

Science Goes to War

A Race for Chemicalization - The Land Battleships - The Robot of the Skies - Hell at the Front

by Bertram D. Wolfe

Science was never completely harnessed to the war chariot until the epoch of imperialism, of capitalism in decay. No first rate scientific mind was ever interested in the problem of mass destruction until modern imperialism mobilized all industry in its service, and with it, the most advanced technique of modern science. In the later part of the World War, the mobilization of science was just beginning to gain headway. When the war ended, armies and industries were demobilized. Science was not!

A Race for Chemicalization

"Brains, not numbers," writes the President of the American Chemical Foundation, "the nation holding the potent secret formulae, the most deadly poisons, will hold the offensive."

"The full story of what chemical warfare may be like is still untold. Peace pacts, agreements and protocols expressly forbid the manufacture and storage of lethal gases, yet all the large powers retain chemical warfare services and continue to develop new poisons. Thirty asphyxiating gases were known at the beginning of the war; today there are more than 1,000. In vaults and secret archives of all large nations repose the structural formulae and chemical equations of still other toxins whose potency can only be surmised."

"Chemical preparedness in the United States is a billion-dollar project sustained and administered by private enterprise and capital, but assignable to the nation on short notice."

"Every nation knows that chemistry can decide controversies, protocols and pacts notwithstanding. The present race for armaments is essentially a race for chemicalization."

In other words, the ink was not yet dry on the Treaty of Versailles when the chemical industries of all countries began in earnest their preparations for a "bigger and better" war!

The Land Battleship

Chemistry is not the only form of "scientific" preparation for the next war. When the first tank was proposed to the British War Office in 1912, a tank much superior in design to that "invented" in 1916, the plans were buried in a pigeonhole with the notation "The man's mad!"

Now there is a grim race for mechanization of the various armies. Inventors vie with each other in the production of faster, huger, more heavily armored and armed, gas-proof, bullet-proof, explosive-flame-and-poison spraying land battleships. In 1924 the British replaced their heavy and sluggish wartime tanks with the new Vickers, capable of 20 miles an hour. In 1925 came a 30-ton battle tank much faster than the 10-ton and with big guns in a revolving turret. The French in 1930 boasted forty-six battalions of tanks comprising more than 3,000 machines. They have armor one and one-eighth inches thick. Recently they introduced a seventy-ton tank (70 tons—140,000 lbs.) carries armor over 2 inches thick. Machine guns are as useless as rain drops against it. The Italians have developed the singularly flexible monster Ravesi tank which can climb serpent-like over the most precipitous ground with front half tilted one way and rear another, at the most astounding angles.

The United States have been experimenting on a high speed tank and on January 10, 1931 made its first outdoor trial—a convertible caterpillar speed tank which "travelled about a field here today, at a speed of 45 miles an hour, bumping over logs two feet thick, sloshing thru frozen ponds, spinning about in its own length, mashing barbed wire entanglements and crumpling walls two feet thick. The machine's caterpillar tracks were quickly removed and the tank roared over a paved highway at seventy-five miles an hour!" On caterpillar treads the tank climbed an incline of 45 degrees at 35 miles an hour. The top speed on wheels was reported by the inventor as 90 miles an hour.

At the Aldershot maneuvers of the British army in October 1930 "a new giant tank, like a steel crab on wheels, rumbled across shell holes . . . Old-fashioned caterpillar tanks controlled by wireless fought a battle before the Prime Ministers' (Ramsay MacDonald's) eyes . . .

"The most hair-raising of all the day's monsters was the tank which moved like a crab . . . designed to solve every problem of a shell-torn battle area . . . When it came to gaping craters it simply lifted its wheels in the air one at a time and crawled on the other side. Like the claws of a night mare the tank's wheels stretched from shellhole to shellhole, each with its own grip on the surface."

The Robot of the Skies

One of the marvels upon which

science is working is the robot-steered airplane. Airplanes have already been successfully run by wireless without a human pilot. When perfected, such planes will rise in clouds, steer over industrial centers, drop their charge of explosives or phosphorous fire-bombs or poisonous gases, and return to their base "untouched by human hands". Thus they become projectiles of unimagined range and calibre.

Similarly there are the experiments of Professor Oberth and others with rockets. Professor Oberth in January 1931 developed a rocket weighing 88 lbs. when full and travelling at the rate 9,750 feet a second (nearly two miles a second). He promises the development of missiles "for bombarding an enemy country with a murderous rain of rockets carrying poison-gas containers capable of exterminating whole populations in a few minutes."

Somewhat more remote, but not outside the realms of probability, is the perfection of ray warfare, of which Major-General E. D. Swinton

Phosgene

This was soon "improved" by the addition of carbon monoxide, the deadly element in illuminating gas, to form phosgene. It is much more poisonous than chlorine alone, a little over 2 parts in 10,000 being a deadly concentration. It is an important industrial chemical used in making dyes. Its most important property is *delayed effect*. In low concentrations soldiers may breathe it for hours apparently unharmed. Ten or twelve hours later, they may be in the purest of mountain air, but their lungs fill with liquid and they drop dead.

