-term research interest was in understanding how the products of genes interact to guide the spatial patterning of cells in the development of organisms. Among his major discoveries was a mutant gene in drosophila that

results in multiple abnormalities owing to the defective development of small clusters of cells that form the adult integument. He called this gene *decapentaplegic* (*dpp*) because the distal portions of all the jointed appendages are missing. The *dpp* gene product, called “DPP,” was the first discovery in a nonmammalian species of a type of transforming growth factor beta (TGF-beta) protein important in cell growth, cell proliferation, cell differentiation, and other morphogenetic processes. His group also identified the genes for DPP receptors and discovered the intracellular proteins that transduce extracellular signals from TGF-beta ligands to the nucleus, where they activate downstream gene transcription.

Related to his interest in development, Professor Gelbart’s research helped clarify an epigenetic phenomenon known as transvection, in which certain genes manifest different levels of expression depending on whether the two copies present in each cell are able to undergo pairing in the nucleus. In some cases, pairing results in increased expression of the gene, whereas, in others, it results in reduced expression. His research established that transvection does in fact result from the presence or absence of chromosome pairing, and he showed that certain mutant forms of another gene, called *zeste*, interact with all transvection-sensitive genes in an allele-specific manner.

A master in methods for genetic manipulation, Professor Gelbart devised a method using two distinct transposable elements, which can change position in the genome, to create nested sets of genomic deletions ranging in size from tens to thousands of base pairs starting from any point in the genome. This method has been important in functional analysis of the fruit fly genome, including identification of protein-coding genes and noncoding RNA molecules and dissection of large regulatory regions of DNA into their component parts.<sup>1</sup>

In the early 1990s, Professor Gelbart was one of the first to realize that DNA sequencing technology was improving so rapidly that sequence data would soon overwhelm existing procedures for integrating it with other data and making it accessible. He spearheaded an international consortium of groups including members from Harvard, Indiana University–Bloomington, and Cambridge University that established FlyBase, an online information resource that integrates genetic and molecular data with biological information about the fruit fly *Drosophila melanogaster*. FlyBase has become an indispensable research resource for this organism. Its personnel develop and maintain the most up-to-date predictions of the

structures of all of the genes in the genome. They also develop computer-assisted, interactive methods for identifying DNA motifs associated with regulatory elements and other protein-binding sites within the genome, and they create and improve ways to query and extract information from FlyBase and other databases.

Professor Gelbart's expertise in genomics and genome annotation allowed him to play a key role in the sequence analysis and annotation not only of the genome of *Drosophila melanogaster* but also of the genomes of a dozen other species of drosophila; the honeybee *Apis mellifera*; the mosquito species *Anopheles gambiae*, which transmits malaria in Africa; and the mosquito species *Aedes aegypti*, which transmits viruses such as those for eastern equine encephalitis as well as dengue and yellow fever.

His distinguished research career was paralleled by his dedication to teaching. He taught large-enrollment undergraduate courses in genetics and genomics as well as small specialty undergraduate courses in genome annotation. For many years he was a Harvard College freshman advisor, the Head Tutor for the undergraduate concentration in biology, chair of the Faculty Advisory Committee of the Harvard Foundation for Intercultural and Race Relations, program director for an interdepartmental predoctoral training program in genetics and genomics, and coauthor of a leading textbook on genetics. Many students who he mentored as a graduate or postdoctoral advisor have gone on to successful careers of their own. His many honors include being elected Fellow of the American Association for the Advancement of Science, receiving a MERIT award from the National Institutes of Health, and being awarded the George W. Beadle Award from the Genetics Society of America "for outstanding contributions to the community of genetics researchers.

Respectfully submitted,

Matthew Meselson  
Norbert Perrimon (Harvard Medical School)  
Daniel Hartl, Chair

<sup>1</sup>Cathryn Delude, "William M. Gelbart September 11, 1945 - August 11, 2015," Department of Molecular and Cellular Biology's website, October 20, 2015, <https://www.mcb.harvard.edu/mcb/news/news-detail/3841/william-m-gelbart-september-11-1945-august-11-2015/>.