In the first half of the 20th century, Roanoke College nurtured and trained three individuals who went on to exceedingly distinguished science careers: Dr. Vernon Mountcastle ’38, Dr. Carl Gottschalk ’42, and Dr. Theophilus Painter ’1908.

“Drs. Mountcastle, Gottschalk, and Painter are exemplars in taking what Roanoke offered and using it to change the world through science,” Roanoke College President Michael Maxey said. “Each is a giant in his field.”

Dr. David Gring, Roanoke College president emeritus, said as a biologist, he had come to know all three of these pillars of science through scientific literature. They “serve as a daily reminder that science programs at Roanoke College stand on the shoulders of giants, inspiring current and future generations of students,” Gring said.

**Vernon Benjamin Mountcastle**

Vernon Mountcastle entered Roanoke College in 1935, earning a baccalaureate degree in chemistry in three years. He entered Johns Hopkins Medical School in 1938, with intentions of eventually specializing in neurosurgery. Mountcastle held to this plan tenaciously even beyond his military service during World War II. He had not considered medical research as a vocation.

During World War II, Mountcastle served as physician-in-charge of an orthopedic ward at a field hospital in the Atlas Mountains. He later served aboard several landing ship tanks (LSTs), including one that was part of the immense Allied armada anchored just off the Normandy coast the night of June 5, 1944.

Upon returning from the war, Mountcastle went to Duke University to seek a training appointment in neurosurgery. He was at the end of a long line of applicants, most of whom had just returned from the service. It was agreed that he would go back to Johns Hopkins for a one-year neuroscience research fellowship and begin his surgery residency at Duke the following year. But, fortunately for the field of neuroscience, he would never return to Duke and would stay at Hopkins for the rest of his celebrated career.

In the post-war era, the field of neuroscience held much promise. Researchers were beginning to probe the brain in ways...
never before imagined. Mountcastle wanted to know how the human brain worked, and he used monkeys as models to investigate the brain’s function. He was primarily interested in a region of the cerebral cortex (the part of the brain where all of the high-level neural processing occurs) called the somatosensory cortex, which receives and processes information sent from nerve cells that sense mechanical stimuli such as touch and pressure.

Mountcastle was among the pioneers in recording activity from single brain cells while stimulating sensory receptors in the skin and other body regions, using glass microelectrodes the size of human hairs. He was also interested in how single brain cells responded to joint movement, helping us understand how we process and control limb movement. He refined these experiments using what he called the “walking” monkey preparation — probing sensory processing in the cerebral cortex of manually-anesthetized animals, allowing him to peer inside an “awake,” human-like brain as it worked. Mountcastle is most famous for his discovery that the nerve cells in the cerebral cortex are arranged in vertical columns, and that this arrangement directly relates to their collective function in processing sensory information.

Published in a classic 1957 paper, this discovery is acclaimed as being foundational in the field of neuroscience. Indeed, all work on the brain that followed was based on this information. Mountcastle’s influence in the neuroscience field was pervasive. A prolific author, he wrote several books, sat on editorial boards of the most prestigious journals, and served as a reviewer for research grant proposals submitted to the National Institutes of Health. A founding member of the Society of Neuroscience, Mountcastle chaired the Department of Neuroscience at Hopkins for many years, and was central to the establishment of Hopkins’s Mind/Brain Institute.

Mountcastle is among the most decorated scientists of our time. The only major award he has not received is the Nobel Prize. He was elected to membership in numerous societies, including the U.S. National Academy of Sciences and was elected a Foreign Associate of England’s Royal Society. Notably, he shared the Lasker Award — considered by many to be the American “Nobel Prize” — with two scientists who went on to win the Nobel. He was awarded the National Medal of Science in 1986, an honor he said he cherishes most. He holds several honorary degrees, including one awarded by Roanoke College in 1968.

CARL WILLIAM GOTTSCHALK
Carl Gottschalk enrolled at Roanoke College in 1938 and graduated with a baccalaureate degree in biology in 1942. A man of diverse interests, he was considered an expert on butterflies. His first scientific publication, produced while he was still an undergraduate student, included a description of a new butterfly species he discovered locally that bears his name: Styrmia cottii, gottschalki. He returned to Roanoke College in 1948 for a research fellowship in the Harvard University laboratory of Dr. Eugene Landis, for students who have graduated from a public high school in Roanoke, Salem and Roanoke County, and who meet the requirements for admission to the College’s Honors Program. The Mountcastles’ intent, according to the scholarship description, “is to support the most talented young people who attend Roanoke College.”

CARL WILLIAM GOTTSCHALK
Carl Gottschalk entered the University of Virginia in 1942 and received his M.D. in 1945. Following graduation, he spent a year doing a medical internship at Massachusetts General Hospital in Boston, followed by two years of service as a research scientist in the Army Medical Corps.

In 1949 he returned to Boston and his wife established a scholarship in memory of their son, George Earl Putnam Mountcastle, for students who have graduated from a public high school in Roanoke, Salem and Roanoke County, and who meet the requirements for admission to the College’s Honors Program. The Mountcastles’ intent, according to the scholarship description, “is to support the most talented young people who attend Roanoke College.”

MOUNTCASTLE IS AMONG THE MOST DECORATED SCIENTISTS OF OUR TIME. THE ONLY MAJOR AWARD HE HAS NOT RECEIVED IS THE NOBEL PRIZE.
A major player in the cardiovascular physiology field, Gottschalk’s experiences there, would set the course for the rest of his professional life.