Tear Gases

Then there are the tear gases. Poisonous in higher concentrations, even the weakest solutions cause intense pain and blinding tears. Should you walk into a room containing only enough to go on the head of a pin, you would feel as though some one were tearing your eyes out with his fingernails. A little over 2 parts in 10,000,000 is enough to cause suffi-

WAR DOGS OF TODAY



of the British Army writes:

"We may not be so far from the development of some kind of lethal ray which will shrivel up or paralyze or poison human beings. . . ."

But rockets and deathrays carry us a slight step ahead of the present "achievements" of Science and those achievements are more than ample to convert killing from retail to wholesale.

Hell At The Front

"Science" is preparing for the front lines a kind of mad nightmare that will make the trench warfare of the last war seem idyllic by comparison.

"Trench warfare passes by the board," writes Garvan. "For what ditch will be safe against a 4000-pound poisonous gas bomb which excavates more dirt in one minute than 25 men and a steam-shovel can handle in four days and haul off with seven trucks? Or survive the crushing impact of an 800-ton steel tank carrying a battery of high-powered poisonous gas-firing guns?"

The "smoke of battle" will linger for days and be used to make areas uninhabitable for weeks and to "occupy" regions without the use of troops.

The rifle will give way to the portable machine gun and chemical grenade. "Flesh and blood cannot advance against machine guns in the proportion in which they are now included in modern armies . . ." declares General H. L. Gilchrist, Chief of the Chemical Warfare Service in his 1929 report to the Secretary of War.

Chemical laboratories will be attached to every company—laboratories on wheels that will manufacture poisons and gases while en route. " . . . We have created a field laboratory for each field army," reports Gen. Gilchrist. Under such circumstances "attacking in open company will mean sheer suicide. Every inch of the body must be insulated with gas-resisting substances." (Garvan).

Poison Gas

Let us look a little more closely at some of the achievements of the science of chemistry. The texts distinguish lethal, lachrymator, sternutator and vesicant gases. Laughing, blistering, coughing, itching, sneezing, choking, vomiting, tear and killing gases, and clouds of suffocating smokes.

These gases are marvelously easy to manufacture for the most part and do their work in incredibly small quantities. The first gas used in the world war at the Second Battle of Ypres was chlorine . . . It is made by the electrolysis of common table salt. Its virtues are that it is dense and persistent (2½ times the density of air) and 2 parts in a thousand will kill in half an hour.

cient pain to make it impossible for you to open your eyes. Another tear gas, Chlor-aceto-phenone is a solid and be scattered by being shot from guns.

The sneezing and vomiting gases contain arsenic and thus not only cause intense pain and irritation of nose and throat and lungs and vomiting, but as after effects produce arsenical poisoning. Diphenylchloro-arsine is a solid and is used in shells, mixed with other poisonous liquids and high explosive charges which scatter it in tiny particles able to penetrate gas masks designed only to absorb gases. "It causes sneezing and severe burning sensations in the nose, lungs and throat in concentrations as slight as one part in ten million. In higher concentrations, say 1 part in 200,000 to 500,000 (2 parts in 1,000,000—B.D.W.) it causes severe vomiting . . . still higher concentrations are serious (i.e. fatal—B.D.W.), as in equal concentrations diphenyl-chloroarsine is more poisonous than phosgene."

Mustard Gas

The vesicants are gases which attack the skin. "Ordinary clothing is converted into a sticking plaster which communicates blisters to the skin." (Garvan) Mustard gas, of which Garvan is talking in the above quotation, causes lesions of the skin and mucous membranes. As little as one part in 14,000,000 is sufficient to cause conjunctivitis, severe inflammation of the eyelids. The gas penetrates the cells of the skin, especially where there is moisture from perspiration as under the arms and in the crotch, and having penetrated the skin is hydrolyzed by the water in the skin cells to form muriatic acid under the skin. It is one of the most poisonous of the gases so far used. Thus 39 parts in one million of air is sufficient to kill a dog, while it takes 2,000 parts in a million of chlorine. In other words it is more than 50 times as effective. Ground saturated with mustard gas contaminates those who pass over it. In the last war it was used as a vapor, but in the next it will be mixed in shells with high explosives so as to be reduced to a fine spray. Then the victim can draw into his lungs enough in a single deep breath, to finish him off.

But the prize gas developed during the last war, too late to be used, was Lewisite. Like Mustard Gas a vesicant, it is much more easily absorbed by the skin, and introduces deadly arsenic under the skin. Three drops on the stomach of a mouse will cause death. It is especially appropriate for airplane bombing, and General Fries, with a touch of poetry, christened it "The Dew of Death."

Next Week:

THE RACE WITH DEATH