

Cobalt Blues



Portrait of Leonard Grimmitt 1949 [1]

Peter R. Almond

Cobalt Blues

The Story of Leonard Grimmett,
the Man Behind the First Cobalt-60 Unit
in the United States

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Houston
USA

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*To my wife June who for the last
ten years has indulged my passion for
Grimmett and the cobalt unit*

Foreword

Leonard George Grimmett was an Englishman who came to Houston in 1949, sight unseen, to start a physics department at a brand new institution. Unfortunately, he died suddenly of a heart attack 28 months after arriving in Houston. I had no intention of writing his biography and was in fact researching the life of another Englishman who had come to Houston 37 years earlier, also sight unseen, to start a physics department in a new institution. His name was Harold Albert Wilson who came to Houston in 1912 as chairman of the physics department at the Rice Institute, the year Rice admitted its first students. Wilson was one of a group of extraordinary young men who had studied physics at the Cavendish Laboratory at Cambridge University at the turn of the century under J. J. Thomson. Four of the group would receive Nobel Prizes, J. J. Thomson (1906), Ernest Rutherford (1908), C. T. R. Wilson (1927), and Owen Richardson (1928), and yet it was said that H. A. Wilson was the best in the group. Given that fact I was intrigued as to why Wilson would come to a small town on the edge of civilization to an institution that had not even started, especially when universities like Princeton and Columbia were interested in him. I was researching the answer to these questions for articles to be published by the Rice Historical Society when I came across some of Grimmett's early letters. Wilson's sister had married Owen Richardson and although Wilson kept few, if any, of his personal papers, Owen Richardson kept everything and filed them away, including letters to his wife and mother-in-law who in later life lived with them. Being a recipient of the Nobel Prize in Physics, his papers were of interest to science historians and after his death they were acquired by the University of Texas. While reviewing Harold Wilson's letters in these files in Austin, I was surprised to see the name of Leonard George Grimmett in the catalogue. I knew who Grimmett was but did not know of the connection between Grimmett and Richardson. The files contained letters from Grimmett to Richardson spanning nearly 20 years from 1926 to 1943. They started when Grimmett was a young undergraduate at King's College in London, where Richardson was chairman of the physics department, seeking to do research for Richardson, continued while Grimmett was a research student under Richardson and finally when he was a professional medical physicist. Although the correspondence ended while

Grimmett was still working in London I wondered if he knew, when he decided to come to Houston, that Richardson's brother-in-law, Harold Wilson, was head of the physics department at the Rice Institute in the same town; did that play any part in his decision to come and did they ever meet?

As a result of the articles published by the Rice Historical Society I learned that Grimmett's secretary¹ was still alive and living in Houston. When Grimmett died unexpectedly she had had the responsibility of collecting his personal affects; not knowing or being told what to do with them she put them in a suitcase where they had been kept in her attic for over 50 years until I contacted her. The contents of the suitcase began to answer the above questions and helped explain the close connection between the departments of physics at Rice University and the M. D. Anderson Cancer Center. It also opened up a whole new world about Leonard Grimmett, his life, and his quest to improve upon the tele-radium treatment units by replacing the radium with a more suitable lower costing artificial radioactive isotope.

A word about institutional names: many of the institutions mentioned in this account have undergone various name changes over the years. When recounting specific events I have used the names of the institutions as they were known by at the time of the event. When the institutions are referred to in a more general context I have used the names they are known by today. For example, Rice University was the Rice Institute until 1960 when the name change took place. For most of this account therefore it will be called the Rice Institute. The University of Texas M. D. Anderson Cancer Center (MDACC) is the current designation for what was called, when Grimmett arrived in Houston, the M. D. Anderson Hospital for Cancer Research of the University of Texas. This in most cases has been shortened to M. D. Anderson Hospital (MDAH), the name it is still referred to by the local population.

The Oak Ridge Institute for Nuclear Studies (ORINS) changed its name to Oak Ridge Associated Universities (ORAU) in 1966. Since this was long after the events in this book ORINS will be used throughout.

For the physicist the meaning of the designation 'medical physicist' or its derivatives, for example, 'hospital physicist' or 'physicists in medicine', has not changed over the years. The same is not true for the clinicians. The general term for physicians using radiation is 'radiologist' both in imaging, where the more specific term 'diagnostic radiologist' might be used, and in therapy. However, to distinguish the physicians who treated with radiation from those who diagnose with radiation, the term radiotherapist came into use around 1950. Today the term 'radiotherapist' designates the technologists who treat patients on the machines and the MDs are now called 'radiation oncologists'. Since that term had not come into use during the time period of this book, the term 'radiotherapist' will be used in this book unless the modern term 'radiation oncologist' is more appropriate.

¹ Her name was Shepley, née Kocian. She died in 2007, while this book was being written but not before she met Grimmett's last surviving relative, his niece.

Exact quotes from transcripts, memos, letters, newspaper accounts, and interviews are either in quotation marks or indented.

The book has been written using only simple physics and mathematical concepts. The design and use of a cobalt-60 treatment machine depends upon some understanding of the treatment of cancer with radiation and the medical physics concepts involved and these have been outlined in Appendix A. The actual production of the radioactive cobalt-60 requires some knowledge of activation of materials in a nuclear reactor. Since this is the area in which the M. D. Anderson Hospital machine ran into problems that delayed its initial use and resulted in, what is called here, the “Cobalt Blues”, a short primer on production of radioactive cobalt-60 in a reactor is given in Appendix B.

