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Joan Brugge

Joan Brugge's first career goal was to be a math teacher, driven by a passion in high school for mathematical problem solving. She entered Northwestern University from her native Wyoming, Ohio, as a math major, but when she took more advanced math courses, her interest foundered when it came to theoretical mathematics.

While in college, Brugge's sister, Mary Pat, only one year older, was found to have a brain tumor. The turn of events coincided with Brugge's distraction from math. "In probing the doctors for causes of her disease, I was very frustrated because many of my simple questions couldn't be answered," Brugge remembers.

Brugge talked with her sister's neurosurgeon, who suggested that viruses were going to turn out to play a significant role in cancer. In her quest to understand her sister's illness and death, Brugge recalls that "I asked for an independent study to read what was known about cancer, especially viruses and cancer."

Brugge's personal interest led her to the work of Peyton Rous, who had demonstrated that cancer could be caused by an infectious agent, a virus. "Viruses like the Rous sarcoma virus (RSV) invade normal cells and capture some of their genes, disrupting the regulation of the cell, often causing it to reproduce itself uncontrollably, as in cancer," explains Brugge.

Still an undergraduate, Brugge turned her full attention to the study of biology and started to do part-time work in a research lab. Brugge recalls that "although I just washed dishes in the lab and performed routine assays, I sensed for the first time the thrill that scientists experience when they explore uncharted paths."

The next summer, before her senior year, Brugge participated in a student research program at Jackson Laboratory in Bar Harbor, Maine, studying tumor virology and personally experiencing for the first time the excitement of doing experimental investigation. "I began to learn the basics of the scientific process. In no time I was hooked, and research became my passion. It was a turning point in my life; I became consumed by the need to do research."

Following college, Brugge wanted to devote her graduate studies to research on tumor viruses, but no one at Northwestern at that time was doing such research. So upon graduation she moved to Houston to work with Janet Butel at Baylor, examining how normal cells in rodents and monkeys can become cancerous by the virus SV40.

After earning her Ph.D. in Virology in 1975, Brugge moved to the University of Colorado for postdoctoral training. Working with Ray Erikson, she isolated the protein coded for by the viral and cellular forms of the SRC gene. These proteins were the first retroviral/cellular oncogene products to be identified: the study of the normal and oncogenic forms of this gene product has served as a model system to investigate cellular processes that regulate normal growth and the mechanisms involved in tumor formation.

In 1979 Brugge took her first independent position when she joined the faculty of the State University of New York (SUNY) at Stony Brook. She worked her way through the ranks to Professor in the Department of Microbiology before leaving SUNY in 1989 for the University of Pennsylvania, where she was also named an investigator of the Howard Hughes Medical Institute. For 13 years in New York and Pennsylvania, Brugge taught graduate students and medical students while continuing her research on the genes involved in the development of cancer.

But in 1992, Brugge came to grips with the fact that 80% of her time was broken up into little bits of time - time over which she had little control. She describes her frustration as follows: "my time was consumed by committee meetings, study sections, curriculum meetings, grant reviews, fellowship reviews and similar things. I wasn't getting much satisfaction in those one-percent parcels of my time."

After three years at Penn, Brugge was lured by the founders of ARIAD, a start-up biotechnology company in Cambridge MA, to become Scientific Director. While this represented a radical change, Brugge felt that she could continue to research intracellular signaling pathways involved in disease processes and at the same time focus her extra energy on one meaningful enterprise. ARIAD is focused on signal transduction, finding proteins that were involved in diseases.

Initially, Brugge looked forward to the opportunity to continue her research as well as "the opportunity to translate research findings into therapeutic applications, since the small signaling domains involved in many disease processes seemed like good specific targets for structure-based drug design."

However, Brugge found to her disappointment that time she had hoped would be directing research was instead consumed with management, administration and travel. "The first two years at ARIAD was a whirlwind of recruiting scientists, building and equipping laboratories and starting several projects to develop new drugs." She describes her work at that time as "thrilling", but leaving little time for her own research.

As time permitted, she continued her basic research, funded by the National Cancer Institute. But eventually she realized that she was engaged in the same juggling act that had triggered her to leave academia in the first place. "After five years at ARIAD, I realized that it wasn't feasible to do research of the quality I was comfortable with and also be scientific director." So in 1997 she returned to academics when she joined the faculty of Harvard Medical School as a Professor in the Department of Cell Biology.

Returning to academics, Brugge developed a plan to refocus a major effort on cancer research. Today much of her lab at Harvard is focused on studies of intracellular signal transduction pathways involving integrin and growth factor regulation of cytoskeletal alterations, cell proliferation and survival.

"At the beginning, my research on SRC was focused on understanding the mechanisms involved in conversion of a normal cell to a tumor cell. The SRC protein I originally found was associated with Rous sarcoma virus, but was actually a cellular gene that was captured by the virus. When I left my postdoctoral fellowship after finding the SRC protein, I decided to investigate what normal cellular activities are regulated by the SRC protein did so we could understand how alterations in normal processes could lead to cancer. But studies of SRC had led us in very unexpected directions, like neurobiology, platelet biology, integrin adhesion receptors; we were kind of lured into areas that were pretty far from cancer, so I really wanted to go back to cancer," she says.

"I decided that I wanted to get into epithelial cell tumors because the majority of tumors were epithelial cell tumors, whereas all the models that had been used in oncogene research were fibroblast: epithelial cancer biology was much more poorly explored. Breast cancer appealed in particular because there was a lot of really interesting work in that area that was related to what we were doing with adhesion receptors and growth factors. I thought it was an area where we could bring together the research areas we were familiar with in a new cellular system. We've set up genetic screens to identify genes that are involved in breast cancer, trying to fit those genes into known pathways regulated by growth factors and adhesion receptors."

Former colleague and current SUNY-Stony Brook professor Sidney Strickland comments that, "Joan's influence on the field of cell biology has been profound. Since her early work on the SRC kinase, she has been dedicated to the highest quality in science. She has coupled her extensive accomplishments with an extraordinarily rare confluence of wonderful personal characteristics: a friendly and cooperative approach to her colleagues, the highest integrity, and a stimulating and warm mentorship of postdocs and students. Joan truly epitomizes the best in being a scientist. She is a revered figure in the field both for her talent and insight, and for her qualities as a human being."

Former ASCB President and Brugge's current department chair at Harvard, Marc Kirschner, describes Brugge as "a born leader, with a deep empathy for students, a loyalty to colleagues, and a generosity of spirit that is unexcelled." He adds that "Joan has had a distinguished career in science, making one of the seminal discoveries in signal transduction as a postdoc and continuing throughout her career in developing important insights into kinase regulation and cell biology."

Brugge's introduction to the ASCB came when she was invited to give a presentation at the Annual Meeting, which left a remarkable impression. "I was incredibly impressed by the meeting, how well great science was mixing with programs that supported younger scientist's careers. I was basically lured into it by experiencing it." Brugge's Society involvement escalated last year when she was elected to serve on the ASCB's governing Council. Next year she will serve as Chair of the Program Committee for the Society's 41st Annual Meeting.

Brugge's husband, Bill, is a physician-researcher at the Massachusetts General Hospital, specializing in gastroenterology; his current research focuses on interventional endoscopy. Their two-career household has required balance and adjustment in the Brugge family, where each has taken turn "driving" their moves. "I moved to Colorado for Bill's residency," Brugge explains, "and he moved to Stony Brook for my job. I moved to Penn for his job, and then he moved to Boston for my job with ARIAD. Then I stayed in Boston when I left ARIAD because he was very happy and settled at Mass General."

The Brugges' son, Shawn, was born at the end of Joan Brugge's second year of postdoctoral fellowship. Shawn graduated in May with a degree in physical geography from the University of Colorado.

Free time, a rare commodity for Brugge, is spent playing tennis and enjoying music with her husband. Recently, the two learned to scuba dive, and spent last Christmas with Shawn scuba diving in the British Virgin Islands.