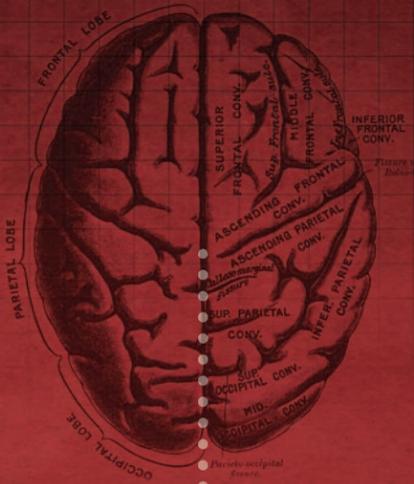




**DR. THEOPHILUS PAINTER 1908**  
 DID SOME OF THE EARLIEST WORK ON HOW GENETIC MATERIAL, DNA, IS ORGANIZED IN CELLS. HIS INNOVATIVE RESEARCH ALLOWED HIM TO MAKE THE FIRST MAPS OF FRUIT FLY GIANT CHROMOSOMES, PROVIDING VISUAL EVIDENCE OF THE LOCATION OF GENES ALONG THE LENGTH OF THOSE CHROMOSOMES.



**DR. VERNON MOUNTCASTLE 1938**  
 DEVOTED HIS CAREER TO NEUROSCIENCE AND IS CONSIDERED ONE OF THE FATHERS OF THAT DISCIPLINE. HE IS BEST KNOWN FOR HIS DISCOVERIES ON HOW NERVE CELLS ARE ORGANIZED IN THE HUMAN BRAIN AND DID SOME OF THE EARLIEST WORK ON HOW THE BRAIN RESPONDS TO SENSORY INFORMATION.



**DR. CARL GOTTSCHALK 1942**  
 WAS A KIDNEY PHYSIOLOGIST WHOSE EXPERIMENTAL RESEARCH HELPED US UNDERSTAND HOW OUR KIDNEYS WORK TO CONTROL THE STATUS OF BODY FLUIDS AND HOW THEY IMPACT THE FUNCTION OF OTHER PHYSIOLOGICAL PROCESSES. HE ALSO WAS IMPORTANT TO PUBLIC HEALTH, WORKING TO MAKE DIALYSIS TREATMENT WIDELY AVAILABLE TO INDIVIDUALS SUFFERING FROM KIDNEY DISEASE.

# SCIENCE

BY DR. DARWIN D. JORGENSEN

## ROANOKE COLLEGE ENJOYS A LONG, PROUD TRADITION OF EXCELLENCE IN SCIENCE THAT EXTENDS FROM THE LATTER PART OF THE 19TH CENTURY TO THE PRESENT.

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. Mount-

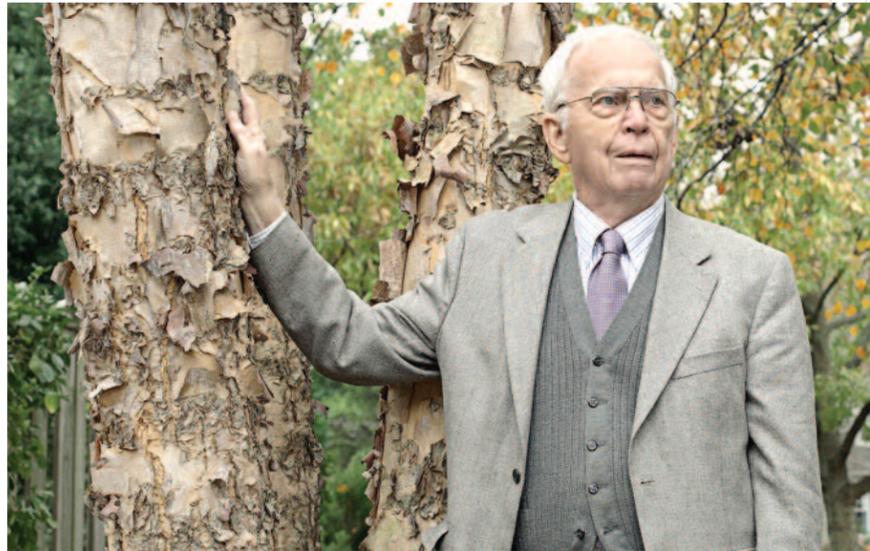
castle held to this plan tenaciously even beyond his military service during World War II. He had not considered medical research as a vocation.

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

# GIANTS



Dr. Vernon Mountcastle, at left, in the 1960s, and at right, in a 2007 photo that appeared in Hopkins Medicine magazine. Photo at right: Keith Weller, courtesy of Johns Hopkins Medicine

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 "waking" monkey preparation — probing sensory processing in the cerebral cortex of minimally-anesthetized animals, allowing him to peer inside an "aware," 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.

