

Baltimore Longitudinal Study of Aging

The Founders

Nathan W. Shock, Ph.D.

Arthur H. Norris, B.S.

William W. Peter, M.D.

Every two years, over 1,100 men and women, ranging in age from their 20s to their 90s, return to the Baltimore Longitudinal Study of Aging (BLSA) to participate in more than 100 physiological assessments intended to yield a scientific understanding of the processes of human aging.

Deemed the most comprehensive longitudinal study of aging in the world, its scientific legacy reaches beyond numerous publications and the training of many researchers and physicians, to an ever increasing public audience.

Any adequate description of the Study must include biographies of the three remarkable men who brought it into existence. These three — Nathan W. Shock, Arthur H. Norris, and William W. Peter — brought to the Study unusual vision, persistence, and commitment to scientific excellence which their successors, Jordan D. Tobin, M.D., and James L. Fozard, Ph.D., seek to continue.

Nathan W. Shock, Ph.D.

Nathan Wetherell Shock, Ph.D., founder of the Baltimore Longitudinal Study of Aging, began his gerontology career in 1941 as the chief of the newly formed Unit on Gerontology of the Division of Physiology of the five-year-old National Institute of Health. His instructions from NIH:

“Go to Baltimore City Hospitals and work with them to initiate a research program to learn about the basic biological mechanisms of aging.”

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Anyone interested in more information about the BLSA should write to the Baltimore Longitudinal Study of Aging, National Institute on Aging, Gerontology Research Center, 5600 Nathan Shock Drive, Baltimore, MD 21224-6825; or call 410-558-8139 or 1-800-225-BLSA; Email blsa@grc.nia.nih.gov.



Over the next 48 years, the National Institute on Aging evolved, first, as part of the NIH Division of Physiology, which became part of the National Heart Institute and thence the National Institute of Child Health and Human Development. Dr. Shock’s work as head of the Gerontology Branch

(now the Gerontology Research Center, or GRC) established the science of gerontology in America as a rigorous scientific discipline. At the time of his death in 1989, he was recognized as the dean of American gerontologists, and the father of American gerontology. Throughout his career, he was a tireless advocate for fundamental aging research.

A man of prodigious diverse capabilities, Dr. Shock was born on Christmas Day in 1906, the son of a professor of mathematics at Purdue University in Lafayette, Indiana. He obtained both a bachelor's degree in chemical engineering and a master's degree in organic chemistry from Purdue in 1928. Then, at the University of Chicago, combining psychology and physiology, his 1930 doctoral thesis research established much of what is understood about acid-base balance and carbon dioxide in the blood. In 1932, Shock moved to the Institute of Child Welfare in Berkeley, California, where he spent nearly a decade studying physiological change in adolescence.

In 1914 a Dr. Nasher had published a text on "geriatrics" — a term he coined — mostly a non-scientific description of diseases of old age. Then in 1936, the National Institute of Health was established. In 1940, in an interesting reversal of the usual process, the Josiah Macy Jr. Foundation made a one-year grant of \$10,000 to the NIH to establish a study of aging, at that time considered a somewhat drastic idea.

The search then began for a concentrated population of elderly near an academic center, a clinical medicine site with a sizable long-term care facility and a teaching hospital, of which there were very few. However, the Baltimore City Hospitals, affiliated with both the University of Maryland and Johns Hopkins University, stood adjacent to a residential farm for the elderly. These were old people who for a variety of reasons — infirmity, homelessness, economic necessity, or distance from family — tended this

farm and made it their home. An operative farm with a working dairy, this facility's pasteurization plant processed milk all the way through World War II.

The site secured, Dr. Thomas M. Parren, then Surgeon General, called upon Baird Hastings, a nationally influential physiologist and one of the sponsors of Shock's doctoral research, to suggest someone who could initiate such a study. Hastings recommended Nathan W. Shock, whom as a student had impressed him with his exceptional rigor in scientific methodology, extraordinary range of interests, and penetrating grasp of disciplines as diverse as design engineering, chemical biology, and developmental psychology.

Nathan Shock came from adolescent developmental psychology at Berkeley to gerontology in Baltimore in 1941 — whereupon Pearl Harbor shut down the study almost immediately.

