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IN MEMORIAM

William R. Brinkley: A giant in biomedical research and public policy

Susan A. Gerbi¹, Robert E. Palazzo², William C. Earnshaw³, and William T. Schrader⁴

Dr. William Robert (“Bill”) Brinkley, a leader in cell biology, graduate education, and public policy, died November 10, 2020, at age 84. Bill was born in Weldon, Texas, on May 31, 1936. In his college freshman biology course, he observed mitosis in onion root tips and became fascinated by chromosomes and their movement in cell division. He obtained his BS and MS degrees from Sam Houston State University, where he maintained their small natural history museum. His PhD (1964) was from Iowa State University, which was one of the first graduate programs in cell biology to include training in electron microscopy. There, he studied chromosome ultrastructure with John H.D. Bryan. Bill then returned to his home state of Texas for postdoctoral research with T.C. Hsu at the University of Texas M.D. Anderson Cancer Center in Houston. A dozen years earlier, Hsu had developed a hypotonic solution that allowed observation of individual chromosomes, and his laboratory provided a fertile environment with access to “Professor Hsu’s frozen zoo” of mammalian cell lines from many different species. Although Bill wanted to become a cytogeneticist, Hsu encouraged him to use his talent as an electron microscopist to study chromosome architecture. Hsu assured Bill that he could likely solve mitotic chromosome structure in one year! In 1964, Bill joined the American Society for Cell Biology (ASCB) that had been founded just four years earlier and became a leading force in the society. T.C. Hsu was also an early member of the ASCB, and both he and Bill subsequently became presidents of this organization. Bill remained at M.D. Anderson as an assistant and associate professor until 1972, when he moved to the University of Texas Medical Branch in Galveston as director of the division of cell biology. In 1977, he moved to Baylor College of Medicine as professor and director of cell structure in the department of cell biology. In 1985, Bill left Texas to become chair of the department of cell biology at the University of Alabama at Birmingham, where he also served as codirector of the Cystic Fibrosis Research Center. The lure of Texas remained strong, and Bill

returned to Baylor in 1991 to become vice president for graduate sciences and dean of the graduate school, a position he held for two decades until becoming dean emeritus in 2011. Bill also served as codirector of Baylor’s W.M. Keck Center for Computational Biology.

Despite his administrative duties, Bill maintained an active research laboratory throughout his career, focusing on mitosis, aneuploidy, and genomic instability in cancer cells. He was one of the first to describe the ultrastructure of the kinetochore (Brinkley and Stubblefield, 1966), which is currently a major focus of investigations in the mitosis field. We now know from the work of many scientists that kinetochores capture microtubules in prometaphase, sense the correct attachment of all chromosomes to the mitotic spindle, and in many systems contribute to chromosome movements. Bill gave a historic talk about his ground-breaking observations on kinetochore ultrastructure at the 1966 ASCB meeting in Houston. In addition to meeting attendees, others came from the nearby M.D. Anderson Hospital to hear their dynamic young assistant professor speak. When his talk began, the audience overflowed the meeting room and extended well into the hallway. Subsequently, McGill and Brinkley (1975) used electron microscopy to identify centrosomes and kinetochores as microtubule organizing centers. In addition, Bill pioneered the use of antibodies for molecular localization in cells. In 1975, he collaborated with Gerry Fuller to develop the first monospecific antibodies against tubulin (Fuller et al., 1975). Using the newly developed method of indirect immunofluorescence they discovered that tubulin was organized as a cytoplasmic microtubule array in interphase that was transformed into the mitotic spindle during M-phase (Fuller and Brinkley, 1976). Later, Bill pioneered the use of human anti-centromere autoantibodies in his discovery of mitosis with unreplicated genomes, in which kinetochores align on spindles independent of the body of chromosomes in mammalian cells after checkpoint override (Brinkley et al., 1988). He and his

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W.T. Schrader is retired.

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Photo from Brinkley, 2014.

collaborators also used these antibodies to reveal a repeat substructure of the kinetochore (Zinkowski et al., 1991) and to show that centromeres remain condensed in interphase nuclei (He and Brinkley, 1996). For these studies and many others during the course of his career, Bill received several honors and awards, including a National Institutes of Health (NIH) MERIT award. In 1999, Bill was elected to the Institute of Medicine (now the National Academy of Medicine). A meeting sponsored by the Federation of American Societies for Experimental Biology (FASEB), the “Brinkley-Fest of Mitosis,” was held in 2007 to honor Bill’s contributions to the field. In 2014, he was awarded the E.B. Wilson medal, the highest scientific award from the ASCB, to recognize his far-reaching contributions to cell biology over a lifetime in science.

Bill served the scientific community in many ways. He was elected president of ASCB (1979–1980), president of the International Federation for Cell Biology (1980–1984), and president of the Academy of Medicine, Engineering and Science of Texas in 2012. Bill’s activities also benefitted cell biology around the world. At Keith Porter’s request, he served as chair of the first International Congress on Cell Biology in Boston (1976), and subsequently, he was the secretary-general of the sixth International Congress for Cell Biology (1994). He was proud editor-in-chief of *Cell Motility and the Cytoskeleton* and was on the editorial board of many other journals, including *Journal of Cell Biology* and *Cell*. He served the NIH in a number of capacities as grant reviewer and member of several advisory boards. Bill’s activities had a significant impact on graduate education, extending well beyond his role at Baylor. He was the founder and chair (1993–1995) of the Association of American Medical Colleges Graduate Research Education and Training Group, whose annual meetings provide the only forum for national discussions about biomedical graduate education.

Bill’s insight and passion for public policy led him to become one of the most effective advocates of his time for the scientific profession. His commitment was exemplified by a commencement address he gave at the University of Texas (Houston) in

May 2003. Entitled “The Duty of Citizenship in the Profession of Science,” in his remarks he said:

“My message to you is not just about being good scientists, but also about being very good citizens of science!...I hope to convince you that the task of good citizenship in science is too important to abdicate the responsibility to less qualified and less interested individuals...Today, more than ever, scientists have a need and obligation to engage themselves in the political process that affects the future of biomedical research, healthcare delivery, and indeed, all of science and medicine. In other words, each of you, as a scientist, owes a direct duty to the public. The spirit of inquiry behind science is not self-sustaining. It is a privilege to be engaged in scientific research, and that privilege is purchased, primarily, by taxpayers’ dollars...Citizen scientists have another critical role to play: We must shape the public discourse that determines science policy. Without careful scrutiny and constant vigilance, your ability to carry out independent, investigator-initiated research might be jeopardized by capricious government policies—policies that not only burden or impede freedom of investigation but may actually criminalize the pursuit of cutting-edge research. Hotly disputed issues include stem cell research and the ability to carry out somatic cell nuclear transfer to produce human stem cells; the use of animals in research; and the use of human subjects in research, to name but a few.”

Through his devotion to the scientific community, Bill set an example *par excellence* of the “citizen scientist.” Recognizing the importance of scientists speaking to their congressional representatives, in 1981 Bill founded the ASCB Legislative Alert Committee, the first nationwide science advocacy group. He recruited scientists in each of the 435 congressional districts and set up a nationwide telephone network. FASEB followed suit, creating a similar instrument for the voice of its over 130,000 scientist members. Soon after the establishment of the ASCB Public Policy Committee, Bill served as its chair (1990–1992). Bill’s humble and sincere demeanor made him an effective spokesperson when interacting with Congress on behalf of biomedical research. In recognition that professional guidance from an experienced lobbyist would be very helpful, Bill chaired a search committee that hired former Congressman Peter Kyros to serve as the ASCB congressional education liaison to help develop a plan for targeted advocacy for the NIH and National Science Foundation (NSF). This was a controversial decision, as some ASCB members felt that lobbying was a dirty business. However, Bill’s insight proved correct. Kyros recommended a strategy that led to the formation of the nation’s first Congressional Caucus on Biomedical Research, an effective bipartisan body of the U.S. House and Senate members that helps to support our country’s biomedical research enterprise. Bill organized one of the first presentations to this caucus entitled “Cloning of the Cystic Fibrosis Gene: An American Success Story in Biomedical Research.” This format continues today in an effort to keep Congress informed of the relevance and exciting progress being made in biomedical science. In addition, Bill was among the founders of the Joint Steering Committee (now the Coalition for Life Sciences), where several scientific societies joined forces to oversee the advocacy efforts of Kyros.