Acknowledgments

This book would not have been possible without the help and support of many people and I am indebted to all of them. In particular, Lesley Brunet and Javier Gaza at the Historical Resource Center of the University of Texas M. D. Anderson Cancer Center made available to me the archives of the University of Texas M. D. Anderson Cancer Center and the Texas Medical Center and provided help and insight in locating material helpful to this project.

Mrs. Jane Dyer of England, Grimmert's niece and only surviving family member, provided much useful information. Not only about Grimmert's family but located material about his career from the National Archives at Kew in England.

Mrs. Trudy Shepley née Kocian who had been Grimmert's secretary in Houston provided invaluable information about Grimmert's time at M. D. Anderson Hospital and had kept some of his personal papers (which were later donated to the Historical Resource Center) without which this project would not have been possible.

I am indebted to a number of people who knew Grimmert when he was in Houston and who graciously spent time with me recounting their memories of him, including Jorge and Harriet Awapara and Mrs. Jasper Richardson. In particular Dr. Robert Shalek, whom Grimmert hired as a graduate student and who later became chairman of the physics department, provided many interesting insights about Grimmert and his relationship to Fletcher.

I wish to acknowledge my thanks to Dr. Thomas Fletcher and Mr. Walter Fletcher, Fletcher's sons for very helpful conversations about their father and for donating invaluable material to the Historical Resource Center at the University of Texas M. D. Anderson Cancer Center.

In addition to the Historical Resource Center at the University of Texas M. D. Anderson Cancer Center the John P. McGovern Historical Collections and Research Center at the Houston Academy of Medicine-Texas Medical Center Library also provided helpful documentation.

I also wish to express my thanks to the UNESCO archives in Paris, France, to the Welcome Library in London, England, the University Archives of the University of Illinois in Urbana, Illinois, to the Harry Ransom Center at the

University of Texas, and the Niels Bohr Library and Archives at the American Institute of Physics and their helpful staffs for helping locate additional material about Grimmett.

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Prologue

On August 6, 1945 during World War II the United States of America exploded an atomic bomb over Hiroshima, Japan, followed 3 days later by a second bomb dropped on Nagasaki. Over 100,000 Japanese were killed and both cities were devastated. The next day, August 10, 1945 Japan surrendered and World War II ended. Almost one year later on August 1, 1946 the United States Atomic Energy Act was signed into law transferring the control of atomic energy from military to civilian hands, under the auspices of the United States Atomic Energy Commission (USAEC). It was strongly felt that atomic energy should be used to promote world peace and improve the public welfare as much as, if not more than, for nuclear weapons.

In Tennessee, The University of Tennessee joined with 14 other southern schools to form the Oak Ridge Institute of Nuclear Studies (ORINS) to take advantage of the opportunities offered by the Oak Ridge National Laboratory that had been an integral part of the atomic bomb project. On October 17, 1947 ORINS received its charter of incorporation. Early in its history medical research became an important focus and in 1948, the Atomic Energy Commission authorized ORINS to establish a clinical research program to study the use of radioactive materials in treating and diagnosing diseases and to set up a cancer research hospital. A newspaper headline of the day declared: "*Cancer Cure found in the Fiery Canyons of Death at Oak Ridge,*" referring to thyroid treatment with radioactive iodine [2].

The Manhattan project that had developed the atomic bomb was a joint effort between US, British, and Canadian scientists and a large number of British scientists had moved, during the war, from Britain, mainly to Canada but some to the United States, to aid in the effort. The British medical physicist, Leonard George Grimmett was working for the Medical Research Council (M.R.C.) in London at the time and enquiries were made about his participation but:

He declined to assist in the atomic bomb development. 'I don't mind killing Germans in odd numbers' he said with a wry grin, in oblique explanation [3].

Grimmett was an expert in the use of radium to treat cancer and in the safe handling and measurement of radiation and radioactive materials in clinical situations. He had spent the best part of his career devising better, safer, and more efficient ways to treat cancer with radiation and he remained in England during the war. Then in 1948 while working for UNESCO in Paris he received an offer he could not refuse the, "... *post as physicist to a new 'Cancer Research Institute and Atomic Center' in The University of Texas*", [4] one of the original universities in the ORINS' consortium. Thus was set in motion the events that would lead Grimmett to Houston, Texas and to be the first person to publish, in 1950, the design of a cobalt-60 radiation therapy unit for the treatment of cancer. For the next 25 years cobalt-60 units would be the mainstay of cancer radiation therapy, treating millions of patients worldwide. Grimmett, however, would not live to see the completion of his work. This is his story.



Logo of the U.S. Atomic Energy Commission [5]

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Abbreviations

A.E.C.	Atomic Energy Commission
AECL	Atomic Energy of Canada Limited
BIR	British Institute of Radiology
BOAC	British Overseas Airways Company
C.C.I.R.U.R.S.I.	International Consultative Committee for Radio Communications of the International Union of Radio-Science
D.S.I.R.	Department of Scientific and Industrial Research
DBM	Division of Biology and Medicine
G.E.	General Electric
HPA	Hospital Physicists' Association
JAMA	Journal of the American Medical Association
MIT	Massachusetts Institute of Technology
MDACC	MD Anderson Cancer Center
MDAH	MD Anderson Hospital
MRC	Medical Research Council
NRX	National Research Experimental Reactor
ORINS	Oak Ridge Institute for Nuclear Studies
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNO	United Nations Organization
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation