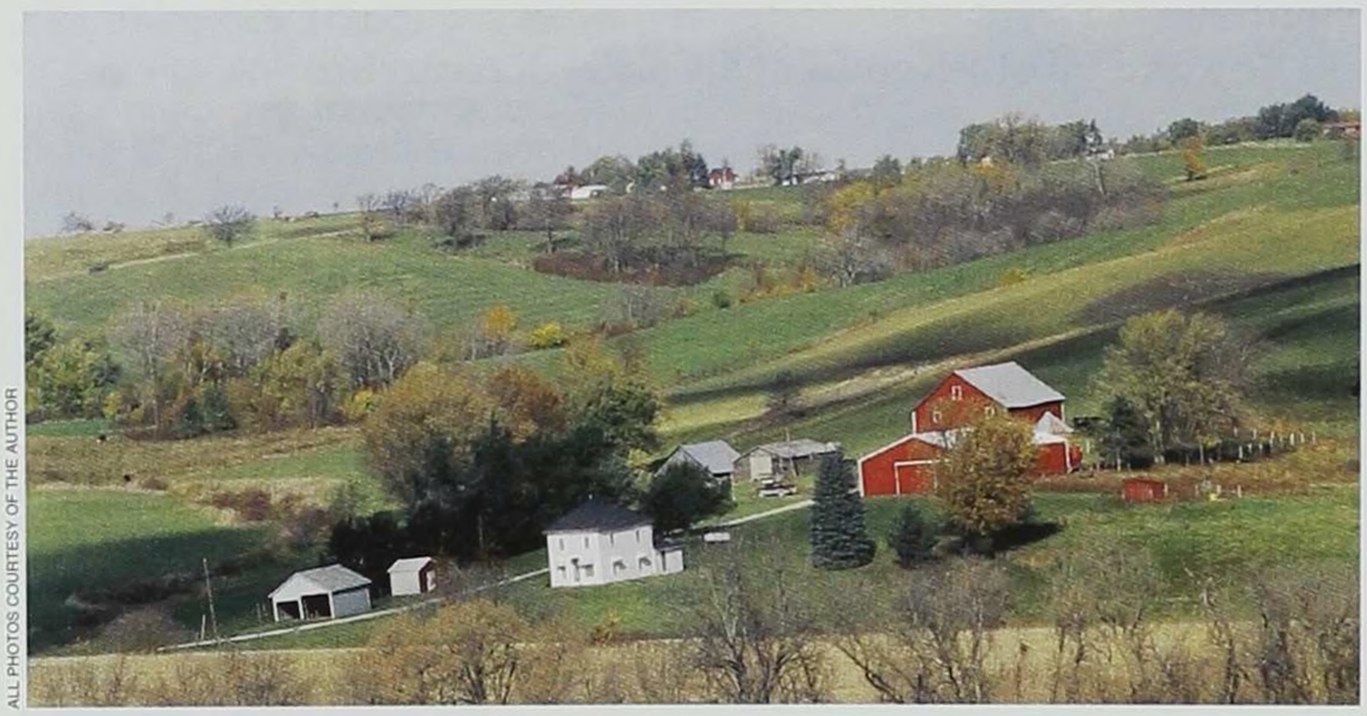
Walter Enoch Heston

Lucas County Farm Boy and World-Renowned Cancer Researcher



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by Mark Smith

My great-grandparents' farmhouse (*above*) now sits empty. It was in this house in Lucas County, near the Clarke County line and the little town of Woodburn, that my great-uncle, Walter Enoch Heston, was born on August 23, 1909. Sixty-six years later, on December 31, 1975, he retired as Chief of the Laboratory of Biology of the National Cancer Institute in Bethesda, Maryland. His contributions to the understanding of the onset, course, and interventions of cancerous diseases improved the lives of millions.