# RISING GIANT

## Lea M. Beaulieu, Ph.D.



**Current position:** Instructor of Medicine, University of Massachusetts Medical School

**Undergraduate Education:** B.S. Biology, Roanoke College, Salem, Va., 2001

**Graduate Education:** Ph.D. in Cellular and Molecular Pathology, University of North Carolina, Chapel Hill, N.C., 2007

**Postdoctoral Fellowship:**

- Postdoctoral Fellow, Boston University School of Medicine, Boston, Mass., 2007-2011

**Fellowships:**

- Sykes Fellowship, University of North Carolina, 2001-2002
- Integrative Vascular Biology Predoctoral Training Grant, University of North Carolina, 2002-2004
- NIH Ruth L. Kirschstein National Research Service Award Predoctoral Fellowship, University of North Carolina, 2006-2007
- Multidisciplinary Training in Cardiovascular Research Postdoctoral Fellowship, Boston University School of Medicine, 2007-2010

**Academic Appointments:**

- Instructor of Medicine, University of Massachusetts Medical School, 2011

**Primary specialty:** Platelet and Megakaryocyte Biology

**Why I chose to pursue a career in the medical profession:**

I chose a career in academic biomedical research for various reasons. I enjoy teaching, and identified this as a teaching assistant in the science labs at Roanoke College. I had done research in both the biology and chemistry departments at the College and also had done a NSF-sponsored summer research internship. I enjoyed the work because the projects were like puzzles to me — using specific tools I could find a solution to the question at hand. Every question led to another, which eventually created a story. But the topics of these projects were not what I really wanted to study. I was more interested in diseases — why we got sick, how diseases progressed, and how our bodies fought them off. My interest in this topic was also personal. I had family and friends that were affected by various diseases. I wanted to make a difference and saw research as an opportunity to do just that.

# RISING GIANT

## Paris Butler, M.D., M.P.H.



**Current position:** Chief Surgical Resident, University of Virginia Department of Surgery

**Undergraduate Education:** Double Major B.S. Biology and Sociology, Roanoke College, Salem, Va., 2000

**Medical Education:** Doctor of Medicine M.D., University of Virginia School of Medicine, Charlottesville, Va., 2004; Master's

Degree in Public Health M.P.H., University of California-Berkeley, Berkeley, Calif., 2009.

**Postdoctoral Research Fellowship:** Stanford University, Stanford, Calif., 2009

**Internships:**

- Internship, University of Virginia Health System, Charlottesville, Va., 2005

**Residency:**

- Resident in General Surgery, University of Virginia Health System, Charlottesville, Va., 2012

- Residency/Fellowship in Plastic and Reconstructive Surgery, University of Pennsylvania Hospital, Philadelphia, Pa., to begin July 2012

**Membership:**

- Resident Member, American Medical Association: 2005-present
- Resident Member, American College of Surgeons: 2005-present
- Resident Member, Society of Black Academic Surgeons: 2005-present

**Primary specialty:** General Surgery/Plastic and Reconstructive Surgery

**Why I chose to pursue a career in the medical profession:**

In my humble opinion there could not be a more satisfying profession. The combination of scientific intrigue, technical expertise, and most significantly, a dedication to humanitarian efforts separates medicine/surgery from all others. I believe that being a physician is a calling and I could think of no better field to have dedicated my life.

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 neuro-

**MOUNTCASTLE IS AMONG THE MOST DECORATED SCIENTISTS OF OUR TIME. THE ONLY MAJOR AWARD HE HAS NOT RECEIVED IS THE NOBEL PRIZE.**

science 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 No-

bel 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.

Mountcastle retired from his position as University Professor of Neuroscience at Johns Hopkins in 1998, but continued on as Emeritus Professor until 2005, when he withdrew completely from any active scientific or University work.

"My years at Roanoke College were wonderful," said Dr. Mountcastle, now 93 and living with his wife in the Baltimore, Md. area. "Faculty members, across all disciplines, clearly were interested in teaching, were good at it, and enjoyed it."

"I've always felt that I was lucky to have gone to Roanoke and have admired the institution my whole life."

In 2000, Mountcastle and his wife established a scholarship in memory of their son, George Earle Pierpont Mount-

castle, 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 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: *Stryman cecrops gottschalkii*.

Gottschalk entered the University of Virginia's School of Medicine 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.

