

MUSTARD GAS WARFARE

Man Who Makes It Tells of Science's Deadliest Weapon and How United States Army Will Use It in Quantities

MUSTARD GAS, the deadliest instrument of warfare yet devised, is not a gas, but an amber fluid of a faint, sweetish, not unpleasant odor. It is no more volatile than turpentine. It kills by inhalation and maims or blinds by contact. In one recent attack, lasting forty-eight hours, it was estimated that the Germans used 7,000 tons of it.

Now that it has become common knowledge that gas was largely responsible for astonishing enemy successes in the last four offensives, it is possible to give these random facts from the story of "mustard," and to discuss in some detail its properties, manufacture, and history. It is not a story of German chemists more adroit than the Allies in this branch of the lethal arts; for American chemists reported its deadliness and its availability, both to this Government and to the British, before the enemy began throwing it across "No Man's Land." And, although the United States is admittedly behind in its gas program, it may be said, for whatever aid and comfort it affords Berlin, that the kind of mustard gas being manufactured here is one-fourth more toxic than the kind being used by the Germans.

When an official British communiqué last April contained a line that Armentières was "full of gas" and that neither side could enter there, few realized the tragic import of the news. What it meant was that Armentières was full of mustard gas. The gutters ran with the reddish-brown liquid. Phosgene and other poisons evaporate so readily that they do not make any spot untenable for more than a few hours, but "mustard" lingers from two to four days, depending on weather conditions. Several months earlier, at Cambrai, the importance of the weapon had become manifest. British infantry held Bourlon Wood. Again and again German troops were hurled against that redoubtable force. Ten times they attacked, and each time were driven back. Then came the official announcement of the British retirement. But enemy infantry had won no decision. Mustard gas was the victor.

It was about this time that the "Tom-mies" named the stuff. No mustard enters into its composition, but a drop of it on a soldier's sleeve penetrates, and, after the lapse of hours, blisters like mustard. It is a deep burn, and causes great swelling. But mustard gas is so innocent in appearance and so inoffensive to the nostrils that the soldiers were not on their guard against it. The chief sufferers were the artillerymen, who threw aside their masks after working for a time amid it. The masks were of little avail, anyhow, for the kind then in use did not last ten minutes in an atmosphere drenched with the drug.

Such was the new weapon forged by Kaisercraft. Until of late little has been known about it publicly. Major Gen.



Press Illustrating.
Dr. Nernst, German Professor
Who Invented
Poison Gas for
War Use.



Major Gen. William L. Sibert, in Charge of War Gas Work of the American Army.



Privy Councillor Haber, Responsible for Much of the Deadliness of German Gas Warfare.

William L. Sibert was placed in charge of the gas division several weeks ago, and it was generally understood that this must mean the focusing of unusual attention and effort on that work. At a weekly meeting of the Senate Military Affairs Committee with the War Council some of the facts were told.

It is known that a chemist told an army officer in Washington as long ago as last January he understood the United States wanted seventy-five tons of mustard gas a day. The army officer reduced the tons to pounds and, when he saw the big number, said it was far too great. He thought the

United States wouldn't want anything like so much as that. But even before Major Gen. Sibert had been appointed, the officer's error of judgment had been set right. Under General Sibert's direction chemists have undertaken the production of mustard gas in quantities, and they are turning it out as rapidly as possible, so as to lose no time in giving the Germans some of their own medicine.

During the last year the Bureau of Mines, whose war gas work has just been taken over by the War Department, has acquired a large staff of chemists, including some of the ablest men in the country; and those who are in a position to know what they are doing are confident that, when the full story is told, the myth that the Germans are supermen in this realm of science will be exploded.

Questions have become general as to the nature of mustard gas and as to the ability of the United States to produce it in quantities. In an effort to answer them, an interview was sought with

Dr. Benjamin T. Brooks, chief chemist of the Commercial Research Company at Flushing, which has taken an active part in this phase of war preparation. It was he who, fifteen months ago, urged the use of mustard gas against the Germans.

"My suggestion," he explained when questioned on that point, "was turned over to an agent of the Bureau of Mines, which bureau is in charge of gas research work. At that time, I ought to explain, the means of manufacturing mustard gas had not

reached their present stage; but I reported on its composition and toxicity. The report never got any further than the agent. That, however, was an individual blunder. It is not properly to be charged against Washington. Another American chemist made a similar report to the British Government even before I reported to Washington.

