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### Recommended Citation

Davis, Lakin () "Chemical Warfare in WWI: The Psychological Corrosion of Soldiers via Chemical Warfare and the 1925 Geneva Convention's Involvement in Eradicating Future Gaseous Afflictions," *West Virginia University Historical Review*: Vol. 2 : Iss. 1 , Article 6.

Available at: <https://researchrepository.wvu.edu/wvuhistoricalreview/vol2/iss1/6>

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## ***Chemical Warfare in WWI: The Psychological Corrosion of Soldiers via Chemical Warfare and the 1925 Geneva Convention's Involvement in Eradicating Future Gaseous Afflictions***

LAKIN DAVIS\*

The discourse surrounding mental health awareness has progressed throughout decades of research, stigma breaking, and connectedness; however, this trend of growth regarding mental illnesses was not as forgiving over a century ago, during and directly after the Great War. Natural elements of war alone caused tumultuous suffering for soldiers within the Triple Entente and the Central Powers. Yet, it was the man-made technologies of World War I that caused the deepest traumas, particularly the chemical variants created by Fritz Haber. By examining this history through a psychological lens, the British soldiers exposed to chemical warfare from Ypres to Verdun are given a better diagnosis than the broad term of "shell shock." In addressing the origins of gaseous agents like sulfur mustard and phosgene, this paper finally recognizes the men that fought to preserve the world order for the war they were fighting on the inside post-gas attack.

Situated northeast in the Belgian municipality of West Flanders lies a town built and rebuilt from centuries of conquest and war. Known record indicates the town, named by the Germanic Frisian locals around the first century, was built to encompass a grand palace market and St. Martin Cathedral, all near the river Ipre. Subsequently, the settlement was called Ieper; however, it was later renamed to "Ypra" after the invasion of Julius Caesar and his Roman army not half a century after its settlement.<sup>1</sup>

From the Roman invasion onward, the settlement developed with little interference hindering the cultural expansion of its inhabitants. Through adopting architectural concepts from the Romans, the people of Ypra built Romanesque buildings, Gothic cathedrals, and public halls. Half-a-dozen gate entrances encircled the growing town with cobblestone roads connecting Ypra to nearby settlements. Benefiting from location and geography, the community became one of industry, creating wool textiles that were soon traded with the English. Industry remained the city's largest source of income until and beyond French conquest in the seventeenth century. With French influence now dominating the growing town and surrounding settlements, former Ieper was once again renamed to appease the mother tongue of the conquerors and became what is modern-day Ypres.<sup>2</sup>

The Gothic and Roman architecture and the people within survived the complete removal of the French after Napoleon's defeat at Waterloo. The territory of modern-day Belgium gained

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<sup>1</sup>Greatwar.co.uk, "A History of Ypres (Ieper): Origins," A Guide to the Western Front WW1 Battlefields and History of the First World War, accessed March 29, 2021, <http://www.greatwar.co.uk/ypres-salient/town-ieper-history.htm>.

<sup>2</sup>Greatwar.co.uk, "A History of Ypres (Ieper): A Fortified City," A Guide to the Western Front WW1 Battlefields and History of the First World War, accessed March 29, 2021, <http://www.greatwar.co.uk/ypres-salient/town-ieper-history-fortified.htm>.

its sovereignty from the Dutch in 1830, and for the next eighty-four years, Ypres remained an industrial powerhouse and even made successful networking expansions into fishing.<sup>3</sup>

Although events in Ypres stayed relatively mundane under King Leopold I, one of the largest conflicts in world history was looming over every inhabitant of Ypres and beyond. The German Empire and the other actors of the Central Powers would soon devastate Ypres's architecture and civilians beyond recognition.

Initiated by one bullet intended for the Archduke of Austria, Franz Ferdinand, World War I broke a near century-long period of peace in Europe. Beginning in the summer of 1914, the Central Powers and the Triple Entente fought tirelessly in battles all across Europe, particularly sending hardships and death across the Western Front, the main theater of the war. Here, nestled in bliss until the spring of 1915, laid Ypres. Where geography once launched the growth of the town, it soon doomed everything in the area. Sought by the German Empire for invasion because of its location, Ypres became one the most infamous battlegrounds in World War I.

Led by a Polish chemist, German soldiers initiated the first use of synthetic chemicals that caused extreme damage to the health of soldiers—so much physical and mental carnage that ethical concerns regarding what should be permitted in war arose after the conclusion of the Great War. Therefore, this introduction of chemical warfare as an offensive battle tactic depleted the psychological health of soldiers during and post-World War I. Because of synthetic agents like phosgene and sulfur mustard gas that damaged soldiers far beyond physical mutilation, the political actors during the 1925 Geneva Convention called for their banishment in future international and domestic afflictions.

