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H. GUYFORD STEVER
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A Biographical Memoir by
BY T. KENNETH FOWLER

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Biographical Memoir

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October 24, 1916–April 9, 2010

BY T. KENNETH FOWLER

AFTER A DISTINGUISHED CAREER OF SERVICE in academia, government, and industry, Guy Stever died on April 9, 2010, at his home in Gaithersburg, Maryland. He was 93. During 1965-1976, he served as president of Carnegie Tech, then Carnegie-Mellon University; director of the National Science Foundation; and science adviser to Presidents Nixon and Ford. He was a member of Section 31 of the National Academy of Sciences, elected in 1973, having already been elected to the National Academy of Engineering in 1965. He was awarded the National Medal of Science in 1991.

I knew Guy best when I served with him on the Fusion Policy Advisory Committee of 1990, which played an important role in enabling Princeton finally to conduct experiments with tritium that yielded the first definitive demonstration of controlled fusion power, in 1993. Guy was chair, a frequent role for him after his years in the White House. Just the year before, in 1989, he had completed a far more difficult assignment as chair of a panel overseeing booster-rocket redesign following the Challenger disaster. This panel was convened through the National Research Council in response to a recommendation of the Rogers Commission, which was investigating the explosion of the Challenger space shuttle, which killed all onboard. In a scathing report pinpointing

both technical and management issues, the commission advised external oversight of booster redesign. Guy accepted the chair position at the urging of then president of the NAE, Robert White. The school teacher who had won a seat on the Challenger had been a student at Carnegie-Mellon when Guy was president, and his son Guy Jr., also a teacher, had been a contestant. After 30 months of hard work on what was to have been a two-month assignment, Guy's panel had the pleasure of witnessing the successful test: a full two-minute burn on the ground as required for an actual launch. The panel had insisted upon this test and other measures, over protests from NASA officials.

The White House years, the Challenger panel and all of Guy's career activities are thoroughly and candidly described in his memoir, *In War and Peace* (2002). This book should be must-reading for anyone contemplating becoming involved in advising the government on science. I have drawn heavily on Guy's memoir in writing the present memoir. Unless otherwise noted, quotes are from his memoir. Guy's career of service in science is even more thoroughly documented in material he donated to the Gerald R. Ford Library in Ann Arbor, Michigan. The donation consists of "96 linear feet, 192,000 pages," for which a detailed inventory is available on the Internet. The collection covers the years 1936 to 1990, including even undergraduate class material at Colgate University and graduate work at Caltech. His official records as president of Carnegie-Mellon are at the university. Other files are at the National Science Foundation and the U.S. Air Force.

Guy Stever's life is an American success story shaped by World II, the Cold War, and a love of and respect for science. He was born on October 24, 1916, in Corning, New York, home of the Corning Glass Works. In his memoir he recalls the summer day in 1935 when, as an 18-year old college

student, he began work on a 2-to-11 shift at Corning, only to find workers desperately trying to prevent a flooding river from damaging the immense glass casting for the 200 inch telescope for the Mount Palomar Observatory.

The Palomar mirror helped draw Guy to science.

Science came into my life first in its purest form when as a young boy I saw the leaders of the California Institute of Technology come to my hometown to watch the casting of the Mount Palomar mirror. In the 1940's, as I walked through the wreckage of wartime London, I saw science in quite a different way, as central to the desperate struggle to survive.

These two themes—a love of science and service to country—would define Guy's career as scientist. By his own choosing his early ambition to be a professor was derailed by World War II. After a good start in the Corning high school, Guy entered nearby Colgate University in 1934, with the help of a modest scholarship and \$200 saved from a paper route. Early in his liberal arts studies at Colgate, when worn out by a janitorial night job, Guy received his first D on an exam, in math. Encouraged by his professor's "you can do it," he bounced back to an A for the course, enjoyed the broadening experience of philosophy and religion classes, and graduated summa cum laude with a major in physics. Then to Caltech in 1938, where, he learned later, accepting a graduate student from Colgate had been considered "a shot in the dark." In just three years under thesis adviser Victor Neher, Guy completed two publishable thesis projects (1940, 1941), each worth a Ph. D. One of these projects, concerning measurements of the new cosmic-ray-generated "mesotrons" (muons), took Guy and a fellow graduate student on a treacherous mule expedition into the High Sierra. Immersing their electrosopes in lake water to compensate for different degrees of muon absorption led to an ingenious scheme to make measurements in lakes at different altitudes, the last at 13,000 feet. Despite a severe storm and

a boat mishap that dumped equipment into Lake Tulainyo, they succeeded, eventually drawing attention from Robert Oppenheimer who spent an afternoon at Caltech coaching Guy on what to look for.

