John Gofman's Nuclear Courage

Remembering an eminent scientist who fought tirelessly to protect
human health from the hazards of nuclear weapons and nuclear energy.

by Joseph J. Mangano

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The life of eminent nuclear scientist and physician John Gofman ended last month just short of age 89. The *New York Times* obituary recounted his scientific résumé but ignored the backlash he faced from industry and government, simply describing him as a "nuclear gadfly." Gofman should be remembered for his brilliance and integrity, which are critical factors in the current debate over the future of nuclear power.

Gofman's brilliance was evident early. His doctoral dissertation described co-discoveries of radioactive uranium-232 and -233, and protactinium-232 and -233, and the ability to transform uranium-233 into an atomic bomb. Soon after graduation, Gofman joined the Manhattan Project to help win the race with Nazi Germany for the first atomic bomb. His team at the University of California, Berkeley, made more than one milligram of plutonium—the most created to that point—leading to the plutonium bombs tested in New Mexico and used at Nagasaki.

After the war, Gofman settled in at Berkeley as a teacher and researcher, focusing not on radiation but coronary disease. His pioneering work on lipoproteins in the blood—HDL and LDL cholesterol—remains a cornerstone of cardiology. In 1974 the American College of Cardiology named him as one of the twenty-five leading researchers in the field over the previous quarter-century.

But the arms race between the United States and the Soviet Union pulled Gofman back into the nuclear world. In the early 1950s the Atomic Energy Commission (AEC) set up a nuclear weapons research lab at Lawrence Livermore Laboratories, fifty miles from Berkeley. Gofman formed the lab's medical department and worked part-time for several years, helping with calculations on health effects and problems of nuclear war before returning to Berkeley.

In late 1962, during the depths of cold war tensions, Livermore beckoned again. Massive atomic bomb testing by both superpowers was spreading fallout across the globe in unprecedented amounts, and the world came perilously close to nuclear war during the Cuban missile crisis of October 1962. Gofman headed a biology and medicine lab; with an annual budget of more than $3 million, he formed a crackerjack staff of 150.

With scientists like Linus Pauling and Andrei Sakharov warning about hazards of bomb fallout,

and with the government issuing repeated denials, a moral crisis was imminent for Gofman. Soon after he took over the lab, an official at Livermore asked him to help suppress publication of the work of AEC scientist Harold Knapp, who concluded that doses of radioactive iodine from bomb tests in Utah were much higher than the AEC had publicly admitted. Despite the warning that "we can't afford to have him publish that evidence," Gofman reviewed Knapp's analysis with his staff, and found it accurate. Refusing to yield to political heat, Gofman urged publication of the data, which the AEC reluctantly allowed.

Nuclear tensions eased after the Partial Test Ban Treaty of 1963, signed by President John F. Kennedy and Premier Nikita Khrushchev, banned atmospheric nuclear tests. But the treaty did not mean the end of the battle over fallout's harm. In 1969 University of Pittsburgh physicist Ernest Sternglass startled many when he published an article in *Esquire* magazine showing that for the first time in the twentieth century, the steady rate of decline in US infant death rates had halted as bombs were tested in the atmosphere. Sternglass calculated that 400,000 additional American infants died in the 1950s and early '60s, and suggested that fallout was the cause.

The AEC called on Gofman and his colleague Arthur Tamplin to debunk the article. Although Gofman later acknowledged that "Sternglass may have been right," the two estimated that excess infant deaths were about 4,000, not 400,000. But even that wasn't enough for AEC officials, who told them to publish only a critique with no estimates. They ignored the AEC and published the paper using the 4,000 figure.

By now, Gofman had built a reputation for being an obstacle to the AEC party line, but he had yet to be disciplined. A more cautious person might have stopped insisting that nuclear power was harming people, to preserve his professional status. But that wasn't John Gofman. Just months after the Sternglass controversy, he turned to radiation routinely emitted by nuclear power reactors, the darlings of the nuclear industry, heralded as a "peaceful" use of the atom.