Bill's activities in public policy extended beyond the ASCB. As president of FASEB (1998–1999), he led a successful effort to double the NIH budget over five years. During this period, Bill was named to the board of directors of Research!America, was chair of the Campaign for Medical Research, was elected chair of the Public Affairs Advisory Committee of the American Society for Biochemistry and Molecular Biology (ASBMB) and was elected to the ASBMB Council (2003–2006). In 2008, he was honored with the ASBMB Service Award for Leadership in Public Policy. Neal Lane (former assistant to the president for science and technology; director of the White House Office of Science and Technology Policy; former director of NSF) stated of Bill: “Through his vision for advocacy, he, more than any other individual scientist, helped to promote the five-year doubling of the NIH budget and inspired a lasting commitment to the duty of citizenship in the profession of science.”

Bill touched the lives of numerous scientists and students as a collaborator, mentor, and friend. He was a passionate naturalist and enjoyed hunting, fishing, nature photography, and taxidermy. His *joie de vivre* is epitomized by numerous hilarious stories, including the following. In the early 1980s, Bill was visited by the director of the USSR Institute of Experimental Cardiology in Moscow during the first U.S./Russian research exchange. Bill wanted to make his visitor feel at home, so he told him that Russia might not be a bad place to work, but he couldn't give up hunting. The director told him that if he came to Russia, he would take him on a great hunting trip. Before he knew it, Bill was being instructed by the State Department on protocol for his trip. After Bill gave a series of seminars, his Russian host took him on the promised trip, flying in a Red Army helicopter to the Caucasus Mountains to hunt big-horn sheep, prized for their huge, curled horns. Bill got one. The army people prepared the skull and horns and wrapped it in a package for his departure by plane back to Moscow and on to Houston. Bill managed to check out from his Soviet hotel with his strange package without raising suspicion from the old woman whose job was to sit by the elevator and monitor all the foreign guests. So far, so good. Bill got out to the airport and boarded the plane, with the horns in a box in the overhead rack. The plane was ready for departure, and Bill was beginning to relax, when the engines suddenly shut down, the stairs unfolded, and an ominous-looking agent came aboard and announced over the loudspeaker “Will Doctor William Brinkley please identify yourself!” Bill nervously raised his hand and the man asked: “Are you Dr. William Brinkley?” to which Bill nodded. The man then said: “Dr. Brinkley, you neglected to turn in your room key at the hotel!” Bill apologized, fumbled in his suit jacket, and found the key... and the agent thanked him and left!

Bill was a passionate scientist who was able to combine his love of the kinetochore with an insight and passion for public policy, leading him to become one of the most effective

advocates of his time for the scientific profession. His many contributions to the science of mitosis, to public policy, and to graduate education reflect an energy that defies the merely mortal. Despite all his activities, he never seemed rushed, and he made you feel as though your conversation with him at the moment was the most important item on his agenda. He helped to change the cell biology community for the better, but it is important that we not forget that Bill was also the person you would want to be sitting next to on a long bumpy bus trip in Taiwan, smoothing the ride with joke after joke. Indeed, those of us who were at the breakthrough “Chromosome Transmission in Mitosis” conference in Leningrad in 1990 will never forget how Bill's passion for understanding kinetochores did not dissuade him from an equally single-minded pursuit of buying “Russian military watches,” most of which (legend has it) failed soon after their transfer of ownership. Bill's legacy will live on long after the few genuine watches from that trip have long since failed, and the many young scientists who are fascinated by kinetochores today would do well to read the publications from the old master as they try to develop their own scientific styles.

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