THE CHEMIST AS DEFENDER OF HIS FATHERLAND

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At the beginning of man's history upon this planet, the struggle against his environmental enemies did not differ radically from that of other mammalia of that era, nor had he much more control over the forces of his universe. As a reasoning creature, however, he soon learned from experience, and this fund of experience, passed on from generation to generation and steadily augmented, has given him an ever-increasing knowledge of the laws which govern our little world and how they can be made to execute his will.

As science advances, warfare changes. Methods of fighting inconceivable to our ancestors occupy the center of the stage to-day, and future wars will see still other methods employed of which we do not as yet even dream. One by one, man's fighting weapons have been rendered obsolete by the appearance of new and more potent ones, or ineffective through the development of an adequate defense. The bow and arrow displaced the war club and grew into the cross-bow; but the archers were put out of business by the introduction of body armor, which lost its value in turn through the discovery of gunpowder and firearms. The contest between artillery and above-ground fortifications was decided definitely in favor of the former in the early days of the world war, and men sought refuge in trenches and dugouts, there to be asphyxiated by the toxic gases later employed, until protection was supplied by gas masks and dugout blankets. In the year 1862, in my own country, the navy boasted of its wooden fighting ships. No one dreamed of ironclads; but in that same year the Merrimac destroyed the Union Fleet in Hampton Roads, and wooden war vessels gave place to the steel battleship, which has itself become the prey of the submarine and of the airplane. The operation of both land and sea forces is now subject to domination by the military forces in the air, whether the planes are discharging huge aerial tor-
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