One of the main catalysts in this global event, however, started years prior to that fateful June day in 1914. Surprisingly, a large portion of the ghastly war machine began in modern-day Poland. Factory owner Siegfried Haber and his wife, Paula, anticipated the birth of their child in the winter of 1868. Upon his arrival, Haber's life immediately started with death, as his mother passed away due to childbirth complications. Despite the loss of his biological mother, Haber was untroubled in his youth and had strong connections with his aunts, and soon, his stepmother. Additionally, Haber had good relationships with his siblings and, despite their age gap, shared with them a deep passion for the Greek language and poetry. While Haber held this interest in literature all his life, he did not find a passion for chemistry until an experimental class in college when he realized his lifelong interest in fire was more than an unhealthy obsession; rather, it was a fascination that he could explore further through collegiate studies. After one semester at the University of Berlin, Haber transferred to Heidelberg University and then to Charlottenburg Institution, with chemistry being his main focus in both schools.

Toward the end of Haber's collegiate career, he studied under the renowned chemist Robert Bunsen and eventually worked as a professor himself at the Karlsruhe Institute of Technology. The culmination of his knowledge in chemistry led him to develop an effective way to convert the nitrogen gas found naturally in the Earth's atmosphere into a compound suitable enough to fertilize the depleting crops of the twentieth century.<sup>4</sup> Up to this point in his career, Haber's contributions to science served to assist the greater good of humanity; however, the beginnings of the Great War served as the main stage for Haber to demonstrate his true wit in science. So, he started working to aid the German army in developing a weapon that he believed would help them achieve victory in the Great War. Yet, unbeknownst to him, World War I would expose a dichotomy within Haber's life: his life was marked with the curse of death.

<sup>3</sup>Greatwar.co.uk, "Origins."

<sup>4</sup>Gilbert King, "Fritz Haber's Experiments in Life and Death," *Smithsonian Magazine*, June 6, 2012, <https://www.smithsonianmag.com/history/fritz-habers-experiments-in-life-and-death-114161301/>.

Despite Haber understanding that large amounts of chlorine and phosgene gas would greatly impact opposing combatants, the chemist found resistance to the use of the chemical tactic from his spouse and several German military officers. Clara, his first wife and equal in the study of chemistry, warned him of the dangers that chemical fumes could cause; nevertheless, Haber told her and others that “in German hands, the weapon could bring quick victory.”<sup>5</sup> The scientist continued to present his weapon with high esteem because he believed in its tactical strength. Unlike Haber, Clara viewed the destructive possibilities of the gaseous agents to be a downfall and an element of science that was meant to stay undiscovered. Unfortunately, Haber’s mind was set on the use of gas in warfare, and the night after their disagreement, he left for Ypres to aid the German army. Not even the existence of their young son could stop Clara Haber from committing suicide. Feeling guilty by association, the mastermind’s wife became the first death of invention—the psychological impact of chemical warfare claimed a life before it even made it to the battlefield.

Set in his beliefs, Haber considered that the best strategy toward victory, in warfare, was surprise. This philosophy was not an original thought of Haber’s, as similar teachings can be found in Sun Tzu’s *The Art of War*. Within one of his lectures, Haber stated:

Every new weapon is capable of winning a war. Every war is a war against the soul of the soldier, not the body. New weapons break his morale because they are something new, something he has not experienced, and therefore, something that he fears. We were used to shell fire. The artillery did not do much harm to morale, but the smell of gas upset everybody.<sup>6</sup>

Despite his confidence, Haber still could not convince the German army to use the lethal gas on a larger scale. Instead, military generals at Ypres chose that particular town as the experimental grounds for the mechanized gas, where they used below Haber’s recommended amount. Ironically, the chlorine gas deployed at Ypres was not the strongest gas used over the four-year course of the war. Instead, phosgene and sulfur mustard gas caused the most injuries and fatalities among those affected by Haber’s standardization of chemically-based warfare.

Though the introduction of chlorine gas changed the course of the war, sulfur mustard acted in a grander, more lethal way. Before being known as the “King Gas,” sulfur mustard was historically used to treat psoriasis; however, Haber found a way to alter this antidote into a militarized agent of torment.<sup>7</sup> Physical effects of exposure would start within twenty-four hours of contact and would irritate the eyes, skin, and lungs to cause enough discomfort and pain that soldiers were rendered futile in the line of defense. With enough exposure, some soldiers would experience light sensitivity, coughing fits, blistering of the skin, and complications within the digestive tract. Deeper in the interior of the body, bone marrow would become affected, as a decreased formation of blood cells, white blood cells, and platelets would lead a soldier weak and prone to infection.<sup>8</sup> Symptoms like these and more led to deaths in the thousands and left an even greater amount of soldiers in military hospitals.

Unfortunately, the long-term effects of this yellow-tinted compound were just as vile in comparison. Surviving soldiers exposed to sulfur mustard were marked with physical and

<sup>5</sup>Morris Goran, *The Story of Fritz Haber* (Norman: University of Oklahoma Press, 1967), 71.

<sup>6</sup>Fritz Haber, *Fünf Vorträge Aus Den Jahren 1920-1923* (Berlin: Verlag Von Julius Springer, 1924), <https://www.springer.com/de/book/9783662335895>.

<sup>7</sup>World Health Organization, “Mustard Gas,” Press Archive, 2011, <https://www.emro.who.int/press-releases/2011/mustard-gas.html>.

<sup>8</sup>Centers for Disease Control and Prevention, “Facts About Sulfur Mustard,” Emergency Preparedness and Response, page last reviewed April 4, 2018, <https://emergency.cdc.gov/agent/sulfurmustard/basics/facts.asp>.

psychological reminders of their exposure. First, those that lived through an optical encounter of mustard gas were at risk of developing permanent blindness after the attack or later on in life. Chronic respiratory disease and other infections could deteriorate the body and chances of developing lung cancer increased.<sup>9</sup> These physical damages, among the wartime atmosphere and other ordeals, were bound to generate psychological terror within the psyche of soldiers. The detrimental impact of seeing scarring on the skin or never being able to see again at all may have negatively impacted the self-esteem and overall condition of a soldier's mind. According to the World Health Organization's Internationally Peer Reviewed Chemical Safety Information (INCHEM) division, soldiers exposed to mustard gas during the Great War could experience apathy issues, mental disturbances, and heightened anxiety. In more chronic cases, all of these symptoms were said to "persist for some time."<sup>10</sup> While these mental conditions could have developed due to other gruesome happenings during the war, soldiers in Ypres and other battles close to the war's beginning were unprepared for gas attacks, not even being provided a chance to fight or flee, leaving their minds more susceptible to trauma in these instances.

To the modern mind, a fear of gas attacks is distant and incomprehensible, although a century ago they were once a nightmarish reality for soldiers in the trenches of European soil. S. J. M. Auld, a member of the of the British Military Mission to the United States, described the bewilderment of soldiers who first saw a cloud of mustard gas creeping toward them in his writing, *Gas and Flame in Modern Warfare*: "first wonder, then fear; then, as the first fringes of the cloud enveloped them and left them choking and agonized in the fight for breath—panic."<sup>11</sup> In his writing, Auld continued by describing how soldiers thought to protect themselves from inhaling the gas in the opening minutes of the first attack. A majority of men buried their heads in the soil or stuffed handkerchiefs in their mouths but "many of these men were saved by their presence of mind."<sup>12</sup> The amygdala is known to be the fear processing center of the brain, and, when stimulated, this almond-shaped panic room sends signals to the prefrontal cortex, or the decision-making center, to fight or flight. In the first moments of introduction to this new weapon, the clarity of a soldier's brain would have saved him from additional damage; however, as the war continued, the trauma would linger, which may be a root of the anxiety noted by INCHEM.

The strategy of soldiers being gassed needed to be entirely defensive in addition to being adaptable to any environment. Buried heads in the earth and cloth handkerchiefs, with the help of British industry, evolved into respiratory masks that could be used in haste to ward off any gas cloud within a large vicinity. While these masks came with complications in their infancy of development, their existence alone helped discipline the soldiers in a reactionary way: "For destructive effects gas must depend on surprise, on poor discipline or on defective appliances. Consequently, gas casualties are preventable if the soldier is trained continually to exercise vigilance."<sup>13</sup> Yet despite the purpose the masks served in maintaining health and discipline, the appearance of one mask used by the British army felt like a fault in its design. An excerpt from a soldier, cited by Dennis Winter in his book, *Death's Men*, elaborated on that sentiment: "We gaze[d] at one another like goggle-eyed, imbecile frogs. The mask makes you feel only half a man. . . . A man doesn't live on what passes through the filter—he merely exists. He gets the

<sup>9</sup>Centers for Disease Control and Prevention, "Sulfur Mustard."

