NATIONAL ACADEMY OF SCIENCES

CHAUNCEY GUY SUITS
1905—1991

A Biographical Memoir by

ROBERT J. SCULLY AND MARLAN O. SCULLY

Biographical Memoir

Photograph Courtey General Electric

CHAUNCEY GUY SUITS

March 12, 1905–August 14, 1991

BY ROBERT J. SCULLY AND MARLAN O. SCULLY

GUY SUITS, DECORATED SCIENTIST AND inspired administrator, is proof that giants once strode the earth. Here is a man who put the stamp of excellence on everything he touched. He cared deeply about science and his fellow man. He helped us all to be better than our best.

In the present era of "How does it impact the quarterly earnings?" it is important to pause and consider one who always kept the big picture in focus and in so doing helped his company and his country become more prosperous and more productive. As the chief scientific executive officer of General Electric (GE), Guy put many far-reaching programs in motion. For example, one of us (M.O.S.) had the privilege of interacting with Guy Suits as a General Electric-Rensselaer Polytechnic Institute (RPI) scholarship student. Indeed, during the early 1960s, GE had many special programs in which students from around the country were brought to RPI on generous scholarships.

M.O.S. recalls with pleasure a conversation with Guy at that time. As a naïve young student M.O.S. asked, "How does GE justify spending so much money on undergraduate scholarships?" Guy's reply was memorable: "We draw from the body of knowledge and we feel we should add back in like measure."

The scientific community is indeed fortunate to have had such a truly unique and high-minded leader as C. Guy Suits. In addition to being an eminent scientist, Guy embodied commitment and dedication to excellence and leadership. Under Guy Suits direction the different units of the company paid into a central pool such that approximately two-thirds of the GE research lab budget was funded by internal money with only one-third coming from external grants and contracts. Unfortunately, over the next decades the ratio of internal to external research funding went from roughly two to more like one-half. Fortunately, the ratio is now heading back in the direction of the Guy Suits paradigm, with more of the research funding provided internally.

In life one's values determine one's actions (i.e., our response to stimuli is conditioned by our training and background). Science in some ways is just the opposite. The process of discovery, invention, and development naturally result in insights and technologies that redefine what is important. So it is that scientists play a vital role in shaping our society. It is thus important to analyze and study the lives of leaders who made the United States the scientific powerhouse that it became after World War II.

Guy was born in Oshkosh, Wisconsin, the son of a pharmacist. He grew up around Medford, Wisconsin, and completed his schooling there. During his graduate work, Guy worked as a consultant for the U.S. Forest Products Laboratory. One of his biggest contributions there was the development of new methods for measuring the moisture content of wood. Guy's innovative achievements began turning heads, and in 1929 he was awarded an exchange fellowship at the Swiss Federal Institute of Technology. He found the requirements for graduate work to be somewhat lax in Europe. To earn a Ph.D. degree at that time one needed only to produce a research work and pass a verbal exam. He earned his doctor of science degree there in 1929 but returned to the University of Wisconsin to further his training. The summer of the same year he worked for GE as an intern, returning early in 1930 to begin his lifelong career at GE. Guy began work as an assistant to Albert Hull, the inventor of the first electron tube. Hull had an undergraduate degree in Greek, and he gave Greek names to the electron tubes he invented, the Thyratron tube being the most famous.

General Electric has always been fond of saying, "Our people are our most important product," a motto they still adhere to. Obviously, they've benefited from this, perhaps never more so than when they hired the young Mr. Suits, who at the age of 39 became GE's youngest officer. The nature of his experiments, discoveries, and patents were always innovative and useful. During his years as director of research at GE, Guy led teams who developed a literal treasure chest of technologies. One such example was the first engineered diamonds as well as a patented process for their large-scale production. He later guided his research teams in the development of Borazon® (cubic boron nitride), a synthetic material nearly as hard as diamond. Another "home run" was the multivapor lamp, today's leading high-efficiency light source. On the chemical side of things, Lexan® and Noryl® resins were developed. These last two are world-class polymers with excellent resistance to heat, cold, and water penetration. They have replaced many metals in today's products and comprise everything from compact disks to motorcycle helmets. They are increasingly being used in computers, surgical instruments, and automobiles.

When Guy began his career at GE he was interested in the emerging field of electronics. The word "electronics" was just becoming a household word, and the company was making basic contributions to its study. He was particularly interested in the electric arc and high-temperature plasma phenomena, today the backbone of any industrial assembly plant. As with many effective leaders and developers, he broke down the complicated into simple terms. He described electrical arcs as follows:

> Electrical machinery, as a manner of speaking, is made up of copper wires, electric fields that form coils, circuit breakers, and the like. The principal unknown was what went on in the circuit breaker, involving electric arcs. The engineers in the company were very pleased when I got into this field, because it was a field where they had felt very baffled and completely lacking in any sense of design organization in phenomena involving electric arcs.

Suits eventually acquired 79 patents in his name. His experiments included high-temperature arcs in which arc temperatures of 18,000 degrees Fahrenheit were achieved. And he invented original methods of measuring those temperatures. Industry today uses much of the comprehensive theory developed by Guy Suits in the understanding of switch, light, and welding arc applications.

He enjoyed his first 10 years with the company as a researcher, but GE is a company with demand for the unique resource of good leadership. Guy found this out in 1940 when he was made an assistant director of research. As with most highly qualified managers, management was the last thing he wanted to get into. He even said that it was the remotest thing from his mind.

World War II interrupted the course of research and development for Guy. The company assigned him permanently to the Washington office of war-related R&D in the spring of 1942. We were jumping into the war effort with both feet. Every individual was expected to contribute, and Suits contributed mightily, leading a massive U.S. effort on radio and radar countermeasures. Experts later determined that those countermeasures (jamming) saved some 450 planes and 4,500 lives. In addition, a $2 billion Axis radar system was rendered ineffective.

During the war, Guy moved further away from research and went more heavily into management. He was on the run most of the time, coordinating the efforts of 30 GE laboratories, which were deliberately spread out to increase competition among fields of opposing interests. For example, radar measures and radar countermeasures are competitive fields. Having them work under the same roof would have been less productive, as competition would have been unlikely.

That security restrictions during the war were stringent could not be argued. Most scientists felt they were too stringent. Despite his frustrations he stayed focused on prioritizing his teams' efforts to meet Allied demands. In the face of almost zero information exchange, as well as the difficulty of obtaining accurate details of the technology needed at the front, Suits was able to stay focused on the needs of the military.

This was accomplished by holding meetings with a group of naval, air force, and army officers who could tell him what was happening at the front. Such pressing times made for lifelong camaraderie. For the rest of his life the group held annual reunions, a testament to Suits's belief in the development and training of personnel as the best way to advance any organization. In fact, upon his return to duties at GE he felt that the greatest asset he brought back to the company was his acquaintance with some very capable people.

At war's end Guy oversaw the postwar expansion of GE's powerful research arm. A 600-acre site was selected in Niskayuna, New York, as the home for a new research laboratory. Not only would Guy be the new director of research, but the director of the lab as well. He insisted on impeccable design and construction features. The result of this today is that the facility is still an excellent working laboratory.

As Guy made an impression on the international scientific community, his list of awards and honorary memberships grew large enough to constitute a report in itself. To name a few: in 1940 he was chosen to be one of the outstanding young men in Durward Howes's "America's Young Men." He was elected to the National Academy of Sciences in 1946 and the National Academy of Engineering in 1964. In 1958 he was awarded the Procter Prize of the Scientific Research Society of America. Always an advocate for improving on the metallurgical skills in heavy industry, Guy received the Industrial Research Institute Medal as its highest honor for contributions to the management of industrial scientific research. He was awarded the Advancement of Research Medal of the American Society for Metals in 1966, followed by the Frederik Philips Award from the IEEE in 1974, the King's Medal for Service in the Cause of Freedom (U.K.), and the Presidential Medal for Merit (U.S.).

Guy retired in 1965. He remained active in numerous scientific and research societies, never losing his drive for invention and progress. He designed skis and boomerangs, made his own furniture, and rewove oriental rugs. His house was largely decorated and furnished with his own creations—just what one might expect from an inventor. He was a self-taught clarinetist, a pilot, a skin diver, a hunter, and an exceptional photographer who made his own beautiful leather camera cases.

From an engineering standpoint Guy was never one to be satisfied with the most conventionally accepted technologies. From skis to boomerangs he always envisioned ways to improve even on the most traditional developments. This engineering creativity extended to telescopic rifle sights, which he found to be inefficient and unreliable—so he built his own. But such ambition did not keep him from being down-to-earth and approachable. Early in his marriage he often had to assist his wife with cooking instructions. His son recalls that once his mother called Guy to ask how long she should boil potatoes. To this he responded sharply, "What do you mean, 'How long do you boil potatoes?' You boil them till they're done." Surely there was much wit and charm in a family as creative as that of Guy Suits's. When he passed away that family included his wife, Laura; sons, David and James; five grandchildren; one great-grandchild; and several nieces and nephews.

Guy Suits's great contributions were not only what he did for scientists but the general population as well. The life of Guy Suits is a beacon illuminating the attributes of a successful life, for him they featured:

- Loyalty—He stayed with one employer his entire career.
- Selflessness—He sought to better the lot of peers, his subordinates, and the world's future scientists.
- Dedication—His love of science did not blind him to other duties. When his country called, he answered, saving thousands of lives.
- Success—He was a highly regarded scientist who rapidly rose through the ranks of a very competitive company.

Here indeed was a giant of a man.

SELECTED BIBLIOGRAPHY

1929

Self-rectifying valve voltmeter. *Helv. Phys. Acta* 2:3.

1930

A thermal voltmeter method for the harmonic analysis of electrical waves. *Proc. I. R. E.* 18:178.

1931

Determination of the moisture content of wood by electrical means. *Gen. Electr. Rev.* 34:706.

Non-linear circuits for relay applications. *Electr. Eng.* 50:963.

1932

New Applications of Non-Linear Circuits to Relay and Control Problems. *A. I. E. E. Trans.* 51: 914-922.

Flashing lamps without moving parts. *Electr. World* 99:1098.

1933

Simple relays given precision by resonant relays. *Electr. World* 101:140.

Reactor-rectifier circuits serve as flasher and dimmer. *Electr. World* 101:320.

1934

Stabilizing arcs by electrode surfacing. *Physics* 5:380.

1935

Welding arcs in argon (letter to the editor). *Physics* 6:190.

A study of arc temperatures by an optical method. *Physics* 6:315.

1936

High pressure arcs. *Gen. Electr. Rev.* 39:194.

1937

With H. Poritzky. Interpretation of high pressure arc data (letter to the editor). *Phys. Rev.* 52(3):245.

1938

Multiple states in the high pressure discharge (letter to the editor). *Phys. Rev.* 53:609.

Discussion of paper on "Arc Welding Atmospheres" by G. E. Doan and A. M. Bounds. Research supplement of *J. Am. Welding Soc. Welding Journal Supplement* 3(11):7.

1939

Convection currents in arcs in air. *Phys. Rev.* 55(2):198.

High pressure arcs in common gases in free convection. Phys. Rev. 55(6):561.

With H. Poritsky. Application of heat transfer data to arc characteristics. Phys. Rev. 55(12):1184.

1940

Arcing phenomena in mercury switches. *Gen. Electr. Rev.* 43(3):120.

1946

Peacetime uses of atomic energy. *Electr. Eng.* 65:4.

1950

Development of useful power from nuclear fission. *Electr. Eng.* 69(6):523-528.

1951

New instruments from the research laboratory. *Gen. Electr. Rev.* 54(11):32-33.

1952

The engineer and the fundamental sciences. *Sci. Mon.* 76(2):90.

1953

The defects in crystals. *Proc. Am. Philos. Soc.* 97(6):681-685.

1956

A future for physicists in industry. *Phys. Today* 9(1):28.

1957

Science—The fabulous pitcher. *Gen. Electr. Rev.* 60(6):8-13.

1958

The appraisal of technological change. Paper presented at the 3rd Annual Industrial Economics Conference of Stanford Research Institute, Los Angeles, Calif., on January 13, 1958.

1959

Basic and applied engineering research. *Electr. Eng.* 78:5.

1960

The synthesis of diamond. A case history in modern science. Paper presented at the American Chemical Society Meeting, Rochester, on November 3, 1960.

1962

The new engineer and his scientific resources. Paper presented at the Eta Kappa Nu Society, 25th Anniversary of the Outstanding Young Electrical Engineer Award, Governor Clinton Hotel, N.Y., on January 29, 1962.

1963

Steel and its opportunities. The Charles M. Schwab Memorial Lecture, American Iron and Steel Institute, N.Y, on May 22, 1963.

1964

The emergence of atomic power. Paper presented at the Engineers' Week meeting, Chamber of Commerce of Kansas City and Western Chapter, Missouri Society of Professional Engineers, on February 19, 1964.

Man-made diamonds—A progress report. *Proc. Am. Philos. Soc.* 108(5):443-449.