



NOVEMBER 1918: THE FIRST WORLD WAR ENDS



➔ **FEW 100-YEAR ANNIVERSARIES** resonate so loudly as November's marking of the end of the world's first truly global armed conflict. The war's unspeakable carnage scarred the memory of a generation, but its most tragic legacy was the resulting Communist rule in Russia (1917), Fascist rule in Italy (1922), and Nazi rule in Germany (1933). Those developments led to the Second World War, which killed even more people and left direct and indirect legacies—including NATO vs. Russia and a divided Korea—that still trouble our lives. • Even though World War II was deadlier, a case can be made that the first war constituted the critical disaster, as it gave rise to so much of what followed. True, the second war deployed far greater advances in destructive power, including the fastest fighter planes ever powered by reciprocating engines, enormous four-engine bombers (the B-17), missiles (the German V-1 and V-2), and at the war's very end, the nuclear bombs that destroyed Hiroshima and Nagasaki. • In comparison, World War I, with its entrenched and barely shifting fronts, was a decidedly less dynamic conflict. But a closer look shows that purely technical advances were indeed critical for lengthening its duration and adding to its death toll. • Leaving aside the use of poisonous gases in combat (never repeated on such a scale), several key modes of modern warfare were developed and even perfected. The first diesel-powered submarines were used on long forays to raid convoys of merchant ships. The first tanks were deployed in combat. The first bombing raids, using both dirigibles and airplanes, were mounted. The first battle-ready aircraft carrier was launched in 1914. The French successfully tested portable transmitters enabling voice communication from the air to the ground in 1916 and from air to air in 1917,

beginning the long road toward ever smaller, ever more usable electronic components.

Amid all these developments, we must single out the momentous innovation that allowed a blockaded Germany to endure its two-front war for four years: the synthesis of ammonia. In 1909, Fritz Haber, a professor at the University of Karlsruhe, ended the long-running quest for this goal by employing an iron-based catalyst to synthesize ammonia from nitrogen separated from air and from hydrogen produced, at that time, by hydrogenation of coal.

By October 1913, BASF (then the world's leading chemical conglomerate), under the leadership of Carl Bosch, embodied the process in the world's first ammonia plant, in Oppau. This synthetic ammonia was meant as fertilizer, and more than any other invention, it helped to launch the Green Revolution, which has fed the world ever since.

Less than a year later, when the war began and the British Navy cut Germany off from Chilean nitrates, there was thus a ready substitute. But instead of converting ammonia into solid fertilizer (above all sodium nitrate), BASF began to mass-produce the compound for conversion into nitric acid to be used in the synthesis of wartime explosives. A larger ammonia plant was completed by April 1917 in Leuna, west of Leipzig, and the combined production of the two plants sufficed to support Germany's manufacture of explosives until the war's end.

The new power of industry to find ways around every shortage helped to drag out the war, adding millions of casualties. This terrifyingly modern development belies the war's primitive image, framed by prolonged stalemates in muddy trenches—and it paved the way to even greater carnage a generation later. ■

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