

Evolution of the UT–Oak Ridge partnership described in new book (part 1)

(As published in The Oak Ridger’s Historically Speaking column the week of September 23, 2024)

Carolyn Krause has written a series of three articles based on a recent talk to Friends of Oak Ridge National Laboratory by Lee Riedinger on a 2024 book he coauthored with Al Ekkebus, Ray Smith and William Bugg on “Critical Connections: The University of Tennessee and Oak Ridge from the Dawn of the Atomic Age to the Present.” This article also draws from the book as well as a book by Alvin Weinberg, research director and director of ORNL for 26 years.

In 1940, the University of Tennessee in Knoxville was poorly managed by its president and poorly funded by the state. It had no doctoral programs, and the faculty conducted little research. In 1948, Clinton Laboratories in nearby Oak Ridge was facing a challenge to its survival as a major designer of new types of nuclear reactors.

During the Manhattan Project (1943-45), the Oak Ridge lab had distinguished itself by building the world’s first continuously operated nuclear reactor, demonstrating the production and separation of plutonium from the reactor’s neutron-irradiated uranium fuel, and shipping small quantities to Los Alamos, N.M. At the laboratory there it was decided after examining the Oak Ridge samples that a new weapons design was needed to detonate a bomb fueled with plutonium – what became the first atomic bomb upon completion of the Trinity test in July 1945 in the New Mexico desert.

Robert Oppenheimer, former scientific director of the Manhattan Project and director of the Los Alamos lab, had stated in 1947 as a member of the Atomic Energy Commission General Advisory Committee that the Clinton Laboratories were not worth saving. He said, “Most of us think that the evidence is that Clinton will not live even if it is built up” and suggested that Clinton Laboratories be limited to research on and production of radioisotopes.

Much to the dismay of Oak Ridgers, the AEC decided to relocate all reactor research to Argonne National Laboratory near Chicago, which would reduce employment in Oak Ridge. Alvin Weinberg became research director in late 1947 of Clinton Labs and later director in 1955 of what became ORNL (also called X-10). He wrote in his 1994 book “The First Nuclear Era: The Life and Times of a Technological Fixer” that “I remained preoccupied with the laboratory’s survival and therefore with defining the purpose of the laboratory.

“I had faith that if Clinton pushed the case for breeder reactor development, the AEC’s decision to move all reactor development to Argonne would never be implemented – and this is what actually happened.” It also helped that the Air Force wanted Oak Ridge to develop a nuclear reactor to propel aircraft.

In his talk on the “Evolution of the UT–Oak Ridge Partnership” to Friends of ORNL, Lee Riedinger, lead author of the 2024 book “Critical Connections: The University of Tennessee and Oak Ridge from the Dawn of the Atomic Age to the Present,” argued that the survival of ORNL was aided by the evolving UT-ORNL partnership. By the end of the 1940s, he indicated, the two institutions began finding ways to form mutually beneficial partnerships that lifted each other to new levels.

Since 2000, UT, which had become a respected research university, has partnered with the Battelle Memorial Institute (UT-Battelle) to manage ORNL, the Department of Energy’s largest science and energy lab in the nation. Riedinger is emeritus professor of physics at the University of Tennessee and emeritus director of the Bredesen Center on the UT campus. In the early 2000s he was deputy director for science and technology at ORNL.

In his talk he mentioned the critical points at which connections were made decade by decade, primarily between UT and ORNL. He said the partnership began in the fall of 1945 when Martin Whitaker, director of Clinton Laboratories, requested that UT establish and teach graduate courses in the sciences to help the lab retain valuable researchers who wanted to get Ph.D.’s in their fields. UT initially taught two graduate courses in physics onsite at the lab.

In the spring quarter of 1946, UT offered graduate courses in chemistry, chemical engineering, mathematics and physics for Oak Ridge contractor employees and Army personnel. The formation of UT’s Oak Ridge Resident Graduate Program marked the beginning of the official UT-Oak Ridge partnership. Graduate courses were held after work for ORNL employees and others at Oak Ridge High School.

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In September 1945 a party was held to welcome nuclear physicist Kay Way back to the UT faculty. She had worked at the University of Chicago’s Metallurgical Laboratory. At the party she mentioned that several Midwestern universities were exploring the formation of a consortium with the Met Lab, which became Argonne National Laboratory. She suggested that a similar consortium of southern universities might be willing to form a partnership with Clinton Labs so faculty and students could take advantage of its facilities and expertise and so lab researchers could benefit from collaborations with university professors.

On Dec. 5, 1945, William Pollard, professor of physics at UT and a former researcher on gaseous diffusion for uranium enrichment at Columbia University, seized upon Way’s idea and organized the Conference on Research Opportunities in the Southeastern U.S. at the Andrew Johnson Hotel in Knoxville. The goal was to figure out how to leverage Oak Ridge facilities for the benefit of universities. Representatives of UT and nine universities attended. Pollard was appointed chair of the committee charged with taking the next steps to form a university consortium.

