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## In Memoriam: Harold W. Beams (1903-1992)

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## IN MEMORIAM

### HAROLD W. BEAMS (1903-1992)

Harold W. Beams, long time Professor of Biology at the University of Iowa, died at his home in Iowa City on January 26, 1992 after an illness of several months. Professor Beams was born in Belle Plaine, Kansas on August 3, 1903. He received the B.A. Degree in 1925 from Wichita State University, the M.A. Degree in Zoology in 1926 from Northwestern University, and the Ph.D. Degree in Zoology in 1928 from the University of Wisconsin. He was a DuPont Research Fellow in Anatomy, University of Virginia at Charlottesville from 1929 to 1930. Professor Beams joined the faculty of the State University of Iowa in 1930, was promoted to Associate Professor in 1935 and to Professor in 1939. He spent a year (1934-35) as a Rockefeller Foundation Fellow working in the laboratory of J. Brontë Gatenby, Trinity College, Dublin, and at the Marine Biological Laboratory, Plymouth England. Although Professor Beams officially retired from the University of Iowa in 1971, he walked to his laboratory daily to continue his research interests until a few months before his death.

Harold Beams was a remarkable individual; a very personable, kind, gentle and caring man. He was a true gentleman and humanitarian. He trained 38 students for the M.S. Degree at Iowa and 21 students for the Ph.D. Degree. His students universally held him in deep respect and admiration and many of his former students frequently returned to visit and be warmly welcomed into the Beams household. His former students and colleagues remember Harold for his scholarship, scientific integrity, personal kindness and his concern for them as individuals.

Professor Beams had a long and distinguished career of research and teaching. His brother, Jesse W. Beams, a long time Professor of Physics at the University of Virginia, developed the air turbine ultracentrifuge in the late 1920's. Professor Harold Beams used this instrument extensively to investigate the effects of high centrifugal force (100,000 to 400,000 x gravity) on a variety of cells, small animals and plants, and on their ability to survive extreme gravity and to reorient their internal contents following ultracentrifugation. This experimental biological probe was useful to study protoplasmic viscosity and the relative density of cell organelles. Among the cell types subjected to high centrifugal forces were male and female germ cells, algae, protozoa, somatic cells, root tips, *Elodea* and spinach leaves, pollen tubes, duckweed plants, erythrocytes, reticulocytes, and HeLa cells. Generally, the forces applied ranged from 100,000 to 400,000 x gravity and necessitated placing the cells in an inert material of suitable density to suspend the cells and prevent destruction.

Professor Beams was a very active participant in a controversy raging in the early 1930's about whether the Golgi apparatus was real or artifact. Between 1930 and 1934, he published 9 papers on the Golgi apparatus in such diverse cells as the liver, islet of Langerhans, pancreatic acinar cells, spinal ganglion cells, insect salivary glands, developing tooth and uterine gland cells. The studies on the uterine gland cells in 1934 with Professor R.L. King were particularly important for they were able to demonstrate by subjecting the cells to forces of 400,000 x g that the Golgi apparatus could be displaced into the centripetal end of the stratified cell. This was taken as critical evidence for the existence or reality of this cellular organelle during this early period of intense controversy. His many studies dealing with the Golgi apparatus over the years led to the publication (with R.G. Kessel) of a review article on the Golgi apparatus published in 1968 in the *International Review of Cytology*. This article was later identified as a "citation classic." Professor Beams also published a review article dealing with the development of centrifuges and their use in the study



of living cells (with R. Kessel) and was included in a commemorative Volume 100 of the *International Review of Cytology* (1987).

Professor Beams interacted with a number of other scientists while at the University of Iowa, including Robert L. King, Eleanor H. Slifer, Theodore (Ted) Jahn, L. Saxe, Everett Anderson, Sant S. Sekhon, and Richard Kessel.

Professor Beams authored or coauthored more than 150 scientific publications during his long and productive career. There are several particularly noteworthy and pioneering publications. In 1934, R.L. King and H.W. Beams published a study in which they used the Feulgen stain to demonstrate DNA in chromosomes of *Chironomus*. This study was one of the first to demonstrate DNA in chromosomes using this method. J.B. Gatenby and H.W. Beams published an extensive cytological study of spermatogenesis in humans in 1935 (*Quart. Jour. Micros. Sci.*, 78, 1-29). R.L. King and H.W. Beams published a classic experimental study on the phenomenon of chromosome diminution in *Ascaris* eggs in 1938 (*J. Exp. Zool.*, 77, 425-443). Gordon Marsh and H.W. Beams published an important and classic study in 1946 dealing with *in vitro* control of growing chick nerve fibers by applied electric currents (*J. Cell. Comp. Physiol.*, 27, 139-157).