Committed early to the study of aging, W. Henry Sebrell, Chief of the NIH Division of Physiology, was another scientist with many intertwining interests whose work "elicited numerous key findings of worldwide significance." A career nutritionist, he helped set up the first international standards of nutrition for the League of Nations in the early 1930s, and was the first scientist to recognize and describe the dietary disease *ariboflavinosis*. For the duration of World War II, he charged Shock with conducting nutritional studies in rats in an effort to develop vitamin therapy for shell shock victims.

At war's end, Shock turned at last to aging. He set up a small lab and wrote a broad cross-sectional study design, one that along with many physiological components, incorporated a strong set of psychological and/or behavioral measures.

He also recruited a fellow Hoosier, Arthur Norris, who had similarly far-ranging expertise

and strong commitment to strict science, without a doctoral degree, to implement his ideas. Human experimental subjects came from whatever populations were at hand — the elderly in residence on the farm, of course, supplemented by the staff and student populations available through the Hopkins and University of Maryland connections. This was, of course, before the days of consent forms, releases of information, and the many other protection measures that have since proliferated in human research.

Together with an extremely small staff they set up in basement offices at the Baltimore City Hospitals and ran a program that included numerous physiological and psychological tests.

As the investigation grew, its range of activities came to amount to more work than the support staff could provide.

Gradually, however, other scientists were enjoined in the study who could satisfy Shock's insistence on answering what he considered the discipline's two critical questions: "What are the underlying biological factors that produce what we perceive as aging?" and, "What are the mechanisms that produce impaired performance with age?" For aging, he insisted, was *not* a disease.

In 1958, Dr. William W. Peter, an officer of the U.S. Public Health Service since 1918 and a missionary doctor, had retired to Scientists' Cliffs, Maryland, a settlement built on the fossil-laden Cliffs of Calvert where many scientists had retirement residences. He had decided to bequeath his body to science. An inquiry to NIH yielded the suggestion that he consult Dr. Shock.

By this time, however, Dr. Shock had become convinced of the need to study community-dwelling people over a number of years of aging — that is, longitudinally — rather than studying individual's bodies after their deaths. Dr. Peter found the idea intriguing.

Together, the two men planned an ambitious longitudinal study of aging, one that would "observe and document the physical, mental, and emotional effects of the aging process in healthy, active people."

Armed with the conviction that "People like ourselves, ...living independent lives in the community, should volunteer as subjects for the study of aging, ..." Dr. Peter organized a verbal "chain letter" campaign among the nucleus of early volunteers, asking each recruit to round up other recruits from among family, friends, and neighbors.

Thus, the Baltimore Longitudinal Study of Aging came into existence. Considered the most comprehensive study of aging in human subjects ever attempted, it was a total volunteer effort. Although he insisted on being the Study's first subject, ironically, Dr. Peter died within a year of its initiation.

However, by 1965, more than 650 participants had volunteered. By its 30th anniversary, in 1988, more than a thousand volunteers had contributed the data of their individual patterns to the emerging body of findings about human aging.

In 1968, the BLSA and its many attendant studies took up residence in new quarters, re-named The Nathan W. Shock Laboratories in 1989.

Officially retiring in 1977, Dr. Shock continued his work as Scientist Emeritus until his death in 1989. President of Division 20 of the American Psychological Association in 1952-53, his influence and recognition went well beyond psychology. A recipient of awards from every major national society on aging, he was a founder (with Kornchevsky) and president of the International Association of Gerontological Society of America.

In the words of NIA psychologist Paul T. Costa, Jr., Ph.D., throughout his career Dr. Shock “reconfirmed...the importance of the fundamental notion that exploration, observation, and description are the ultimate bases of all science...”

Arthur H. Norris

Arthur Norris began his career at the GRC as a biologist in 1947. When he died in 1980, he was Chief of the Human Performance Section of the National Institute on Aging. Within that period, he had served as coordinator of the Baltimore Longitudinal Study of Aging for over 22 years.

Born in Indianapolis, Indiana, in 1925, Mr. Norris earned a bachelor’s degree in biology from Westminster College, Fulton, Missouri; he later earned a master’s in personnel management from George Washington University, Washington, D.C. In 1943, he joined the Naval Reserves and served in the Navy during World War II. In 1946, he began working with Baltimore City Hospitals and was commissioned a Public Health Service officer in 1952, from which he retired in 1971.

Dr. Nathan Shock characterized him as “...a steady right hand and a great pillar of strength. He provided enthusiasm for the study of aging...” Dr. Shock and Mr. Norris enjoyed a truly complementary working relationship. While both possessed a wide array of talents and interests, Arthur Norris possessed unusual ability to implement Dr. Shock’s research designs with the rigorous methodology required.