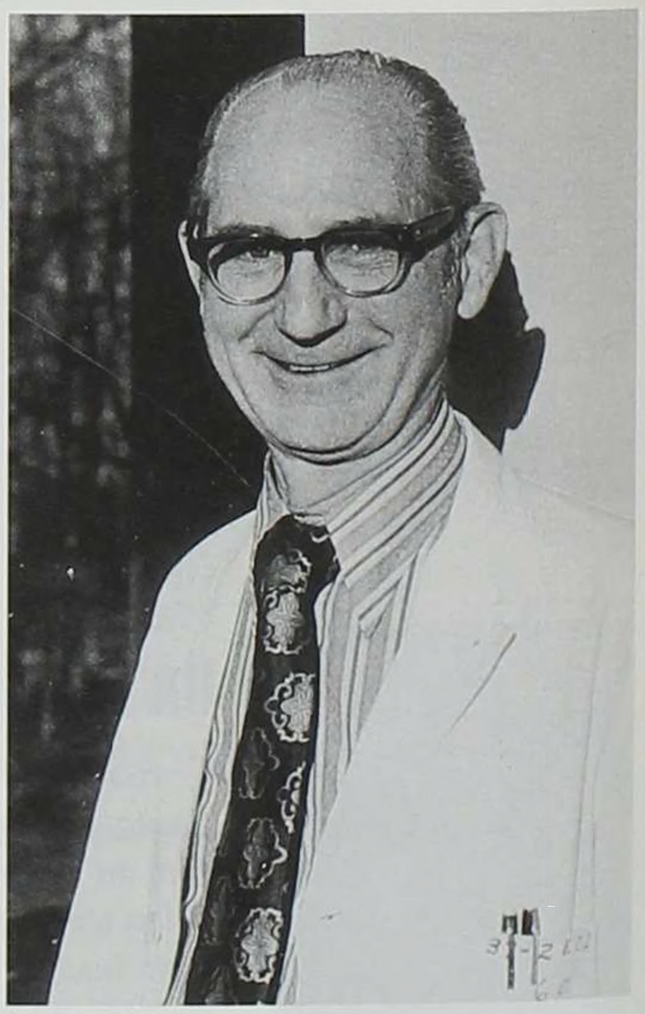
Although not the first geneticist to be part of cancer research, he was the mammalian geneticist who established a relationship between specific genes and the occurrences of certain cancers. His long-term work with colonies of inbred mice vastly improved our knowledge of the genetic factors in cancer. Somewhere along the way, he had time to take an interest in me.

Walter was the ninth of eleven children born to Rosanna and G. L. Heston. As a young man, G. L. had run away from home in Ohio because his father had ordered that his sons become physicians and his daughter, a nurse. G. L., who wanted to farm, rebelled. He settled in Iowa near extended family and set about marrying, raising a family, and farming. Ironically, G. L. ordered that each of his six sons become farmers and that his five daughters become farm women.

Walter was 15 when G. L. died. At the funeral, Walter's mother turned to him and said, "Now you will get the education you always wanted."

Early on, Walter Heston showed two innate qualities of a scientist—he was curious and observant. Once in his youth, he found a crow's nest and carefully removed the eggs, one by one, marveling at the anomalies of each. Then he diligently recorded how many times the bird returned to lay a replacement egg.

At age 16, a year after his father died, Heston was honored as the top student in Lucas County in 1925. He



Iowa scientist Walter Heston, in 1972.

obtained a teaching certificate but couldn't teach for two years because 18 was the minimum age. After working on his mother's farm for a year, he sought more education.

Because medical school was too expensive, he chose instead to study mathematics at Iowa State College. "Economics have driven many of the decisions of my life," he later said. To earn money, he taught in a rural school and lived on Iowa State's dairy farm, where he milked cows morning and night. He was often too tired to study; if he didn't take notes or take homework to class, he rationalized that "at least I could take my brains."

At Iowa State, Walter loved the lectures in embryology by Joseph E. Guthrie, who used modeling clay to illustrate the complexities of blood vessels. Another professor, W. V. Lambert, introduced Heston to genetics. Under Lambert's tutelage, he explored the phenomenon of webbed toes, a condition existing in Heston's family. In 1932 he published his first research, on the inheritance of webbed toes, and graduated with a degree in zoology.