<sup>10</sup>Perharic Walton, R. L. Maynard, and V. S. G. Murray, "Mustard Gas," 9.4.3 Neurological, International Peer Reviewed Chemical Safety Information, IPCS, September 1996. <http://www.inchem.org/documents/pims/chemical/mustardg.htm>.

<sup>11</sup>S. J. M. Auld, *Gas and Flame in Modern Warfare* (New York: George H. Doran Company, 1918), chap. I, <http://www.vlib.us/www/resources/gasflamewwi.html>.

<sup>12</sup>Auld, *Gas and Flame*, chap. I.

<sup>13</sup>Auld, chap. I.

mentality of a wide-awake vegetable.”<sup>14</sup> Although these defensive measures reduced the number of casualties directly caused by gas, a soldier needing to remain alert at all times trains the brain to constantly assume a threat is present.

When considering the basic environment of war, there are a plethora of things that could cause a panic disorder in a soldier; however, just by being acutely aware of a gaseous threat at all times, soldiers could have developed a number of anxieties that could permanently warp the brain. The fifth edition of *The Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) would call for a panic disorder diagnosis when one experiences recurrent and unexpected panic attacks, physical feelings of discomfort like chest pain, sweating, and a pounding heart, and if any attack has been followed by at least one month of persistent worry or change in behavior.<sup>15</sup> These issues would generally become a concern in the months following the war’s conclusion, because in the moments of war, the body is only doing what it needs in order to ensure survival.

Effectiveness of the terror that gases caused did not stop at the initial release of the toxins. The duality of mustard gas was that it was heavier than water as a liquid and heavier than air as a vapor, meaning it had the ability to corrupt puddles of water and settle in trenches and valleys. Lancaster, England, native Joe Taylor shared with the *Worcester Telegram and Gazette* for the diamond anniversary of the Battle of Somme that: “there were huge shell holes along the Somme Valley that had been filled with water by rain. Some Canadians tried to escape from the mustard gas by jumping into the water. But the water was already poisoned.”<sup>16</sup> The way the mustard gas settled in these puddles acted as an unexpected second exposure to the synthetic agent, leaving soldiers with no escape from the physical or psychological effects of the gas. If gas is all around them, that begs the question: where, if anywhere, is safe? Many of the Canadian soldiers that Taylor recalled at Somme could find no answer to the question and were feared for in terms of their mental health. A number of medical personnel on and around the battlefield worried that “the psychological effects of gas would lead to further mental problems and perhaps even to shell shock.”<sup>17</sup> Mustard gas was deteriorating soldiers from the outside in—with blisters budding on the skin and heavy lungs, the soldiers were gaining apathy when they needed optimism most.

Woefully, sulfur mustard was only one half of the deadliest gases that spilled on the Western Front. More notorious than mustard gas was the gaseous compound nicknamed the “White Star,” a compound deadlier than the chlorine gas used by Haber and the Germans at Ypres. Where mustard gas brought terror, phosgene brought it tenfold. Even worse, both of these gases were in commission at the same time, meaning whatever gas he was dealt, a soldier still needed to be ready for anything and use logic to discern between the gaseous agents being used.

Origins of phosgene gas were widely attributed to a group of French scientists led by Victor Grignard, a French scientist most notable for receiving the Nobel Prize in 1912 for his work in chemistry. Although, at nearly identical times in WWI, Germany deployed a phosgene compound identical to that of the French, with all signs pointing to Fritz Haber as the mastermind behind the chemical. The exact root of the gas is no concern when the result is the same: at room temperature (and enough gas in concentration), phosgene can blister the skin, induce vomiting, create skin lesions, and provoke irritation within the eyes and throat. Phosgene was a useful offensive tactic on both sides of the war because of the fluid that would build up in the victim’s lungs after approximately forty-eight hours. This fluid, foreign to the respiratory system, would leave a

<sup>14</sup>Denis Winter, *Death’s Men: Soldiers in the Great War* (New York: Penguin Books, 1979), 124.

<sup>15</sup>American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. (Washington, DC: American Psychiatric Publishing, 2013), 209.

<sup>16</sup>Richard Duckett, “Horror of WWI Still Vivid,” *Worcester Telegram and Gazette*, 1991.

