

**Genius in the Shadows: A Biography of Leo Szilard, the Man Behind the Bomb.** William Lanouette with Bela Silard. 587 pp. Scribner's New York, 1992. Price \$35.00 ISBN 0-684-19011-7. (Reviewed by David Hafemeister.)

This delightful biography by Bill Lanouette brings Leo Szilard out of the shadows today: the time of the finale of the Cold War, a time foreseen by Szilard in his novelette, *The Voice of the Dolphins*. It is high time for a comprehensive look at Szilard, who was involved simultaneously in the first steps in building the original nuclear weapons and in the creation of international regimes to control the nuclear genie he had let out of the bottle. Lanouette's book does justice to the man who propelled the world across the nuclear Rubicon with the Einstein–Szilard letter to Roosevelt (p. 205): "Some recent work by E. Fermi and L. Szilard, which has been communicated to me in manuscript, leads me to expect that the element uranium may be turned into a new and important source of energy in the immediate future... This new phenomenon would also lead to the construction of bombs... [which] might very well destroy the whole port together with some of the surrounding territory."

By obtaining a first access to Szilard's correspondence with his wife Trude, his brother Bela, and many others, Lanouette has been able to fully expose the two competing sides of Szilard's actions. The inherent conflict between building bombs and controlling bombs made Szilard's unique, somewhat frantic personality all the more chaotic. Lanouette shows that Szilard, the unemployed dreamer, was the creative force in the nuclear shadows of Einstein and Fermi, and also the instigator of today's arms control process. This is a humane book about Szilard the person, related through countless anecdotal stories; it is not a formal history of the Manhattan Project.

Szilard was an intuitive applied physicist whose thumb prints are on applied technologies (thermal reactors, breeder reactors, atom bombs, electromagnetic pumps, electron microscopes, and information theory) rather than on fundamental science. Lanouette shows that Szilard was politically very astute. He realized early on that Hitler could get the bomb and that a nuclear arms race would follow the first nuclear weapons. Szilard, driven by these political concerns, acted boldly: he secretly patented the nuclear chain reaction in 1934; he tried to get other physicists not to publish nuclear data, but after they published, he too published; he wrote three Einstein–Szilard letters (two to begin the Manhattan Project and one to slow it); he created much of the Franck report, which called for an initial demonstration explosion over Japan rather than city destruction; he lobbied Congress for civilian control of the atom and various other arms control matters; he helped organize the Federation of Atomic Scientists, the Pugwash meetings, and the Council for a Livable World; and he initiated the creation of the Salk Institute to study both science and its impacts.

No doubt, Szilard was a most difficult person to work with. He overslept in the morning, then soaked for hours in the bath tub, only to arrive at work at noon with new suggestions for others to carry out. He didn't like to get his hands dirty, and he continually argued with the conventional wisdom of the day. With increasing anti-Semitic instability in Europe, his unpredictable personality became



Fig. 1. The sculpture commemorating the American Physical Society's Szilard Award is a dolphin that draws its motif from Szilard's prophetic novelette, *The Voice of the Dolphins*.

all the more frantic, but purposeful. Szilard, who couldn't be constrained to settle down until the last year of his life, always kept two packed bags, ready to hit the road. Szilard converted this frenetic energy into results. Lanouette argues that Szilard was the first to conceive of the bomb and among the first to initiate arms control movements because he was so contrary and difficult. His example implies that all large projects, such as the Strategic Defense Initiative, need contrary, but honest, nay sayers with social conscience to point out possible problems.

*Genius in the Shadows* answers many questions, such as: *Who really conceptualized the December 1942 reactor in Chicago?* Lanouette points out that it was Szilard, not Fermi, who first understood nuclear chain reactions and first designed the nuclear reactor. Lanouette states (p. 178) that "[Fermi] failed to recognize the importance of this news [of the fission process] and failed even to mention what he had heard to his Columbia colleagues. Fermi was so typically cautious, in fact, that as the grave consequences of fission became apparent to others around him, he repeatedly denied their significance." Fermi was clearly the group leader, but Szilard was the creative prophet.

*Who first conceptualized verifiable arms control agreements?* A month after Hiroshima, Szilard addressed the Atomic Energy Control Conference. Lanouette writes (p. 283): "Szilard had the last word at the conference—and the first on record about the touchy topic of verification—when he said a necessary first step would be to 'guarantee immunity to scientists and engineers everywhere in the world in case they should report violations of the [arms-control] agreements' " Later Szilard recommended supplementing his immunity for whistleblowers with \$1 million rewards. These ideas sound good today; wouldn't whistleblowers in Iraq, North Korea, India, Pakistan, Israel, South Africa, and several other states have been useful? The special and challenge inspections of today's arms control treaties are further extensions of Szilard's suggestions of September 1945.

Because Szilard had the courage to work against the misuses of science, the American Physical Society and its Forum on Physics and Society have given the Szilard

Award for "outstanding accomplishments by physicists in promoting the use of physics for the benefit of society in such areas as the environment, arms control, and science policy." Since 1974 the award has been given to many prominent physicists, including Richard Garwin, Hans Bethe, Wolfgang Panofsky, Andrei Sakharov, and Jack Gibbons. Upon receiving the Szilard Award, Gibbons, the former director of the Congressional Office of Technology Assessment and the present Science Advisor to President Clinton, stated that "Szilard should be the patron saint of OTA!" Many of us fondly remember Trude Szilard, who joined in the early years in presenting the Szilard Award at

the Washington APS meetings. More recently, the Szilard award has been enhanced by adding a sculpture of a dolphin which travels from winner to winner.

*David Hafemeister teaches courses on physics and arms control as a professor of physics at the California Polytechnic State University. He has held positions on arms control matters in the State Department, in the Senate Committees on Foreign Relations and on Governmental Affairs, and in various universities.*