Gottschalk moved to Chapel Hill in 1952 and established a research laboratory at the University of North Carolina School of Medicine, having decided to do full-time renal physiology research. A human kidney contains about 1 million individual blood filtering units called nephrons. Understanding how the kidney worked required understanding how nephrons worked, and their small size made them very difficult to approach experimentally.

Influenced by his time in Boston, Gottschalk believed that a method known as micropuncture technique — in which the tips of human hair-sized glass tubes are inserted into tiny spaces to sample fluids and measure pressures — could be used to determine how a nephron, and by extension, the kidney, worked. Gottschalk perfected the application of the micropuncture technique to the study of kidney function.

Gottschalk became more publicly prominent when, in 1966, he was asked to chair the Special Committee on Kidney Disease, formed by the U.S. Bureau of the Budget. The committee’s recommendations led to the passage of law that funded renal research.

That material, DNA, is typically found in discrete units called chromosomes. Little was known about either the structure of these DNA units or how they worked.

Returning to the United States from Europe in 1914, he was an instructor at Yale for two years, and taught summer courses at the Woods Hole Marine Biological Laboratory before moving in 1916 to the University of Texas at Austin, where he spent the rest of his career, interrupted only by military service during World War I.

Painter focused his attention on a special set of chromosomes in salivary gland cells of the common fruit fly, which are larger and more visible than chromosomes in other cells. Using clever staining procedures, he was able to provide direct visual evidence that the chromosomes consisted of a series of distinct units, called genes.

Dr. Theophilus Painter, who is known for his work in identifying genes in fruit flies.

Painter was the son of a Presbyterian minister and was named Théophile, a French name meaning “pionner,” or pioneer. Gottschalk believed a method known as micropuncture technique — in which the tips of human hair-sized glass tubes are inserted into tiny spaces to sample fluids and measure pressures — could be used to determine how a nephron, and by extension, the kidney, worked. Gottschalk perfected the application of the micropuncture technique to the study of kidney function.

From Roanoke in 1908 and went to Yale University, where he received his Ph.D. in 1913.

Painter next went to Germany’s Würzburg University and the laboratory of Theodor Boveri, one of the pre-eminent cell biologists at that time. There, Painter cultivated an already active interest in the material found in cells that appeared to drive all cellular function. That material, DNA, is typically found in discrete units called chromosomes. Little was known about either the structure of these DNA units or how they worked.

Returning to the United States from Europe in 1914, he was an instructor at Yale for two years, and taught summer courses at the Woods Hole Marine Biological Laboratory before moving in 1916 to the University of Texas at Austin, where he spent the rest of his career, interrupted only by military service during World War I.

Painter focused his attention on a special set of chromosomes in salivary gland cells of the common fruit fly, which are larger and more visible than chromosomes in other cells. Using clever staining procedures, he was able to provide direct visual evidence that the chromosomes consisted of a series of distinct units, called genes.

Painter did the earliest work on mapping these chromosomes, summarizing this research in a series of classic papers in the 1920s and 1930s. For this critical work, Painter was elected to the National Academy of Sciences and was awarded that group’s Gairsain Elliot Medal for outstanding contribution to science in 1934. In 1942, he was awarded an honorary doctorate by Roanoke College.

As a practicing geneticist, early in my career, I knew and taught Painter’s work as a constant in every genetics course,” said Dr. David Gring, Roanoke College professor emeritus. Painter’s faculty career was interrupted in 1944 when he was appointed president of the University of Texas. Asked to fill a role because of his earlier and strong academic reputation at the university, Painter was permanently appointed to the position in 1946. The war and post-war periods were difficult for all academic institutions and mandate led to the passage of law that allowed dialysis treatment to be covered by Medicare and Medicaid, making this life-saving therapy available to the public.

The landmark case was a harbinger of civil rights legal events to come. Brown v. Board of Education followed soon thereafter.

Painter is said to have served as an effective mediator during a difficult time in UT’s history. He resigned from administrative duties in 1952, returning to the UT faculty until his retirement in 1966. He died in 1969.

The esteem in which Painter is held by UT is reflected in the fact that his name graces several campus landmarks, including the physics building. In 1984, UT established the T. Painter Centennial Professorship in Genetics.

Painter was noted for his skill in negotiating in fiscally-challenging times. There was much conflict at UT during a war period at UT between a liberal faculty, and a conservative Board of Regents and Texas state government, particularly after Herman Sweatt, an African American, applied for and was denied admission to the UT School of Law.

Painter, following the Texas constitution, statutes and an attorney general’s opinion, had rejected the admission on the basis of race. Sweat then sued the university. The case, Sweat v. Painter, went to the U.S. Supreme Court, which ruled unanimously in Sweat’s favor. The landmark case was a harbinger of civil rights legal events to come.

The College is beginning a multi-year effort aimed at renovating the complex to carry science at Roanoke through the next 50 years. — Dr. Darin Ferguson

Dr. Theophilus Painter, who is known for his work in identifying genes in fruit flies.

Roanoke College produced three alumni whose discoveries changed the scientific world: President Michael Maxey, reflecting on the significant accomplishments of these three individuals, noted that “Roanoke alumni are far more influential in more extraordinary ways than anyone would anticipate based on the size of the College.”

That means the College attracts people with great minds, nurtures and refines their skills, and gives them the confidence to influence the world,” Maxey said. “This is true in all fields, but it is especially true in the sciences.”

Dr. David Gring

Dr. Darin Ferguson and Mr. Brian W. Theoharl Professor in the Biology Department at Roanoke College.

Dr. Adam Cassis, M.D.