

*At a meeting of the FACULTY OF ARTS AND SCIENCES on October 5, 2021,  
the following tribute to the life and service of the late Raymond Leo  
Erikson was spread upon the permanent records of the Faculty.*

## **RAYMOND LEO ERIKSON**

BORN: January 24, 1936

DIED: March 30, 2020

Raymond L. Erikson was born on a Wisconsin dairy farm in 1936 and grew up near the village of Eagle that had been settled by his father and grandfather in the early 1900s. “I did not have what today might be regarded as a propitious early education,” said Erikson. “I attended a one-room rural school, initially with one first grade classmate . . . from a neighboring farm.” Nevertheless, he eventually matriculated at the University of Wisconsin–Madison intending to become a high school teacher of agriculture sciences. But a junior year genetics course inspired his interest in biology, and an intriguing article on viruses led him to the field in which Erikson made his major contributions.

In 1963, after earning a bachelor’s, master’s, and doctorate from Wisconsin, Erikson began postdoctoral research at the University of Colorado School of Medicine, studying the replication of viruses that infect bacteria. He then transitioned to investigations of tumor-causing animal RNA viruses when he started his independent lab in the pathology department at Colorado, focusing on the RNA genomes of oncogenic retroviruses.

In 1976, a sequence of DNA in the genome of normal chickens was found to be similar to one in a virus known to cause tumors in chickens. This region was called *v-src* (for *sarcomas*) and this finding indicated that normal cells contain genetic information that could cause tumor formation. These and other studies suggested that *v-src* encodes a tumor-causing protein, leading to an all-out search for the protein. In 1977, after five years of hitting dead ends, Erikson and his team finally identified the protein, which is referred to as v-SRC.

A second major milestone was Erikson’s discovery of how SRC works. He and his team showed that v-SRC is an enzyme known as a kinase that adds phosphate groups to other proteins. Phosphorylation dramatically changes the function of proteins, often activating an entire signaling pathway. “This explained the reversible effect observed in SRC [i.e., when it is inactivated],” Erikson explained. “If you take the phosphate away, the protein returns to its quiescent state.” Studies that followed Erikson’s discovery that SRC is a kinase demonstrated that the enzyme specifically phosphorylates an amino acid residue called tyrosine. This led to

the understanding that the mutant viral SRC kinase over-activates downstream proteins, driving unregulated cell proliferation. These findings not only explained the underlying mechanism that is responsible for SRC-induced tumorigenicity but also laid the foundation for uncovering a pathway now considered among the most important cancer-promoting signaling cascades.

“This discovery supported the new concept that our own cells contain proto-oncogenes that have a benign function until some mutation transforms them,” Erikson reflected. “It showed how understanding a pathological situation in a tumor could tell us something about normal cell proliferation.” These contributions earned Erikson—“a pioneer within a field of pioneers”—the Lasker Award in 1982. That same year Erikson came to Harvard and joined a precursor to the Department of Molecular and Cellular Biology. Here, he continued investigating how SRC transmits information downstream to other kinases. Thus began the next phase of the Erikson legacy in which additional kinases were discovered, ultimately revealing a cascade of kinase signaling.

Erikson was a careful and thorough investigator who wanted to understand how things work. As Memorial Minute committee member Joan Brugge recalls, after the discovery of the *v-src* protein, “I wanted to get a bottle of champagne to celebrate, but Ray, keenly aware of the human mind’s confirmation bias said, ‘It’s not time for champagne yet, Joan.’ Erikson was unusually cautious about supposing the existence of more order in the world than was actually there.” And as one of the first postdoctoral fellows in Erikson’s laboratory at Harvard, John Blenis, recounts after discovering a protein that is phosphorylated by *v-SRC*, “Erikson was happy with this finding but not truly impressed. He wanted to know *how*. He was true to his convictions. He didn’t want correlations; he wanted molecular mechanisms. To do this required biochemistry, Erikson’s love.”

As a colleague, Erikson was a perfect gentleman who was always fun to chat with. He was a dedicated and meticulous educator, teaching an introductory course on cell biology and an upper level course on cell division and cancer. Erikson was also an excellent mentor to undergraduates, graduate students, and postdoctoral fellows. Another former member of the laboratory, Xiaoqi Liu, recalls that Erikson “was always there with guidance, mentoring, and encouragement, which I especially appreciated during the periods when my experiments did not work out as well as I’d hoped. The seven years I spent in his lab were the happiest of my entire life so far. I really miss it!”

Ray remained dedicated to hands-on research, so much so that he could frequently be found working at the bench Saturday mornings late in his career. He did, however, spend two weeks each summer back in Wisconsin, when he returned to the family farm so that his brother could take a vacation.

In addition to the Lasker Award, his accomplishments were recognized by the Alfred P. Sloan Prize from the General Motors Cancer Research Foundation, the Hammer Prize for cancer research, an American Cancer Society Research Professorship, and membership in the National Academy of Sciences and in the American Academy of Arts and Sciences. The Raymond Leo Erikson Life Sciences Professor of Molecular and Cellular Biology chair at Harvard University is named in his honor and was endowed by Daniel Simmons, who discovered a medically important drug target based on work he initiated in Erikson's laboratory.

Ray leaves behind his wife, Donna, and daughter, Amanda. In addition, many of Ray's most important early discoveries were achieved with the close collaboration of his first wife, Eleanor (Jo), with whom he remained lifelong friends and who also survives him.

Respectfully submitted,

Daniel Branton  
Joan Brugge  
John Dowling  
Benjamin Neel (NYU)  
Richard Losick, Chair

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Portions of this Minute were previously published by Cathryn Delude, John Blenis, Daniel Branton, Joan Brugge, John Dowling, Richard Losick, and Benjamin Neel, "Ray Erikson 01.24.1936–03.30.2020," Department of Molecular and Cellular Biology website, April 20, 2020, <https://www.mcb.harvard.edu/department/news/ray-erikson-01-24-1936-03-30-2020/>.