

## KAREN BUSH

Professor of Practice of Biotechnology, College of Arts + Sciences

IU Biotechnology Professor of Practice Dr. Karen Bush is retiring from full-time work at the university following a stellar career and a remarkable journey to success. Karen is a prominent microbiologist who spent much of her career in the pharmaceutical industry focused on anti-microbial drug development. In recent years she returned to IU to become an instrumental figure in the biotechnology program. Karen holds adjunct appointments in both the Department of Biology and the Department of Molecular and Cellular Biochemistry. By her own description, her career path was a meandering one, but she succeeded by embracing opportunities when they arose.

Karen grew up in Boonville, Indiana, before moving to Illinois, where she attended Monmouth College as a chemistry major. She truly began her journey into research science when she spent a semester at Argonne National Laboratory outside of Chicago, where she studied how the radioisotope deuterium affects an important enzyme called aconitase. This experience inspired Karen to join IU as a doctoral student in biochemistry. She continued to work on purified enzymes and to study their activities with her IU mentors H. Mahler and V.J. Shiner. Her high-caliber doctoral work was published in prestigious journals such as *Science* and *Biochemistry*. Reflecting her multiple talents, Karen also minored in organ performance while at IU.

After obtaining her Ph.D., Karen pursued postdoctoral work at the University of California Santa Barbara, where she learned microbiology by studying the circadian rhythms of the algae that cause red tides. Shortly thereafter, Karen joined the pharmaceutical industry as an analytical chemist with the company that became Bristol-Myers Squibb.

Her time at Bristol-Myers Squibb provided an opportunity to work on what evolved into a life-long passion: developing new antibiotics and therapeutics that target bacterial cell wall formation. Penicillin and related antibiotics target cell walls, but bacteria have evolved enzymes called beta-lactamases that break down these antibiotics and impart highly effective resistance. The emergence of this form of antibiotic resistance prompted ongoing research into new antibiotics that either are not recognized by the beta-lactamases or inhibit these enzymes.

Colleague and Distinguished Professor (DP) of Biology Malcolm Winkler is a recognized expert on bacterial cell walls. When asked about Karen's work, he responds, "Karen Bush is an extraordinary scientist, who combines a passion for drug discovery with the highest scientific standards and respect for her colleagues. She was one of the most prominent scientists in antibiotic discovery and

development in the pharmaceutical industry in the major area of overcoming  $\beta$ -lactam antibiotic resistance.”

In an era and environment still dominated by male scientists, Karen rose through the ranks to become a senior scientist, a distinguished research fellow, and Antimicrobial Team Leader at J&J. She led a team of diverse scientists who focused on drug development.

Karen has been mentioned in over 40,000 citations, produced multiple patents, and marketed new antibiotics. She propelled nine drug candidates into Phase I clinical trials. As a private sector scientist, Karen retained prominent visibility through her prolific publications, her service on grant review panels and journal editorial boards, and her active membership in the American Society for Microbiology. Among the many awards she has garnered were election as a fellow of the American Academy of Microbiology, and of the International Society of Antimicrobial Chemotherapy (ISAC). Karen was also the first female recipient of ISAC Hamao Umezawa Memorial Award, ISAC's highest award.

After retiring from J&J, Karen returned to IU as a professor of practice with the biotechnology program, where she taught multiple courses and continued her productive research. Over the course of her long and productive career, inside and outside academia, Karen witnessed a very small number of prominent female scientists grow to increasingly equal representation. She has been an agent of change in this process and is an excellent role model for all scientists.

She has always maintained a friendly, positive attitude along the way. Even when confronted with inequities and the occasional abrasive personality, Karen has held firm to the idea in the following quote: “One lesson learned very early in a career is to get along amicably with the people with whom you work. Never slam a door when you move on. You do not know when your difficult colleague today may be your teammate (or supervisor) at your next job.”

IU has been fortunate to have a faculty member of such intellect, prominence, and grace as Karen Bush, and we have all benefitted from her second career since. Again quoting DP Malcolm Winkler regarding her impact on IU Biotechnology, “Karen's immense knowledge, contributions to curriculum, leadership style, and dedication to students have had a profound and long-lasting effect on the success of this important program.”

Clay Fuqua