He returned to Boston in 1948 for a research fellowship in the Harvard University laboratory of Dr. Eugene Landis,

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 — 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



Dr. Carl Gottschalk, who perfected the application of 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 recom-

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**“DR. CARL GOTTSCHALK CAN TRULY BE DESCRIBED AS A PIONEER IN THE FIELD OF RENAL PHYSIOLOGY. HIS GROUND-BREAKING EXPERIMENTS PROVIDED THE FRAMEWORK FOR UNDERSTANDING THE COMPLEXITIES OF THE KIDNEY.”**  
 .....

of the micropuncture technique to the study of kidney function. His work provided much of the experimental evidence that established the connection between our working kidneys and virtually every physiological process of our bodies. His contributions to the field of nephrology have had far-reaching impact.

He was promoted to professor of medicine and physiology in 1961 and in 1969, he was appointed Keenan Professor of Medicine and Physiology, the most distinguished academic appointment at UNC. Upon his retirement in 1992, he was made Distinguished Research Professor. He received numerous honors and awards for his research, including the first Berliner Award for Excellence in Renal Physiology. He received an honorary doctorate from Roanoke College in 1966 and was named a Sesquicentennial Distinguished Alumnus in 1992.

mendations 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 regardless of a patient's ability to pay.

Gottschalk died in 1997. “Dr. Carl Gottschalk can truly be described as a pioneer in the field of renal physiology,” said **Dr. Julie Haddy '97**, associate professor of Clinical Medicine at the West Virginia University School of Medicine and a practicing nephrologist. “His ground-breaking experiments provided the framework for understanding the complexities of the kidney.”

**THEOPHILUS SHICKEL PAINTER**

Theophilus Painter was the son of one of Roanoke's most respected faculty members, F.V.N. Painter, who was at Roanoke at the turn of the 20th century. Theophilus Painter graduated

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 Giraud Elliot Medal for outstanding contribution to science in 1934. In 1942, he was awarded an honorary doctorate by Roanoke College.

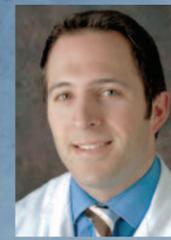
“As a practicing geneticist, early in my career, I knew and taught Painter's work as a constant in every genetics course,” said Dr. David Gring, Roanoke College president emeritus.

Painter's faculty career was interrupted in 1944 when he was appointed president of the University of Texas. Asked to fill that role because of his experience 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

**RISING GIANT**

**Adam Cassis, M.D.**



Morgantown, W.Va., 2006.

**Internships:**

- Internship, West Virginia University Hospitals, Morgantown, W.Va., 2006-2007.

**Residency:**

- Resident in Otolaryngology, West Virginia University Hospitals, Morgantown, W.Va., 2007-2011.

**Fellowships:**

- Neurotology Fellow, House Ear Clinic, Los Angeles, Calif., 2011-present.

**Current position:** Neurotology fellow, House Ear Clinic; attending physician, Los Angeles County-University of Southern California Hospital

**Undergraduate Education:** B.S. Biology, Roanoke College, Salem, Va., 2002.

**Medical Education:** Doctor of Medicine, West Virginia University School of Medicine,

**Academic Appointments:**

- Los Angeles County-University of Southern California Hospital.

**Board Certifications:**

- American Board of Otolaryngology: 2012.

**Primary specialty:** Otology & Skull Base Surgery.

**Why I chose to pursue a career in the medical profession:**

I chose my career in the medical profession for many reasons, but primarily it was to help and improve people's lives in a direct and immediate fashion. The reward of establishing personal relationships and making a positive impact on their lives is something I continue to treasure. Additionally, I have always had an interest in surgery, even before my time spent in my undergraduate studies. Advances in surgical techniques and technology also make medicine an exciting field. It certainly promotes continual learning as well as opportunities for research, both clinically and in the lab. My field of otology/neurotology affords me the ability to practice new techniques and implement new technologies in the treatment of hearing and balance disorders, as well as skull base tumors.



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

Painter was noted for his skill in negotiating in fiscally-challenging times. There was much conflict during the post-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 Sweatt's application on the basis of race. Sweatt then

sued the university. The case, *Sweatt v. Painter*, went to the U.S. Supreme Court, which ruled unanimously in Sweatt's favor. 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.S. Painter Centennial Professorship in Genetics.

**WHERE GIANTS DWELL**

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.” **rc**

Dr. Darwin Jorgensen is Brian H. Thornhill Professor in the Biology Department at Roanoke College.

**SCIENCE AT ROANOKE: LOOKING FORWARD**

The current science center complex at Roanoke College, incorporating the Life Science and Massengill buildings and Trexler Hall, houses three science departments: Biology, Chemistry, and Mathematics/Computer Science/Physics. This complex opened in 1969 and has served the College and students since that time. Its science faculty and student numbers have grown progressively over these past 40-plus years, and the requirements to support science teaching and research are beginning to outstrip the current facilities. In a new science age, the College is beginning a multi-year effort aimed at renovating the complex to carry science at Roanoke through the next 50 years. — *Dr. Dar Jorgensen*