It was his thesis adviser, Victor Neher, who helped lure Guy to the new MIT Radiation Laboratory to work on radar. This was a turning point in Guy's career, forcing him to turn down an appointment in the Physics Department at Stanford.

Had times been normal," he says, "I would have leaped at the Stanford offer to start a career in physics in an outstanding department. However, my strong desire to defeat Nazism turned me to the Rad Lab. Professor I. I. Rabi of Columbia University came through Cal Tech to lecture and to recruit for the Rad Lab, dropping by my research room to convince me to go east. But convincing wasn't necessary...I boarded a Santa Fe train for the east, stopping in Corning. I didn't stay long. I had to start work.

The trek to MIT soon led Guy to his first involvement with the government. A photograph on the cover of his memoir shows a very young Guy Stever, superimposed on an ID card as H. Guyford Stever, Civilian, Technical Observer, Card No. 300. This concerned an assignment that eventually led to his participation in the Normandy invasion, as an observer to learn what the Germans had done. In England and Europe he was immersed in radar but also the growing interest in guided missiles.

Like every step in his long and productive career, Guy's overseas assignment in World War II came from excellent work recognized by others. He had spent two years working on radar at the Rad Lab, 1941-1942. Guy describes radar as a British gift, in reference to their invention of the cavity magnetron that generates microwaves by electrons spinning in a magnetic field, like the device now widely used in kitchen "microwaves." It was sharing the magnetron with the United States that prompted creation of the Rad Lab, which like the

atom bomb would attract so many brilliant people to war work. It was one of these people, Lee Dubridge, director of the Rad Lab, who asked Guy if he would be interested in joining the London Mission of the Office of Scientific Research and Development (OSRD) as radar liaison with the British. Still single, Guy accepted, "to get nearer to the real war." On his first day in London he could hear bombing and anti-aircraft fire, despite no sirens; even then, German bombers were evading British radar by flying low up the Thames. This was 1943, a turning point in the war. It was also the beginning of V-1 "buzz-bombs," which brought urgent attention to the use of guided missiles. During a work trip to the United States in 1944, Guy was already being asked to brief and then advise the director of OSRD Vannevar Bush on guided missiles.

Guy participated in the active investigation of abandoned military sites and gear wherever the Allies succeeded in pushing back the German lines in Europe. To do this he and another colleague were flown to France about 20 days after D-Day. He enjoyed telling the story about his "capture" by German troops in a French town with a large radar control center, thought to be held by the Free French but actually filled with German soldiers who took the Americans to their leader. When the American Colonel in charge finally realized that the German Commander simply wanted to surrender, there were schnapps toasts all around. There were also depressing moments later when they discovered in Germany an abandoned underground V-bomb factory manned by slave labor, 20,000 having perished by starvation, fatigue, or execution.

Guy was 28 years old when he returned to MIT in 1945. Soon after, he married Adelaide Louise Risley Floyd, nicknamed "Bunny," on June 29, 1946, and "began two decades of the happiest, most productive, most rewarding part of my

life.” When Guy returned from Europe, Vannevar Bush asked him to join the Washington Office of OSRD. Guy explained that “I really want to get on the faculty of a research university and spend my life as a professor.” Bush helped him do just that, with a call that netted him a research job at MIT in the Applied Physics Laboratory, as executive officer of the new Project Meteor funded by the navy. In the spring of 1946 he was also made assistant professor in the Department of Aeronautical Engineering.

Project Meteor was Guy’s first immersion into laboratory research on guided missiles, a field that would dominate much of his life. By 1947 this work had also involved him as a “planning consultant” on guided missiles reporting to the Research and Development Board, a federal agency created under the National Security Act of 1947. All this took away from his academic duties, and Guy desperately wanted to become a “genuine university professor.” When he sought advice, his mentor Jay Stratton warned him of the challenges of rejoining academia after so many years since his Ph. D. But he did it, with characteristic success, starting in 1948 not in physics but in his new field of aeronautical engineering. By 1951 he was made associate professor of aeronautical engineering; then professor in 1956; and finally, in 1961, a department chair. At the urging of Jay Stratton, by then president of MIT, he was appointed chair of two departments simultaneously, the Department of Mechanical Engineering and the Department of Naval Architecture and Marine Engineering. Among Guy’s many engineering students at MIT were two astronauts Buzz Aldrin, who went to the Moon, and Rusty Schweikert. He also continued to advise government and industry, briefly as chief scientist of the Air Force during a sabbatical year, 1956-1957.