In addition to his pioneering work with the air turbine ultracentrifuge in biological research, Professor Beams was a pioneer in

electron microscopy. He was among the initial cytologists to use the electron microscope in biological research. His first electron microscope studies were on cardiac muscle and published in the *Anatomical Record* in 1949. The muscle was fixed in 10% formalin, subjected to dissociation in a Waring blender, and the resulting myofibrils were placed on a grid coated with celloidin and stained with 1% phosphotungstic acid. An electron microscope study of the mitotic spindle of crayfish spermatocytes was published in 1950 in the *Proceedings of the Society for Experimental Biology and Medicine*. The crayfish testis was fixed in Bouin's fixative and embedded in a mixture of 60% paraffin (70°C melting point) and 40% beeswax. Sections were obtained with a Spencer #820 microtome equipped with a special thin section adapter. In the late 1940's, Professor Titus Evans of the Radiation Research Laboratory at Iowa was able to obtain funds from the Iowa Cancer Society for an RCA EMU-2B electron microscope which was used for several years. Professor Beams then obtained an NIH research grant for the purchase of an RCA EMU 3D electron microscope in the mid 1950's. Dr. Beams co-authored a paper (with T.N. Tahmisian and R. Devine) dealing with the fine structure of Malpighian tubules of the grasshopper which was published in 1955 in the initial issue of the *Journal of Biophysical and Biochemical Cytology*, the parent of the *Journal of Cell Biology*. In ensuing years, he published more than 80 scientific articles, dealing for the first time with the ultrastructure of many different cell types, both plant and animal. Dr. Beams was highly productive in research at a time when it was easy to probe the ultrastructure of interesting cells that might demonstrate or amplify important and basic biological phenomena and processes. His interest in cell biology was very broadly based and he was concerned with important biological processes regardless of the organism.

Dr. Beams formally retired from the University of Iowa in 1971, but continued with his research interests, writings and activities as Professor Emeritus. Dr. Beams was a longtime member of the Corporation of the Marne Biological Laboratory, Woods Hole, Massachusetts, and spent a number of summers as a research investigator there in the 1930's. He served together with Professor Gatenby as Associate Editor of the 11th Edition of Lee's *The Microtome's Vade-Mecum*. He was also a consultant to the Argonne National Laboratory. For many years he served as an Advisory Editor to the *International Review of Cytology*. He was a member of the Biological Stain Commission, a former member

of the National Institutes of Health Fellowship Review Panel (1962-1964) and is listed in Who's Who in America.

Dr. Beams was a longtime member of the Society of Protozoologists and served as Vice President in 1956-57. He was a member of the Royal Microscopical Society (London), the American Association of Anatomists and American Society of Zoologists for over 50 years. He was Treasurer of the American Society of Zoologists from 1941 to 1944. He was a charter member of the American Society for Cell Biology, the Electron Microscopy Society of America, and a long time member of the Iowa Academy of Science. Other society memberships include: American Microscopical Society, Society for Experimental Biology and Medicine, American Association for the Advancement of Science, American Society of Naturalists, International Society for Cell Biology, Society for the Study of Development and Growth, Sigma Xi, the American Association of University Professors, Gamma Alpha, and Phi Beta Pi.

In 1987, he was selected to receive the Distinguished Alumni Award from Wichita State University. In 1987, he was presented an award from the Iowa Microbeam Society for his extensive pioneering contributions to the field of electron microscopy. The Carver/Harold W. Beams Distinguished Professorship was established by the University of Iowa in 1989.

Dr. Beams is survived by his wife Mona of Iowa City, a daughter, Marilyn, and her husband Charles Holshouser and six grandchildren of North Carolina, and a son, Dr. David Beams, who is a Professor of English in the Borough of Manhattan Community College of the City University of New York.

Professor Beams had an unusually high regard and respect for all of his students, colleagues, friends and family. He was an outstanding scientist, teacher and individual. Harold had an insatiable curiosity about the structure of living things and how they worked. He had enormous energy, drive and insight that were with him to the end. He was a penetrating and enthusiastic observer. The interest, fascination, and emotion that he displayed for his research were deep and infectious. Research was an important part of his life. He truly enjoyed it. Professor Beams was a remarkable and outstanding individual also because of his compassion, love and qualities of forgiving, fairness and understanding. He will be greatly missed. — *Richard G. Kessel, Department of Biological Sciences, The University of Iowa, Iowa City, Iowa.*