Naval War College Review

Volume 54
Number 3 *Summer*

Article 28

2001

The Legacy of the White Oak Laboratory,

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forces of the Napoleonic era. Some of the actions described here are worthy of the best adventure fiction. Many boats ran agents, supplies, and weapons to the underground forces resisting Nazi occupation. For example, the 30th MTB Flotilla's boats often hid in caves along the Norwegian fjords or crept along dark "leads," dodging German patrols while seeking contacts and recruits among the occupied population. MTBs carried the kidnapped German general Werner Kreipe off Crete and transported him to Egypt for interrogation. They also played a deadly game of hide and seek with the Axis navies and the Luftwaffe in the Aegean Sea and among Yugoslavia's coastal islands. Wherever they served, the dog boats were the force of choice for engaging the enemy closely—and they paid dearly for it, losing 273 officers and men killed in action.

Some 228 dog boats were built between November 1941 and April 1945. They fought in over three hundred actions, sinking and damaging innumerable Axis vessels while losing some thirty-seven of their own. On the basis of eight years of research in official records and interviewing people involved, Reynolds has compiled as complete and accurate a record of the dog boats' actions as humanly possible. *Dog Boats at War* is a brilliant, if occasionally dry, treatment of an important and all but ignored part of the Royal Navy's history in World War II. It is worth its price, and I hope it will be followed by similar works on the Coastal Forces' other elements.

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Anspacher, William B., et al. *The Legacy of the White Oak Laboratory*. Dahlgren, Va.: Naval Surface Warfare Center, 2000. 503pp. (Available by e-mail at mrspat@gateway.net or by phone [301] 439-3140). $42

The Navy has had a remarkable and productive group of in-house research and development laboratories. Sadly, with the drawdowns of the post–Cold War era, many have been closed, among them the "White Oak Laboratory"—the Naval Ordnance Laboratory at White Oak, Maryland. WOL, as it was popularly known, gave the Navy a tremendous legacy of technology, weapons, and people. Fortunately, that legacy has been preserved by William Anspacher, Betty Gay, Donald Marlowe, Paul Morgan, and Samuel Raff in this richly detailed account of the laboratory's history.

First, the required disclaimer: this reviewer spent twenty years of his midcareer with WOL. And good years they were.

The laboratory was built in 1946 in what was then remote suburban Maryland, where ordnance testing would presumably not disturb the neighbors. It was an outgrowth of the Mine Building at the Washington Navy Yard, and mine development was the core of its original work. From it came the Navy's postwar mines: the Mark 50 series, CAPTOR, the submarine-launched mobile mine, and the Destructor series.

In 1948, high-mach-number wind tunnels captured at Peenemunde, Germany, were installed at WOL and became operational. With these, the laboratory began a new line of technological development for the Navy. From those first tunnels grew a series of hypersonic wind tunnels that gave engineers the ability to test reentry vehicles at speeds up to Mach 14.

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In addition to military work, the tunnels were used by the space shuttle program to study reentry forces. The laboratory became the nation's center of excellence in hypersonic aerodynamics.

White Oak was never a "big systems" center, and in that lay the roots of its ultimate demise. Rather, it was a technology center, focusing on ordnance and system components.

From 1946 on, the laboratory created extensive expertise for the Navy in explosives, warhead design, fuzing, metallic and nonmetallic materials, magnetic silencing, nuclear weapons effects, and underwater acoustics. The authors devote substantial chapters to each of these—the people, the anecdotes, the products, and the fleet applications. Describing them all is beyond the scope of this review; that pleasure is saved for the reader. Fleet-savvy readers will recognize many WOL-developed components in the systems they use today.

Magnetic-silencing research necessitated the construction of a unique building made entirely of wood and nonmagnetic metals. Up close it looked more like the work of a cabinetmaker than a government-contracted building. Magnetic-signature and degaussing work at WOL led to the development and fielding of the drive-through deperming facilities for submarines at Kings Bay, Georgia, and Bangor, Washington.

The Naval Science Assistance Program, under whose aegis laboratory scientists were assigned to major fleet commands to solve technical problems and introduce new technical concepts, was created and managed at WOL. Two generations of Navy scientists went to sea, wrung salt water out of their socks, gave the Navy new tricks, and returned with solid understandings of their ultimate customer.

Technology developed at WOL spun off new and unanticipated applications in the civilian world. Nitnol, a metal alloy with temperature-stimulated memory properties, found use in orthodontics. Research in the mathematics of nonlinear systems led to techniques for controlling heart arrhythmia, making a chaotic heartbeat a regular one.

The legacy of the laboratory for the fleet is in the technology and hardware now deployed; the legacy in the hearts of the alumni and alumnae (and there are many of the latter) is in the people and the images. Fortunately, the authors have done them all full service. The book is generously illustrated and filled with the people, from the recipient of two Nobel Prizes in physics to the fellow who liberated a fire truck from another government installation—White Oak didn't have one.

Beyond being a fine institutional history, the book is a valuable study in public administration as practiced for military research and development. The authors have unearthed and analyzed an impressive amount of bureaucratic history involving all the players in the Navy's research and development hierarchy.

In their analysis, the White Oak Laboratory suffered from not having a platform-based mission. As an ordnance and technology laboratory, it was not the creature of any of the Navy's controlling baronies—air, surface, or submarine. The laboratory served them all but had the prime responsibility for no platform-based major weapon system. Thus it was always just outside the door, looking through the window but not sitting at the table.

In 1974 the White Oak Laboratory was merged with the Naval Weapons Laboratory at Dahlgren, Virginia, to become half of the Naval Surface Warfare Center, and it found itself in the surface warfare community. A long, painful, but inexorable decline in the laboratory's fortunes began. The authors' detailed and insightful treatment of this period, with all its bureaucratic infighting and personalities, is an important part of the book. At its core, the lesson in public administration is that pure technology and elegant components alone are not a sufficient raison d'être in the military research and development world. Such an institution must have a clearly defined customer base and serve it with comprehensive integrated systems.

In 1996, the White Oak Laboratory was closed, and its people and projects were sent to other naval centers. At this writing the grounds and main buildings are expected to become new laboratories for the U.S. Food and Drug Administration. This is not unfitting. A plaque in the lobby will remind everyone of what was once accomplished there for the Navy.

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