Guy’s academic career culminated in his appointment as president of the Carnegie Institute of Technology in

Pittsburgh in 1965, and the merger of Carnegie Tech with the Mellon Institute to create Carnegie Mellon University in 1967. Guy continued as president for seven years, finally leaving to enter government service in 1972, as the director of the National Science Foundation. During his tenure, he engineered the merger that broadened Carnegie Tech into a university on the model of Caltech and MIT; he helped bring space-age industry to Pittsburgh; and he weathered student turbulence over the Vietnam War without serious incident. The first “green” building on the Carnegie Mellon campus, built in 2003, was renamed Stever House in 2008.

The focal point of Guy Stever’s later career was his years in Washington as director of the National Science Foundation from 1972 to 1976. Lee Dubridge had first approached Guy about taking this assignment in 1969, but he turned it down to continue his obligations at Carnegie Mellon. Guy did accept an appointment to the National Science Board, the governing body of NSF. This was his first nonmilitary work for the government. His usual excellent performance in helping strengthen NSF programs in engineering research and applied science caught the attention of Ed David of Bell Labs, then head of the White House Office of Science and Technology. After a visit to see David in June 1971, Guy finally accepted the NSF directorship nomination. He was appointed by President Nixon on November 15, 1971, and reported for work in February 1972.

In his memoir Guy gives a thoughtful analysis of his time at NSF, which included a disenchantment with science by the Nixon Administration, Watergate, and the transfer of power to President Ford. Since its establishment by President Truman in 1950, the purposes of NSF had been a point of contention. At one extreme was Vannevar Bush’s vision in his monumental 1945 report *Science, the Endless Frontier*; at the other was working scientists’ desire for an unfettered grants

agency. Bush had wanted a broad NSF mandate to organize government funding of science in America, modeled on his own wartime success with the Office of Scientific Research and Development. Many grant seekers were more interested in a place to fund their individual ideas.

I learned a lot about NSF in the year and a half I was on the board before I became Director. I learned for example that any hope the foundation's research program would focus entirely on fundamental work was short-lived. NSF's role in applied research became a hot topic in my two and a half months of "suspended animation" between my nomination and being sworn in...The biggest issue in my in-box when I arrived as director was the foundation's role in applied research.

Given his background, Guy was especially well prepared to deal with these issues, while also steering NSF through exciting times for pure science, for example, the first solid evidence for tectonic plates and the discovery of hydroxyl radicals in the dust between stars. Guy also inherited stewardship for the U. S. program in Antarctica, leading to his visit to our South Pole research station, and a side trip to the Soviet station, where he was given 10,000-year-old ice from core drillings to take back to Washington. One of the snow mountains of Antarctica is now named Stever Ridge.

Guy's greatest challenge as NSF director was inheriting the additional job of science adviser to President Nixon. This came about in a clash between Nixon and the President's Science Advisory Committee, over antiballistic missiles and other matters, culminating in a final PSAC meeting in 1972. "We've been fired," declared committee member Luis Alvarez after the meeting. Indeed, science had been "evicted" from the White House, as was confirmed on January 12, 1973, when Treasury Secretary George Shultz informed Guy that the White House Office of Science and Technology was to be abolished, all duties being transferred to NSF. Some members of NSF's National Science Board approved, thinking they at

last had the mandate Vannevar Bush had sought for NSF. Guy knew better.

I began to think of myself stuck in the middle of a large snowball rolling downhill out of control with arms and legs sticking out...[On] January 26, Nixon publicly announced what was coming down, in his Reorganization Plan No. 1 of 1973...I was close to shock that the Congress swallowed the reorganization with little comment.