Investigator, administrator, and mentor, he conducted original research mainly in exercise physiology and body composition changes. Mr. Norris also served as the Study’s chief diplomat among staff, researchers, and subjects. Honest and modest, “He was an unsung hero to the longitudinal subjects, buying them daily newspapers, lunches, and ...tickets to GRC holiday

parties,” one staff member recalls. As one subject put it, “He made me feel not like a guinea pig, but like a human being who is part of a great scientific enterprise.”

Dr. Jordan Tobin, Chief of the Applied Physiology Section and a longtime colleague, remembers his great patience in teaching. “We learned something very important from Art: patience.” Similarly, according to Dr. Shock: “[He] was always willing to train young physicians who had little or no research experience. His willingness to help others was one of his most outstanding traits.” Along with all his duties, he managed to write numerous articles on many aspects of physiology and related subjects.

A member of the American Association for the Advancement of Science and New York Academy of Sciences and fellow of the Gerontological Society of America, Mr. Norris received a National Institutes of Health Merit Award in 1978. The BLSA’s growth and great success in its first 23 years accounts largely to his leadership. The director’s conference room on the GRC first floor is named in his honor.



Arthur H. Norris

William W. Peter, M.D.

In February of 1958 W.W. Peter, M.D., a retired medical missionary, placed a phone call to Dr. Nathan Shock to find out how he could arrange to donate his cadaver for scientific study. Dr. Shock replied, "Let's have it while you're still alive!" The two men met, and the Baltimore Longitudinal Study of Aging was born. It flourished from the start because of the recruiting efforts of the extraordinary Dr. Peter.

A man of enormous personality, color, and verve, William Wesley Peter was born in 1882, the oldest child of a carpenter, in a community of German immigrants in Elliston, Ohio. Hard working and resourceful, the community retained the ethic and language of its origins. Driven by an irrepressible urge to excel, young William Wesley grew up inventing and building mechanical objects, carpentering, cultivating an ambidextrous manual facility that eventually became expertise in surgery.

As a young man in Ohio, he knew the Wright Brothers. In fact, hearing of his intended voyage to Europe as a steer-wrestler on a ship transporting cattle, they built him a bicycle, which he took along and used to good advantage.

In 1910, he graduated from Rush Medical School, Chicago, Illinois. There, at a meeting of the Student Volunteer Movement, he had encountered Eleanor Whipple, a young woman with remarkable determination, talent, and zest for life, who had worked her way through medical school as a nurse-tutor to an invalid teenage. Moreover, at the age of nine, she had decided that someday she would go to China. After meeting her, William Wesley broke off engagement to someone who had refused to go to China, and married Eleanor in 1911. He was the charismatic character; she, the quiet, effective administrator who kept the household functioning at a high level through all their subsequent extensive travels.



William W. Peter, M.D.

Not long thereafter, the *Evangelische Gesellschaft* (Lutheran Church) commissioned Dr. Peter, as a surgeon, to run a hospital in central China. On the way there, they were detained in Japan for several months because of the Chinese Revolution of 1911, one of the more serious such upheavals. When they arrived, they found that hospitals needed to be established, but that all plans had been disrupted.

Thereafter, Dr. Peter's work in China included much after-battle surgery to try to save soldiers wounded in the many conflicts between powerful warlords. However, he also observed the primitive conditions and ignorance of ordinary sanitation that prevailed in most of the country, abetted by the "flood, famine, and pestilence" cycle of uncontrolled natural phenomena. Concluding that rather than "picking up the pieces at the bottom of the cliff, we need to put a fence across the edge," his primary interest turned from surgery to public health.

During these times, Eleanor ran the household and took care of their three children, Jane, born in Kuling; Hollis, in Nanking; and Margaret, in Shanghai. In a typical arrangement in Shanghai,

theirs was one of seven missionary families who lived in one compound. All food and water had to be sterilized, for most was contaminated. Even with the several customary servants, keeping a family healthy was an executive challenge. The household usually also included an assortment of guests staying for an evening, a few days, or many months — missionaries docking in or departing from Shanghai, children of friends who needed special care, Chinese associates, deaf girls learning lip reading — almost anyone Eleanor could help.

