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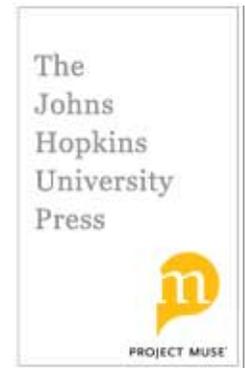
Under Ice: Waldo Lyon and the Development of the Arctic  
Submarine (review)

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**Under Ice: Waldo Lyon and the Development of the Arctic Submarine.**

By William M. Leary. College Station: Texas A&M University Press, 1999.  
Pp. xxvii+303; illustrations, notes/references, bibliography, index. \$32.95.

William Leary uses the career of U.S. Navy scientist Waldo Lyon to trace the evolution of the United States under-ice submarine program, and in the process he offers readers an interesting look at naval research and development at the height of the cold war. *Under Ice* is based largely on Lyon's voluminous personal papers, as well as the records of the Arctic Submarine Laboratory, which he directed. The book will be of interest to military historians and those interested in submarine technology.

A physicist, Lyon joined the navy's Radio and Sound Laboratory in San Diego in 1941. On the basis of his work in underwater acoustics, he believed that with the proper equipment U.S. submarines could operate in and around the Arctic. By 1948 tests in the Arctic had convinced Lyon that submarines would soon be able to transit under the polar ice pack. The navy scoffed that the prospect of a "trans-Arctic submarine" remained "in the realm of fantasy" (p. 28). But Lyon was not easily discouraged. A quiet, methodical man, he and his colleagues at the Navy Electronics Laboratory launched numerous expeditions during the 1940s and 1950s to collect oceanographic information on the Arctic. Operating from icebreakers, submarines, and ground stations, they mapped the ocean floor, collected information on ocean currents, studied water conditions, and investigated the physical properties of sea ice.

In 1954, after the navy refused to modify a fleet submarine for under-ice experiments, Lyon and his staff began building an "arctic pool" where they could study sea ice and test equipment destined for Arctic operations. But ultimately it was the introduction of the nuclear submarine that made Lyon's vision of a true under-ice submarine possible. In 1958 the USS *Nautilus* completed the first successful transpolar crossing, and a year later the USS *Skate* surfaced at the North Pole. Lyon made both cruises. Along with his other duties, he spent long hours operating the experimental sonar systems that guided the submarines through the shallow, ice-choked seas. Yet, despite the widespread publicity the Arctic cruises received, the navy failed to share Lyon's unbridled enthusiasm for Arctic operations. Beginning in the 1970s, support for the navy's under-ice submarine program began to dwindle. Soon Lyon's operating budget was under siege, and in 1977 the navy started closing some of the Arctic Submarine Laboratory's research facilities. Lyon remained director of the laboratory until 1984, however, and spent the final years of his career trying to preserve the institution he had helped establish.

With Lyon as the focal point, Leary uses the book to tell two stories. The first is an engaging account of the early days of the navy's Arctic submarine

program, an adventure filled with aggressive commanders, superb seamanship, and plenty of anxious moments under the ice. The second is a well-nuanced examination of Lyon's career that illuminates some of the cross-currents of cold war research and development. Lyon had a complex role within the navy's R&D community, for he and his small staff "operated with one foot in the submarine, one foot in the sea, and hands in the laboratory" (p. 256). Practical necessity required that Lyon act as chief scientist, engineer, and program advocate. He was effective in all three roles, and over the course of his forty-year career he won the respect of his military and civilian colleagues, not to mention numerous government awards. In a broader sense, this quiet scientist was representative of a generation of earnest, hardworking civil servants who made substantial contributions to national defense that often went unnoticed outside their own fields. Such recognition is long overdue.

*Under Ice* is an intriguing case study that offers readers a glimpse into the realities of military research and development in a government laboratory. The book does have a number of limitations, however. Readers should note that it is not an analysis of the development of the U.S. Navy's under-ice submarine. In his enthusiasm for telling Lyon's story, the author failed to adequately ground Lyon's scientific work within the broader context of cold war military research and development. As a result, Lyon's accomplishments are often examined in isolation, and their significance remains unclear. The history of the Arctic Submarine Laboratory itself is also pushed to the background, and without that organizational framework it is difficult for the reader to determine how it was organized, what its mission was, and even when it was established. These omissions reduce the effectiveness of an otherwise interesting book.

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Dr. Lonquest is a historian with the U.S. Army Corps of Engineers at Fort Belvoir, Virginia. He has written on Simon Lake and the development of American submarines, as well as on broader issues of military research and development.