Some members of Congress were indeed upset that the science adviser no longer had direct access to the President, while others worried about NSF's national security role inherited from the Office of Science and Technology. In response, on July 10, 1973, Nixon formally appointed Guy as science adviser. Many thought the dual burden of science adviser and NSF director was untenable. "But it wasn't all that complicated; I worked a lot harder, had many more appointments, and lots more problems on my daily agenda." And he acquired a strong assistant director.

Everything changed again after Watergate, when "on a lovely day in May, President Ford signed into law the National Science and Technology Policy, Organization, and Priorities Act of 1976. Science was back in the White House." Despite attacks from conservative Republican senators, on August 12, 1976, after a "generous speech by the President," Vice President Rockefeller swore Guy Stever in as science adviser and director of the Office of Science and Technology Policy. He was also still director of NSF, until October 1976.

Even before Jimmy Carter's victory in November, Guy had decided to retire from government service, which he did as of Inauguration Day, January 20, 1977. "I sat in my empty office until shortly before noon, walked out of the office, handed in my badge, and left the building. It was over." He was 60 years old and ready to apply his great experience in industry. Over the next 12 years he served on the TRW Board of Directors and as a consultant to Bethlehem Steel,

Caterpillar, Schering-Plough, and Goodyear. As in academia and government, he left his mark of excellence everywhere he went. He also became actively involved in the business of the National Academies, including his stint as chair of the oversight panel for booster redesign mentioned at the beginning of this memoir. He also chaired a technical assessment of President Reagan's Strategic Defense Initiative for the congressional Office of Technology Assessment in 1985. When he asked OTA Director Jack Gibbons, "Why me?" Jack said Guy was the only person knowledgeable about such things who had not yet come out on the front page to announce his views. Indeed, given the amount of controversy, Guy's committee report was carefully evenhanded but did not hesitate to agree with the prevailing technical opinion that population defense against nuclear-armed intercontinental ballistic missiles "appears impossible to achieve."

Throughout I have referred to Guy by his nickname, his own preference when I knew him. Guy's birth name was Horton Guyford Stever. Horton Stever was his paternal grandfather. The grandparents raised Guy and his sister in Corning, both of their parents having died of tuberculosis when Guy was very young. A cousin's well-to-do commodities-broker husband, Guy P. Ford, "was the reason for my unique middle name, Guyford, one that my parents thought would pay off in the long run. (Unfortunately, the Depression was part of the long run, so it didn't.)"

When Guy entered Colgate in the fall of 1934, his sister Margarete, away at college and grandfather Horton were the only remaining members of his immediate family. Marriage soon created Guy's own family: a son Guy Jr. born in 1947; then two daughters, Sarah and Margarete in 1949 and 1952; and a second son, Roy, in 1954. Despite his busy life Guy was a devoted father. He and the family always experienced renewal together at the family compound in Randolph, New

Hampshire. They called it Cair Paravel, after a castle in a C. S. Lewis novel, finally expanded to a 20 acre woodland after his wife, Bunny, inherited the property in 1961. For a time James B. Conant, former president of Harvard, was a neighbor in Randolph. Guy became an enthusiastic fly fisherman. A photograph in his memoir shows him in a Colorado trout stream while being interviewed for TV. On becoming NSF director, Guy and Bunny moved to the Washington area, where they remained until his death. For many years their home was in the Georgetown neighborhood, until finally the requirements of old age prompted a move to Gaithersburg, Maryland, outside Washington. Bunny died in 2004.

Among Guy's later acts of public service, he was especially proud of the achievements of the Carnegie Commission on Science, Technology, and Government funded by the Carnegie Corporation of New York. Beginning in 1988 Guy served on the Carnegie Commission for five years, along with 21 other members, including former President Jimmy Carter. A collateral advisory group included former President Gerald Ford. "The launch of the commission was a remarkably prescient act," Guy writes, "in effect anticipating the end of the Cold War. . . It was by far the most thorough and exhaustive examination of federal science and technology policy in all its dimensions since Vannevar Bush did it virtually by himself in 1945 with *Science, The Endless Frontier*."

With characteristic modesty, at the end of his memoir Guy summed up his long and productive career this way.

A reporter for the *Pittsburgh Press* in a long story about me when I was President of Carnegie Mellon called me "The Happy Warrior." That was right, I think, even though there were occasions then and since when I was decidedly unhappy. But time has washed much of that away, and I can look back on my life "being in the game," taking part and a few times even making a bit of the history of American science and technology in the twentieth century. I'm satisfied.

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