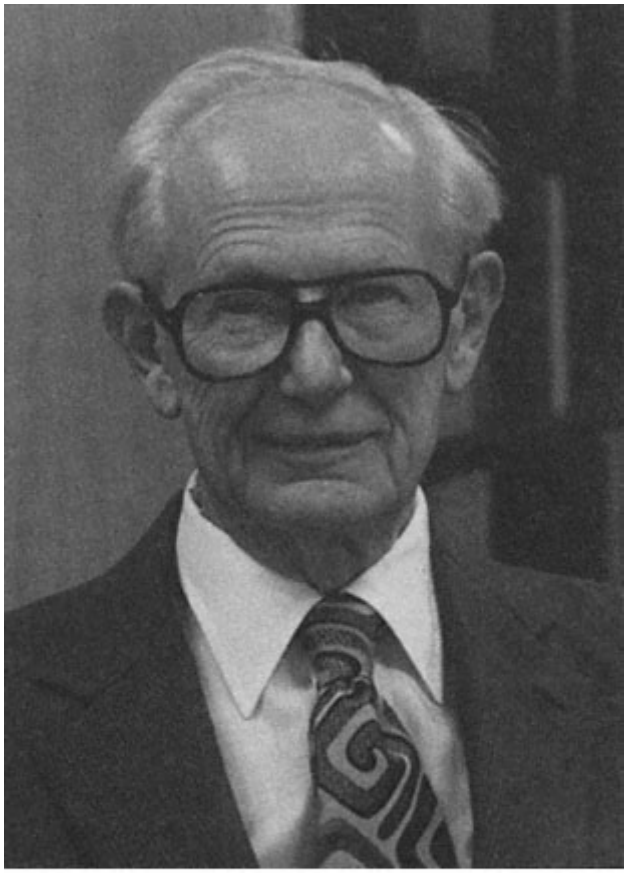

John G. Trump

John George Trump

1907–1985

By Louis Smullin

John George Trump, a pioneer in the scientific, engineering, and medical applications of high voltage machinery, died on February 21, 1985. Married to the late Elora Trump, John left three children: John, Karen, and Christine.

At the time of his death, John Trump was professor emeritus at the Massachusetts Institute of Technology (MIT) in the Department of Electrical Engineering. He was also senior consultant for the High Voltage Engineering Corporation, the company he founded in 1946 and where, until 1970, he served as chairman of the board and then, until 1980, as technical director.

John Trump was born in New York City on August 21, 1907. He earned a B.S. in electrical engineering from the Polytechnic Institute of Brooklyn in 1929 and an M.S. in physics from Columbia University in 1931. In 1933 he received a D.Sc. in electrical engineering from MIT, where he became a research associate in that same year, an assistant professor in 1936, and a professor in 1952. Trump formally retired in 1973, although he continued his active research program as professor emeritus until 1980.

John Trump came to MIT to work with Professor Robert J. Van de Graaff in what was then the new field of super-high voltage generation and applications. "Van's" main interest

was in the application of his new electrostatic generator in the field of nuclear physics. John Trump had two main interests: the insulation of super-high voltages in vacuum and compressed gases and the biological applications of high voltage radiation. These wide-ranging biological applications included the treatment of cancer by megavolt (Mev) X-radiation and electron beams, extensive pioneering studies of food preservation by electron beams, and the treatment of sewage and sludge by 2-Mev electron beams.

With grants from the Godfrey M. Hyams Fund, Trump and his young assistants designed and built an air-insulated megavolt generator that was installed at the Huntington Memorial Hospital in 1937. It was large and awe inspiring. On wet days, the generator crackled and sparked or just died, but the conspicuous advantages of its megavolt X-ray therapy soon became clear. The greater penetration depth of these radiations, compared to lower energy X-rays, permitted more deeply seated tumors to be treated with minimal damage to adjoining tissues.

In 1938, with continued funding from the Hyams Fund, the team began the design of a new, compact 1.25-Mev generator that would be insulated with compressed gas. This particular machine was installed in the George Robert White Hospital of the Massachusetts General Hospital, where it remained in active use for sixteen years. Trump then undertook the building of a 1.75-Mev machine for the American Oncological Hospital of Philadelphia—until World War II intervened, that is, and the machine was taken by the U.S. Army for use in the Manhattan Project.