The second critical connection, Riedinger said, was the formation in October 1946 of the Oak Ridge Institute of Nuclear Studies (ORINS), which consisted of 14 member universities including UT and Vanderbilt University. Pollard was the director until 1974. In 1966 ORINS was renamed the Oak Ridge Associated Universities (ORAU).

Riedinger said that ORINS helped make the case for continuation of Clinton Laboratories when many feared the government would close the facility after World War II. In his book, it is stated that “ORINS members were not happy, because their prospects for future research at Clinton now appeared greatly diminished. Stridently worded letters and telegrams were sent to AEC commissioners and President Truman, protesting the decision and its effect on southern universities.”

In his book, Weinberg wrote that “once ORINS was established, it supported the laboratory’s case for survival as an important center of basic research.”

Riedinger suggests in his book that AEC Chairman David Lilienthal helped ensure the survival of Clinton Labs. On Feb. 1, 1948, he announced over the radio that the lab would henceforth be known as Oak Ridge National Laboratory. He said he wanted “ORINS to play a major role in ORNL and noted that he had been involved in the institute’s incorporation (he was one of the members of the early board of directors of ORINS).”

The third critical connection Riedinger mentioned was the formation in 1948 of the UT-AEC Agricultural Research Laboratory, as researched by Al Ekkebus. Because it was believed that 50 cows were affected by the radioactive fallout from the Trinity test, they were sent to Oak Ridge in 1948 for monitoring. They grazed on 5000 acres along Bethel Valley Road where the new Ag Research Lab was set up.

Riedinger reported that the Oak Ridge scientists found no long-term effects of the fallout exposure on the cows. They arrived in Oak Ridge with gray hair but their normal hair color returned. The 33 calves produced by the exposed cows were born normal, and no evidence of adverse effects on cow fertility was observed. The milk from the cows was not radioactive.

An early experiment that helped launch the field of nuclear medicine, Riedinger said, was performed in 1949 in Oak Ridge. Radioactive gallium-72, which has a 14-hour half-life, was produced in ORNL’s Graphite Reactor and transported to the Ag Research Lab for injection into a pig. Researchers from Bethesda Naval Hospital in Maryland suspected that the element gallium concentrates in cancerous tumors on bone but needed experimental proof, so they worked with the team of Cyril Comar, director of the Ag Research Lab.

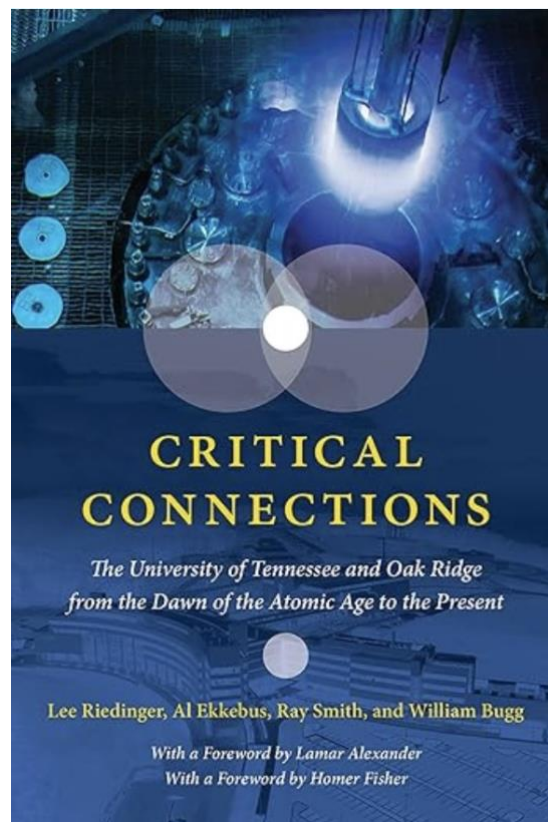
The experiment on the 100-pound pig was a success, stated the book, “as the autopsy showed that gallium did concentrate in the bone, which meant that a therapeutic dose of radioactive gallium could be delivered to a bone tumor for the purpose of killing the tumor.”

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A sidebar on the experiment in the book indicated some difficulties that had to be overcome at the Ag Research Lab [which was renamed the Comparative Animal Research Laboratory (CARL) in the 1970s]. It took six men to lift the heavy pig onto the autopsy table. Room ventilation had to be improved so that the staff would not pass out delivering a large ether dose to the pig to anesthetize it. Delivery of the gallium was late because the truck ran out of gas. To reduce the foul odor from the dying pig, one technician sponged it with Chanel No. 5 perfume. But the experimental results led to beneficial treatments of humans suffering from bone cancer.

Next: The evolving UT-ORNL partnership in the decades of the 1950s and 1960s



Critical Connections book is available on Amazon.com

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A good crowd attended the presentation



Lee Riedinger speaks to the Friends of ORNL audience about the content of *Critical Connections*