REPORT OF THE MEMORIAL RESOLUTION COMMITTEE FOR THOMAS MARSCHALL RUNGE

The special committee of the General Faculty to prepare a memorial resolution for Thomas Marschall Runge, professor emeritus, biomedical engineering, has filed with the secretary of the General Faculty the following report.

Sue Alexander Greninger, Secretary
The General Faculty

IN MEMORIAM THOMAS MARSCHALL RUNGE

Thomas M. Runge, professor emeritus in biomedical engineering was born in Mason, Texas, on January 24, 1924. He died on April 30, 2006, after a brief illness.

In 1947, Dr. Runge received an M.D. from The University of Texas Medical Branch, Galveston. While in medical school, he met Gretchen Herrmann whom he later married. He did his residency in internal medicine at the University of Pennsylvania and had a fellowship in cardiology at Baylor College of Medicine. He then began his lifelong career in Austin as the city’s first cardiologist. Also an academic, Dr. Runge held professorships in biomedical engineering at UT Austin and in the Department of Surgery at the UT Health Science Center in San Antonio.

In this age of intense technical specialization, a renaissance man is rare. Tom Runge was such a person. Both colleagues and patients recognized him as outstanding in his chosen field of cardiology. In addition to providing state-of-the-art medical care, Tom was an inventor and experimentalist devoted to improving medical devices and procedures. He concentrated primarily on enhancing the post-operative recovery of patients undergoing cardiac bypass surgery. Motivating his work were two observations: (1) the extreme edema occurring during surgery and (2) the post-surgical diminution of cognitive function.

He first turned his attention to the characteristics of the pump providing perfusion during the bypass procedure. The pump approved for this purpose early in the history of cardiac bypass, and still in use, provides steady flow whereas the normal heart provides pulsatile flow. Tom reasoned that since nature provided pulsatile flow, it must have significant physiological implications. Therefore, he sought to build a pump that would produce the same in-vivo dynamic properties as the normal heart. This was no simple task in view of the limitations imposed by the necessity to use existing medically approved hardware (e.g., catheters, tubing, and valves), and the physical characteristics of the cardiovascular system itself.

Through years of diligent experimental work, using anesthetized goats, he was able to build a pump that duplicated the arterial pulse of the healthy animal. He also showed that his pump provided higher levels of perfusion and oxygen delivery to the brain, thereby demonstrating the possibility of preventing, or greatly reducing, the post-operative cognitive impairment.

In conjunction with the improved physiological responses provided by the pulsatile pump, Tom solved the edema problem by inventing a blood substitute that would suppress the edema formation while providing adequate oxygen-carrying ability. This blood substitute entitled, “Hyperosmolar Oxyreplete Hemosubstitute” has U.S. patent number 5114932. Besides solving the edema problem in cardiac-bypass surgery, it has multiple other advantages among which are:

1. Prevents of disease transfer through blood transfusion.
2. Eliminates the need for blood typing and cross matching.
3. Maintains a shelf life ten times that of stored blood.
4. Physical properties allow it to be separated out from normal blood when desired.
Tom’s interests in scientific fields other than medicine are exemplified by his early fascination with aviation. As a young boy in Mason, Texas, his observation and study of buzzards swooping down to a slow, non-stalling landing suggested that the flare of the ends of the birds’ wings could be applied to aircraft. He later designed such a wing, evaluated it in the aerospace laboratory and received a patent for this design. A later aircraft patent (U.S. 4326686) has the title, “Fan Jet Engine Bypass Air Delivery System for Blown Wing Aircraft Lift Augmentation Device.” Of the 18 patents Tom was granted, five relate to aviation, the remaining thirteen concern medical devices. Three patents are pending.

In addition to his accomplishments in medicine and aviation, Tom made great contributions to graduate biomedical education through his teaching. His courses at the University were entitled: Cardiovascular Dynamics and Hospital Interfaces.

Cardiovascular Dynamics was based on classical physiology enhanced by years of clinical experience. Hospital Interfaces was perhaps the first in the country to place biomedical graduate students in the various clinical laboratories to learn directly from the clinicians and technicians as they went about their tasks in a typical large hospital.

To provide experience for students in presenting their research results in a formal scientific setting, Tom established the Annual Forum of Original Research as a regular section in the annual meeting of the Texas Medical Association. This gave the students an opportunity to appear before an audience of medical professionals, to field questions, and to further hone their skills for presenting papers at national conferences.

Tom is survived by his wife, Gretchen Herrmann Runge; three children, Pamela, Marschall, and Val; and nine grandchildren. It is notable that all three of his children became academic physicians.

All of us who have followed Tom’s work hope that it will someday be taken up by some young biomedical engineer or physician who would guide it through the rigorous FDA-approval process for commercial development and make it part of the medical armamentarium.

Tom made significant contributions to medical practice, medical instrumentation, and biomedical engineering education. He will be sorely missed in these endeavors.

This memorial resolution was prepared by Professor Emeritus Lee Baker.

Distributed to the dean of the Cockrell School of Engineering, the executive vice president and provost, and the president on September 5, 2007. Copies are available on request from the Office of the General Faculty, WMB 2.102, F9500. This resolution is posted under "Memorials" at: http://www.utexas.edu/faculty/council/.