A furlough to the United States in 1917, a month-long voyage by ship, brought the sights of whale spoutings, and more ominously, of German submarine periscopes. In response, the ship had to observe blackout conditions, for two thousand Chinese coolies bound for France to dig trenches for the American soldiers occupied the hold. In 1918, as a Chinese-speaking Y.M.C.A. Secretary, Dr. Peter — even though a conscientious objector — served with that battalion in France for a year.

In 1917 the family went to live in Boston where Dr. Peter earned in one year a degree from both Harvard and MIT in the new field of public health. After Dr. Peter's service in France in 1918, the family returned to Shanghai, where they lived until 1926. With the help of several missions, the YMCA and many Chinese leaders, including Madame Chiang Kaishek, he ran the Council on Health Education and traveled extensively, lecturing in Chinese on preventive medicine, prenatal care, and smallpox and cholera control.

During this period, he trained many Chinese doctors in Western medicine, and encouraged them to develop ways to solve their country's health problems. With the International Red Cross, he also assisted in famine, earthquake, and flood relief in many parts of Asia.

In 1926, he and his family came home on furlough, unaware that the internal changes about to occur in China meant that only Dr. Peter himself would ever return. After earning another degree in public health from Yale under Ira Hiscock, he took a post with the Cleanliness Institute in New York City. He and Eleanor located the family in White Plains, to take advantage of the education available there for the children.

After the Crash in 1929, at the invitation of the Chinese government, he returned for nine months to China, living as a Chinese, lending influence and practical ideas for public health endeavors there. Later, when he lived in Washington, he tried to have indemnity money owed to China channeled into preventive flood control, rather than to other ends. In 1933-34, he spent a year in Germany with the Oberlander Trust Fund studying public health facilities.

He returned from Europe to begin work as Medical Director of the Navaho Indian Reservation, supervising 11 hospitals, outpatient programs, and preventive education in a huge territory in the Four Corners area, where Arizona, New Mexico, Colorado, and Utah meet. As soon as the housing and administrative colony built by the Bureau of Indian Affairs was ready, he and Eleanor moved from Albuquerque to Window Rock, Arizona, a towering stone mass with a large round opening which Navahos regard as the center of the world.

Because roads were often impassable in the desert, he became the oldest pilot to obtain a license, and made his rounds in a Piper Cub, carrying all manner of supplies along with him. Dr. Peter particularly liked the Navaho people, especially their sense of humor, and felt that they were much like the Chinese, of whom he was very fond.

During World War II, between 1944 and 1946, he filled in for Dr. Ira Hiscock at Yale while Dr. Hiscock served in the armed forces abroad. Arriving to assume his post with his pistol strapped on, he initially terrified the secretaries.

After eight years as a health administrator, he and his wife moved to Washington, D.C., where he took a position with the State Department. Traveling in South America, he conducted the programs by which South American doctors and sanitary engineers came to American medical institutions for further training. It was during this period in Washington, through his activities in the American Public Health Association and his interests in research, that he came to know Nathan Shock.

In 1950, he and his wife built a log cabin at Scientists' Cliffs, the cliffs along the southwestern Maryland shore of the Chesapeake Bay, long of interest to paleontologists for their rich deposits of fossils, where numerous scientists from many disciplines had already established a private community. They then helped their eldest daughter, Jane Peter Coffin, and her family build a similar cabin nearby, where she and her husband live today. For eight years, they enjoyed their hobbies, particularly his penchants for carpentry and invention.

In 1958, he made his historic phone call to Dr. Shock, and after a round of discussions, began a typically energetic, enthusiastic recruiting campaign. "I'm going to do this, and so is my family — and you should, too!" he exhorted his neighbors and friends — to the effect that eighty of them did. He, however, was the first, and may well have been the proudest.

Within a year of this ambitious start, he was found to have "the biggest aneurysm in captivity — bigger than a grapefruit!" for which he underwent surgery successfully. However, he died the

next day in recovery. Outstanding for his physical drive, commitment to excellence, and stellar talents. Dr. Peter had made many contributions to the success of public health world wide, the most lasting of which may be the Baltimore Longitudinal Study of Aging. By the time of his death, the Study had ninety-five participants, all male.

Eleanor Whipple Peter, M.D., waited twenty years to become one of the first women subjects. At the age of ninety-five, in a wheel chair, become one she did. This strong, quiet, much beloved woman, the active helpmate to her husband's exciting, spectacular life, lived to the age of 97. Seventeen of their family members have participated in the program.