His next stop was Michigan State College for graduate studies in genetics, supported by a teaching assistantship (again driven by economics). There he studied under Harrison R. Hunt, who had a reputation for training excellent medical researchers. He earned his master's degree in genetics in 1934 and in 1936 he was the first Ph.D. graduate in zoology from Michigan State.

Heston secured a position as professor of biology and head of the department at McMurry College in Abilene, Texas. Guthrie's modeling-clay illustrations at Iowa State soon became part of Heston's lectures at McMurry, and area science teachers flocked to his summer school in the Sacramento Mountains of New Mexico, where stepping a dozen

Walter Enoch Heston, circa 1912, sits on his father's lap (far left). One of eleven children raised on the Heston family farm, he became a leading cancer researcher.

yards in any direction practically placed you in a different ecosystem.

Heston was fortunate to find a job during the Great Depression; McMurry College was one of the hundreds of small, denominational colleges beset by the hard economic times. It was difficult to maintain optimism as unemployment rose, crops failed, and commodity prices plummeted. Fortunately, one of the national problems that was being addressed during the Depression was cancer.

Through the centuries, cancer had been one of the ultimate fears in life. A diagnosis meant the loss of hope. It meant that a silent and deadly killer had moved into your body and was quietly taking away the healthy functioning of an organ. When you noticed the lump or the lesion that would not heal, or felt a mysterious pain, it was usually too late. Treatments were painful, experimental, and often expensive and far from home. In most instances, you faced a slow, agonizing death. Mostly, you hoped and prayed that this disease would pass you by or, if it didn't, that you would die quickly. You hoped your spouse would remarry or that relatives could raise your children. After receiving a cancer diagnosis, many an Iowa farmer went hunting and was found dead from a gun accident, and many cancerous Iowa women accidentally had the gas on when they cleaned the oven.

It was in this context that the United States Congress passed an act establishing the National Cancer Institute on August 5, 1937. For the first time in American history, there was going to be a government-sponsored, coordinated, and systematic approach to cancer research and treatment. One of the six scientists appointed by the U.S. Surgeon General to lead the nation's research

on cancer was Clarence C. Little.

"C. C. Little was the biggest man I ever knew," Heston recalled. Harvard-trained, Little had co-founded the American Birth Control League, served as president of two universities, was the managing director of the Women's Field Army (later reorganized as the American Cancer Society), and built up the Roscoe B. Jackson Memorial Laboratory in Bar Harbor, Maine. The laboratory would receive one of the first grants from the National Cancer Institute and would become a leading supplier of inbred mice for research. Little believed in a genetic link to cancer, and through Harrison Hunt at Michigan State, he learned of a well-trained genetics researcher teaching biology in Texas—Walter Heston. Heston was selected as a research fellow.

Because there was not yet a home for the National Cancer Institute, research fellows were "farmed out" to various U.S. laboratories. Heston and his wife, Vivian, left Texas for Maine to work at the Jackson Laboratory, which Little directed. The Hestons' three sons, David, Donald, and Thomas, were born while they lived in Maine.

At the Jackson Laboratory, Heston and other scientists hypothesized about the relationship between genetics and cancer. "There I received a good foundation in cancer research and, above all, I was well indoctrinated in the value of inbred strains of experimental animals, particularly mice, in medical research and especially in cancer research," Heston explained years later. By forcing inbreeding, scientists were able to increase or decrease the occurrences of certain forms of cancer and other diseases. At the laboratory, Heston established a breeding colony of mice that was later transferred to the National Cancer Institute in Bethesda, Maryland. Throughout the years, various researchers requested Heston's mice. Descendants of these mice are the basis for much of the medical research in Japan; another group was exposed to atom bomb tests in the South Pacific.

When the doors of the National Cancer Institute opened in 1940, Heston was selected to be the mammalian geneticist. Given tremendous latitude, he set about researching, presenting seminars, training assistants, and publishing articles about cancer causation. Another Iowan, Bernie Bowen from Marshalltown, worked alongside Heston, drawing tumors and tissues to illustrate his articles. (She later married Heston's friend and fellow researcher, Lloyd Law, whose research on the flex-tail gene unraveled many of the mysteries of leukemia.) After years of drawing cancerous tumors for publications, including breast cancer tumors, Bowen died of complications of breast cancer.

The importance of Heston's work with mice lay in his organization and maintenance of the colony that was the basis for much of the genetic work at the National Cancer Institute. "Since I was the one on the staff . . . who specifically had received his degree in mammalian genetics," he explained, "I assumed a special responsibility for maintaining my colonies of inbred mice and fostering the use of inbred strains in the research of the institute." He once commented, "My wife was later to find out that my mice had become more widely known than I was."

Heston's mice were identified as "HE3." To this day, whenever I mention HE3 mice to researchers, they respond knowingly, "Yes, of course."

The origins of these mice were very rare brown mice from Tibet. After China fell to Communism in 1949, they were hard to obtain. They were sought after because they were so genetically similar to humans and thus perfect for research.

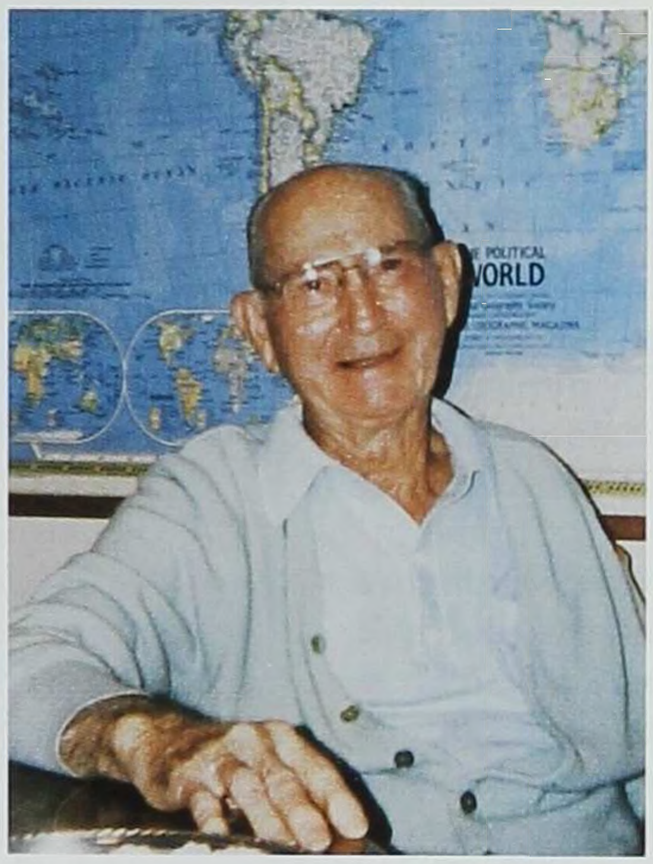
During World War II, genetic research ended, and the focus shifted to the effects of continuous, long-term exposure to low-dosage gamma irradiation. "Instead of being placed in the Armed Forces," Heston recounted, "I was instructed to remain at NCI and to work along with Drs. Lorenz, Deringer, and Eschenbrenner on the Manhattan Project." A well was dug in the basement of Building Six at the institute. Radium was lowered into the well and raised to the sub-basement at the end of every workday. A colony of mice was subjected to the radiation. Heston and his colleagues were not informed as to why this research was being carried out. They assumed it related to the building of atomic-powered ships and what effects low-level emissions might have on the crew.

Toward the end, it became clearer that the United States was making an atomic bomb. After the war, the radium was removed, the well filled in, and cancer research resumed. Heston predicted that among women who survived the atomic explosions in Japan, there would be high levels of ovarian cancer late in life.

In 1965, word traveled throughout our family that Great-Uncle Walter had been awarded Italy's University of Perugia Alessandro Pascoli Prize for his genetic research on lung tumors in laboratory mice and that he had given the opening lecture at the university's international conference. The next year, instead of lecturing in Italy, he traveled to Iowa to join us at the Heston family reunion. His attendance that

summer of 1966 meant that many of us would be meeting him for the first time. Starting with Aunt Elsie Heston Thrasher, the elders introduced their children and grandchildren to our famous relative. With my grandmother, I waited my turn. But it was not until two years later at the 1968 reunion when he and I shared a moment alone. We chatted—or at least I stumbled through a conversation with him. Later, in a letter to my grandmother, he wrote that my brother Lyle and I were nice youngsters and he invited us to Washington, D.C.

Lyle was working and could not go, but I could and did. I had never been east of the Mississippi River and marveled at the sights as my great-uncle and I drove eastward, stopping at Gettysburg en route. Every day in Washington I walked to the various monuments and museums, and I sat in the galleries through debates in Congress. It was a special honor to tour the National Cancer Institute, one of the world's most prestigious laboratories, and to spend days watching my great-uncle dissect tumors from mice. There he taught me the tenets of research and modeled the persistence of a scientist studying a disease that was not giving up its secrets easily.



Mammalian geneticist Walter Heston in 1995, years after his retirement from the National Cancer Institute.

Heston retired at the end of 1975 after a 37-year career. He and his second wife, Blanche, moved to Florida. Now he dabbled in another kind of science. He raised mangoes and citrus fruit in his backyard and toured Thomas Edison's rare plant garden in Fort Myers and the J. N. "Ding" Darling National Wildlife Refuge on Sanibel Island. My daughter still has fond memories of visiting her great-great-uncle and their mutual love of egrets and other birds.

Our trips to Florida eventually ended. He died in January 1998 at age 88. He had selected "This Is My Father's World" to be sung at his memorial because that hymn had guided him through his years of research.

Already in the late 1960s I had recognized that Walter Heston was a great man—the type of person who was great whether he was a factory laborer or a research scientist. From his country-school days to his doctoral work at Michigan State, he gained an immense respect for educators: "They're the most important people in the world. Any nation that is going to advance must have excellent teachers." He taught me humility, and he was frugal and doggedly persistent.

But it is only in reading about and pasting together his life's work that I became aware of his contributions in charting a new course for cancer research—though he did not think in terms of "breakthroughs," explaining that even Mendel's work on genetics was not understood until after his death. Asked about his philosophy of science, he answered, "I don't have one, except a simple desire to do something for mankind. When you work in cancer, you are doing something for mankind."

At a time when the average citizen had little hope of surviving cancer, when the study of genetics was still "on the crest of cancer research," Iowan Walter Heston had the scientist's ability to look cancer in the eye and not flinch. ❖

Mark Smith lives in Marshalltown, Iowa, and is serving his third term in the Iowa House of Representatives, representing Marshalltown, Green Mountain, Liscomb, Albion, and the surrounding rural areas. The great-nephew of cancer researcher Walter Heston, Smith is a survivor of prostate cancer.

NOTE ON SOURCES

Walter Heston's "Biography as Related to Inbred Strains of Experimental Animals," undated and apparently unpublished, was written by him during his retirement years in Fort Myers, Florida, and includes a wealth of information about his career. The biography is in the author's private collection. Other useful sources include Elizabeth Erickson et al., *Celebrating 75 Years of the Roscoe B. Jackson Laboratory 1929–2004* (Jackson Laboratory, 2004); Walter E. Heston (Chief, Laboratory of Biology, National Cancer Institute, National Institutes of Health, Bethesda, Maryland), interview by Wyndam Miles, May 26, 1964 (tapes and transcripts available at the National Library of Medicine, National Institutes of Health); Walter E. Heston, interview and videotape by Mark Smith, circa 1991 (author's private collection); author's correspondence, Oct. 26, 2004, with Michigan State Library regarding Harrison R. Hunt and Walter E. Heston; and Walter E. Heston, "Inheritance of 'webbed toes,'" *Journal of Heredity*, 23 (1932). The author's cousin Georgia Rae Johnson has maintained Walter Heston's birthplace in Lucas County.