"Now, the production of mustard gas is not a thing to be undertaken overnight. Electric power is needed to make the electrodes and to make the chlorine after the cells are set up. There isn't any more electric power than is needed. There isn't much that can be spared. And plants must be

built. These things will give you an idea of what must be accomplished before we begin sending mustard gas shells in quantity to the men abroad.

"It is a peculiar quality of mustard gas that no chemist would suspect from its structure that it is toxic. The formula looks harmless enough. We made some of it last October. As has already been told in a newspaper dispatch, the Bureau of Mines formally reported to the Ordnance Department that the methods of manufacture were satisfactory. Afterward the bureau made two more reports urging that it be used.

"Then the Ordnance Department had to decide about putting it into shells and figure its cost. The question arose as to whether it could be made more cheaply or rapidly. So the experiments continued.

"Every one should have patience. We can beat the Germans at this game just as we can beat them at any other, but the manufacturing chemists of America have only recently been unleashed. We can go the limit now, but we had to get Uncle Sam's word first. The chemists couldn't wage a private war on Germany, much as they might have liked to do it.

"The Germans are using two types of gas shells, those which explode by percussion and those which carry time fuses. Occasionally they drench a territory with shells, some of which have long-time fuses and some short-time fuses, so as to effect the greatest possible concentration of gas in a given sector.

"A question arises as to how the Germans can advance through territory they have subjected to this gas. If the territory is untenable for the Allies it is untenable for the Germans, too. That is why some persons wonder that they can make such great gains with it. We are likely to think of the battlefield as being a

solid line, like the maps we see daily, with another line of trenches back of that. If the western front were a level plain, like an Illinois prairie, that would be fairly true of it, and gas would not be so useful for the Germans; but the situation actually is that there are certain strongly held posts, such as Kemmel Hill

showing gassed areas, and in the advance they may avoid them until they are safe for occupancy.

"One reason the mustard gas is so dangerous is that it seems so innocent. The smell is faint, and it is not especially disagreeable. The vapors from the liquid can be inhaled without any im-

from contact. A soldier walking along a trench which has had a sprinkling of it rubs his shoulder, for instance, against the side of the trench, and a tiny drop gets on his coat. It looks like a drop of oil. It does not hurt the cloth. He is likely to pay no attention to it. It penetrates to the flesh, but only causes a slight smarting. It is not until hours later that the effects are apparent. Then the flesh becomes puffy and red; the tissue swells enormously. The effect is similar to a very deep burn—a burn of the third or fourth class.

"When a mustard gas shell explodes it throws a fine mist over a wide area. If it gets into a soldier's eyes it blinds him. But our experiments have shown that it is not necessary to touch the eyes directly to cause blindness. The poison can be communicated through the tissue.

"How little of the stuff is effective is illustrated by an experience of my own. [Dr. Brooks lifted a scarred and reddened right hand.] Several months ago, when I was making an experiment, some mustard gas got between two of my fingers. It was so little that it escaped notice. It was not until 9 o'clock that night that my hand began to look puffy. The next morning it was badly blistered."

From Washington came corroboration of the praise Dr. Brooks had given the volunteer chemists there. The story was told of a cabled message from abroad, asking for quick investigation of a certain point. The work was undertaken by one of these chemists, who kept at his task day and night until he had completed it. He was so near exhaustion that it was necessary for another man to stand at his side and keep him awake, but he was able to send the reply in half the time originally set as a minimum for that inquiry. The instance was cited as typical of the devotion exhibited by these workers.



Germans Blinded by Their Own Gas and Captured by the French in Recent Offensive.

or Messines Ridge, around which the fighting centres. It is against such positions that the Germans have been using gas. They do not use it indiscriminately. And, once the Allies are forced by gas out of a strong position, they must fall back to others prepared in the rear. Maps are supplied to the German troops

mediate discomfort. The effect has been called 'chemical pneumonia.' The symptoms are similar—high fever, stertorous breathing, and sometimes stupor. Autopsies have shown that the effect of the gas on the lung tissues has been such that they break down like wet paper.

"The chief danger of mustard gas is