The mobilization of science

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The War of Invention: Scientific Developments 1914–18. By Guy Hartcup. *Brassey's:1988. Pp.226. £24, $43.*

IN A characteristic memorandum written shortly before the First World War, an exasperated Sir John Arbuthnot (later Lord) Fisher vented his spleen over the Admiralty's inability to grasp the potential importance of the submarine in warfare: "There is a strong animus against the submarine — of course there is! An ancient Admiralty Board Minute described the introduction of the steam engine as fatal to England's navy. Another Admiralty Board Minute vetoed iron ships, as iron sinks and wood floats".

The submarine and other new technologies were widely regarded with suspicion by the pre-War military establishment — another admiral, A.K. Wilson, described the submarine as "underhand, unfair, and damned un-English". The meddling of scientists in matters of warfare was resented by the military establishment and senior civil servants, and there was also the question of status. What was the social rank of a scientist? Even the term was relatively new, and for most people there was little to choose between a 'scientist', an engine-driver and a man who repaired machines. The question of the standing of the civilian scientists and engineers in the Royal Navy remained a hotly debated issue for many years, until the Royal Navy Scientific Service was firmly established.

As Hartcup's book shows, the First World War had a dramatic impact on military scientific research and development. The general assumption was that the war would be over quickly. But when it became apparent that this would not be so, it became imperative to explore all avenues — even science — in order to stop the German war machine. In the words of H.G. Wells, the war had become a "struggle of invention", and many of the country's senior scientists began to complain that their expertise ws not being used to good effect.

The need to manufacture the chemicals, optical glass and other products that could no longer be imported from Germany resulted in the setting-up of the Advisory Council for Scientific and Industrial Research in July 1915, which, as the Department of Scientific and Industrial Research, remained until the 1960s. Shortages could lead to desperate solutions. Nearly 1,000 tons of alcohol, or the equivalent of 200,000 tons of proof spirit, were required for the production of a new variety of cordite, which led to the restricted sale and increased cost of whisky. A bizarre tale told by Hartcup concerns the pressing requirement for field glasses in 1915, which compelled the War Office to open secret negotiations with the German government for the supply of some 32,000 binoculars through a Swiss intermediary, in exchange for rubber.

This slim volume is a synoptic and readable account of how an entire scientific community was mobilized for war work for the first time in history, from the War Committee formed by senior scientists at the Royal Society in November 1914 to the plethora of committees and sub-committees which, by 1918, were dealing with all aspects of scientific warfare. The first idea was to establish a mechanism to evaluate the thousands of unsolicited inventions that poured into the various government departments. The Admiralty's Board of Invention and Research (BIR) — also known in the navy as the "Board of Intrigue and Revenge" because it was headed by the outspoken Lord Fisher — was swamped with some 100,000 inventions, of which perhaps 30 could be developed. The Munitions Inventions Department received 47,949 and the Air Inventions Committee some 5,000, but the number that turned out to be useful was again small. Similar statistics emerge from France and the United States. It was soon realized that the way forward was for scientists to become involved in research towards specific goals. As the author points out, the scientists who were most valuable to the war effort were those who were able to appreciate the nature of a problem quickly and to suggest a method of solving it.

An interesting aspect of the book is the comparison between the military research organization, and the scientific response to war developments by the Germans and by the Allies, although this subject still requires a deeper analysis for both world wars. Hartcup deals succinctly with the organizational aspects and with the 'fruits' of the resulting research. British wartime landmarks were pioneering work in explosives (the rapid development of TNT, Amatol and improved armour-piercing explosives), aerodynamics, underwater acoustics (for detecting submarines), chemical warfare and the treatment of infectious diseases. Many of the actual instruments of warfare had their origins in the decade or so before the war, but their development was accelerated dramatically as a result of war research.

This book illustrates — although perhaps does not emphasize enough — that the development of wartime technologies is governed by an intricate web of factors: scientific, bureaucratic, tactical and political. It covers the scientific developments of the main protagonists in the First World War, and is best on British events. Military research is a mixture of fundamental science and research and development; the goal is not the elucidation of a basic principle, but the development of an operational device. During the First World War, a large number of civilian scientists, engineers and technicians were introduced to war research for the first time. Those who remained in service after the war formed the core of what has evolved into Britain's present-day military research complex. □

A fish hydrophone for detecting U-boats is lowered into the sea, October 1917.

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