

Britton Chance, a biophysicist who did pioneering research on how living organisms produce and manage energy and helped develop diagnostic tools, like one for the detection of breast cancer, died on Nov. 16 in Philadelphia. Enlarge This Image
Pennsylvania Gazette Britton Chance Dr. Chance, who was also a world-class yachtsman and won an Olympic gold medal in sailing in 1952, was 97. His death was confirmed by his daughter Jan Chance Oâ€™Malley. Over a lifetime of research, Dr. Chance focused on the observation and measurement of chemical reactions within cells, tissue and the body. But unlike most researchers, he also had expertise in mechanics, electronics and optics, and a great facility in instrument-building. His innovations helped transform theoretical science into biochemical and biophysical principles, the stuff of textbooks, and useful biomedical and clinical applications. Early in his career he invented a tool, known as a stopped-flow apparatus, for measuring chemical reactions involving enzymes; it led to the establishment of a fundamental principle of enzyme kinetics, known as the enzyme-substrate complex. Dr. Chance was able to demonstrate that when an enzyme â€” that is, a protein that acts as a catalyst for a chemical reaction â€” acts upon another molecular agent, known as a substrate, the first step in the process is the formation of an association between them called an enzyme-substrate complex. This knowledge enabled scientists to better measure the rates at which enzymes work and determine how they work, crucial elements in determining their metabolic functions. (Dr. Chance named his sailing yachts Complex I and Complex II.) He created a series of instruments to measure and rapidly follow changes in the energy status of cell mitochondria, which take in nutrients and create energy for cells. His later work in magnetic resonance spectroscopy and near-infrared optics aided in the development of techniques for the analysis of muscle dynamics and tools to detect cancer tumors in muscles and breasts and to assess cognitive brain function. As a student and teacher, Dr. Chance was affiliated for more than half a century with the University of Pennsylvania, where he was the Eldridge Reeves Johnson emeritus professor of biophysics, physical chemistry and radiologic physics. He earned his gold medal at the Helsinki Olympics as the skipper of a three-man crew in the 5.5-meter yacht class. Britton Chance was born in Wilkes-Barre, Pa., on July 24, 1913, and grew up there and in Haverford, near Philadelphia. His father was an engineer and ran a construction company that built power plants. As a boy he had twin gifts for sailing and ingenious problem-solving; he was a teenager when he invented and patented an auto-steering mechanism for ships that detected when they were veering off course. He earned a bachelorâ€™s degree, a masterâ€™s degree and a doctorate in physical chemistry from the University of Pennsylvania, and in 1942 received a second doctorate, in physiology and biology, from Cambridge University. During World War II, Dr. Chance worked at the radiation laboratory at the Massachusetts Institute of Technology, a government-financed military research program commonly known as Rad Lab, on a team that focused on the development and enhancement of radar. Dr. Chanceâ€™s first two marriages, to Jane Earle and Lilian Streeter, ended in divorce. He is survived by his wife, Shoko Nioka, a Japanese biochemist whom he married in February; 11 children, including a son, Britton Jr., a naval architect and well-known yacht designer; five stepchildren; 20 grandchildren;

and eight step-grandchildren. A version of this article appeared in print on November 29, 2010, on page A26 of the New York edition.