During World War II, Trump interrupted his high-voltage career to work on microwave radar in the MIT Radiation Lab. He served for a time as field services director and was then posted to the British branch of the Radiation Lab. In 1944 he was named director of the lab and given the responsibility of working directly with the Eisenhower Military Command. At the liberation of Paris, Trump rode into the

city with General Eisenhower and immediately began to set up the Paris branch of the Radiation Lab.

His diary of this period is fascinating reading, especially for those of us who remember the significance of H2X, Oboe, Loran, MEW, SCR 584, and other sets of initials from the alphabet soup of the day. For his wartime service, John Trump received a Presidential Citation and the King's Medal for Service in the Cause of Freedom.

After the closing of the Radiation Lab in 1946, Dr. Trump quickly picked up the threads of his previous high-voltage research. He formed the High Voltage Engineering Company to put electrostatic high voltage machines to work. Van de Graaff generators were soon in use all over the world with a wide range of applications, including those in physics research, the sterilization of surgical instruments, the cross-linking of polymers, and the radiography of welds and castings.

Trump's main efforts and interests, however, remained on the MIT campus, where he initiated a long series of experiments, supported by the Natick Laboratory of the Army Quartermaster Corps, in the preservation of food by high voltage radiation. There was also a continuing train of experiments on the bactericidal and viricidal effectiveness of high voltage radiation. Much new work was done on compressed gas insulation, but his most noteworthy contributions were in the treatment of cancer by radiation.

Dr. Trump and his staff began a systematic study of the problems of delivering radiation to deep tumors without destroying the intervening healthy tissue. From their research came an improved technique of rotating the patient 360 degrees about the tumor site, so that the radiation beam entered the body from all directions but focused on the tumor. The team also developed techniques for static and dynamic beam shaping to protect healthy tissues. This work led to a cooperative twenty-five-year research venture with the Lahey Clinic: the setting up of a treatment facility in the MIT High

Voltage Lab, where patients were routinely treated under the joint supervision of Trump, his staff, and the Lahey Clinic physicians. Ultimately, more than ten thousand patients were treated.

Until 1950 nearly all high-voltage radiation therapy was done with X-rays generated by the impact of a high-voltage electron beam against a gold target inside a vacuum. In a 1940 paper, Trump, Van de Graaff, and Cloud had suggested using direct high-voltage electrons because of the uniquely different way they penetrated matter.

Although X-rays are absorbed more or less uniformly as they traverse the body from the skin inward, high-energy electrons produce very little ionization until their energy falls below a critical value. They then do all of their ionizing within a very short distance and almost never extend beyond it. The first clinical test of this new technique was made in 1951. The technique offered an ideal way to treat many superficial malignancies, and soon after its initial use, it became a standard method of treatment.

Dr. Trump began his last major effort in 1976. Like all concerned citizens, he was offended by the dumping of millions of gallons of barely treated or raw sewage into our harbors and waterways. His calculations showed that a 2-Mev electron radiation system compared favorably with chlorine treatment on an economic basis, had the additional advantage of destroying many viruses, and appeared to dissociate PCBs and similar compounds into less noxious forms. With National Science Foundation support, Trump and his associates built a pilot plant at the Deer Island Sewage Plant in Boston Harbor. In addition, based on the valuable electron radiation data produced at the Deer Island plant, a commercial sewage treatment plant has been built for the greater Miami area.

John Trump was truly a pioneer in the field of high voltage engineering and high voltage machinery and in the medical applications of high energy radiation. He was the author or coauthor of more than one hundred papers and the recipient

of many honors from numerous engineering and medical societies. John Trump was elected to the National Academy of Engineering in 1977. The latest award bestowed upon him was the National Medal of Science, which was presented posthumously in February 1985.

His mixture of personal technical work and quiet leadership produced many important discoveries. John Trump will be missed by his worldwide circle of colleagues and friends.