In late 1969 Gofman and Tamplin were among the first scientists to oppose nuclear power in a paper asserting that even low-dose radiation harmed humans. "I realized that the entire nuclear power program was based on a fraud—namely that there was a 'safe' amount of radiation, a permissible dose that wouldn't hurt anybody," recalled Gofman. The duo calculated a worst-case scenario in which 32,000 additional Americans would die of cancer each year if everybody received the permissible AEC dose from reactors.

He proposed a five-year moratorium on new nuclear plants, declaring that "licensing a nuclear power plant is in my view, licensing random premeditated murder." Gofman had now become too much for the establishment. In 1972 the AEC removed funding for twelve of thirteen of Tamplin's staff members. Later, it threatened to remove Gofman's $250,000 in funds for cancer research at Livermore. He applied to the National Cancer Institute for replacement funding but was rejected, as the blacklist extended throughout the federal government. Gofman resigned and went back to Berkeley.

Being ousted from Livermore didn't stop Gofman from investigating radiation risks. His 1985 book *X-rays: Health Effects of Common Exams*, co-written with Egan O'Connor, stated that 75 percent of cancer cases are caused by medical radiation, including X-rays, mammograms and CT

scans. Doctors howled about how wrong and inflammatory Gofman was—while giving no evidence proving safety. He had now incurred the wrath of both of his chosen professions: physics and medicine. But he never stopped speaking out against the human toll radiation exacts, predicting that nearly 1 million people would develop cancer from Chernobyl, far more than any other estimate.

Gofman was certainly a courageous scientist. But was he right, and is his work relevant?

Are even small radiation doses harmful? A 2005 blue-ribbon panel of the National Academy of Sciences examined hundreds of articles and concluded that no safe threshold exists. The panel used reports from up to fifty years ago, when pelvic X-rays to pregnant women were found to raise the chance that the fetus would die of cancer as a child.

Could up to 32,000 Americans a year die from cancer from reactor emissions? A 1994 General Accounting Office report to Senator John Glenn estimated that the maximum exposure permitted by the government to every American would result in a lifetime premature cancer death risk of one in 300—or 1 million deaths, or about 14,000 cancer deaths a year—which fits Gofman's prediction, made when limits were higher.

Will 1 million people develop cancer from exposure to Chernobyl radiation? For years the International Atomic Energy Agency insisted that only 4,000 would die. But in 2006 a Greenpeace report from scientists who reviewed statistics from Belarus projected that 270,000 would develop cancer. Research continues, but with 5 million to 8 million people still living in highly contaminated areas, Gofman's estimate may yet prove to be correct.

Did thousands of infants die from bomb fallout half a century ago? The period 1950-1963 remains as the only part of the twentieth century in which infant deaths did not fall sharply, and is still unexplained. In 1992 British scientist R.K. Whyte published a paper in the *British Medical Journal* concluding that bomb fallout was the likely reason.

Do medical X-rays give people cancer? A storm of protest is growing over the number of X-rays, especially CT scans, administered to children, who are most susceptible to harm from radiation. The National Cancer Institute cautions that physicians should only conduct pediatric CT scans when necessary, adjust exposure parameters, minimize use of multiple scans in a single examination and consider alternatives to CT scans.

Validation of Gofman's findings is vital to the current debate over nuclear power. After a long decline, the nuclear industry has seized on concerns over global warming and costs of fossil fuels to tout reactors as a "clean and safe" alternative. Bush Administration regulators have thus far granted permission for more than half of US reactors to operate twenty years past their expected life span of forty years. Just last month the first order for a new US reactor since 1978 was made (at the Calvert Cliffs plant near Washington, DC). Congress is considering $50 billion in loan guarantees for construction of other new reactors.

Utility companies and the Bush Administration claim that reactors are safe—without furnishing any hard evidence backing their claim. They turn a blind eye to potential risks of a major

meltdown and actual risks of ongoing radioactive emissions. Objective research and educating people of these risks regardless of political fallout was Gofman's legacy. There is no time like now for citizens and scientists to embrace this legacy to protect public health.

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