<sup>17</sup>Tim Cook, *No Place to Run: The Canadian Corps and Gas Warfare in the First World War* (Vancouver: UBC Press, 1999), ProQuest Ebook Central.

solider feeling as if he were drowning without being anywhere near water.<sup>18</sup> Heart failure and low blood pressure had the potential of appearing as symptoms as well, and if an exposed soldier was not dead by two days, he would pray he was. Unlike mustard gas, the long-term physiological effects of phosgene were less severe; nevertheless, cases of bronchitis and emphysema were reported.<sup>19</sup> It is no surprise that, of the major gases used in World War I, phosgene produced the most casualties.

Relying heavily on wind patterns to accurately spread the gas, phosgene could reach more places and push soldiers out of their trench sanctuaries. Unlike mustard gas's density, phosgene was not dense enough to settle in trenches nor did it stick as easily to clothing. Instead, the force was in the gas's initial release and the lethal entity it became when mixed with chlorine. Phosgene worked as a trickster, giving soldiers brief peace at initial exposure compared to mustard gas but leaving them dead in infirmaries or trenches after choking on the fluid that overwhelmed their lungs hours later. *A Higher Form of Killing* by Robert Harris and Jeremy Paxman mentioned the pleasant feelings that some soldiers felt after a phosgene exposure: "A victim who has just inhaled a lethal dose at first feels nothing more than a mild irritation of the eyes and throat that quickly passes off; for up to two days afterwards a man might actually feel mildly euphoric. Throughout this period his lungs are filling with liquid."<sup>20</sup> Phosgene created a maleficent paradox in which each breath that maintained life, in turn, contributed to one's death.

At the Battle of Somme, British soldiers died by the hundreds, and bodies became too numerous for individual burial. Here, stories were shared of army generals being in relatively perfect health, then dying less than twenty-four hours later. The way soldiers and their leaders turned on a dime in less than a span of hours left the living in a state of confusion: "men [were] caught unaware, panicking, and spreading the terror and confusion that enabled the gas to do its work."<sup>21</sup> But how could soldiers remain calm? A force once unknown to them soon became the center of combat in a war half of the combatants were too young to fight. No training could have prepared their minds or bodies for the horrors of synthetic agents, especially the unsuspecting terror found within phosgene and chlorine as a devilish duo.

Psychologically, soldiers in the Great War were experiencing hardships undealt with up to this point in the recorded history of human warfare. The spontaneity of gas attacks overstimulated the amygdala and prefrontal cortex, keeping men on edge despite the alternative wear these attacks had on their morale to fight. The mind of the soldier hung in a balance of willingness to fight for one's country and wanting to die for one's peace, and the architect of gas warfare anticipated this breakdown at the beginning of the war. *Master Mind* by Daniel Charles examines the life, chemical genius, and downfall of Fritz Haber and, most importantly, highlights his deviousness behind crippling the spirit of soldiers:

[Y]et soldiers seemed more terrified of gas than bullets; perhaps they'd come to accept the gunfire as an inevitable part of war's grim lottery. Facing flying steel went hand in hand with bravery, heroism, and manliness. Gas allowed for none of that. It turned a soldier's instincts upside down.<sup>22</sup>

<sup>18</sup>Winchester Hospital, "Phosgene Exposure," Health Library, accessed March 30, 2021, <https://www.winchesterhospital.org/health-library/article?id=965339>.

<sup>19</sup>Centers for Disease Control and Prevention, "Facts About Phosgene," Emergency Preparedness and Response, page last reviewed April 4, 2018, <https://emergency.cdc.gov/agent/phosgene/basics/facts.asp>.

<sup>20</sup>Robert Harris and Jeremy Paxman, *A Higher Form of Killing: The Secret History of Chemical and Biological Warfare* (New York: Random House, 2002), 20.

<sup>21</sup>Harris and Paxman, *A Higher Form of Killing*, 26.

<sup>22</sup>Daniel Charles, *Master Mind: The Rise and Fall of Fritz Haber, the Nobel Laureate Who Launched the Age of Chemical Warfare* (New York: HarperCollins, 2005), 171.

Depletion of esteem seen with mustard gas and phosgene may be a contributing factor for the push of awareness and education of soldiers regarding all elements of the war.

Although, preparations alone could barely save these men, as fear was now rooted in every breath they took. No soldier was safe from the panic, not even the ones chosen by destiny. A German soldier was exposed to mustard gas near the French community of Marcoing that left him temporarily blinded. The fear that this affliction caused built a sense of empathy with him, one that would last as he played a leading role in the Second World War. Adolf Hitler, a symbol of terror himself, was so frightened by his brief blindness that he did not allow his armies to use the same gases on his enemies once used on him decades earlier.<sup>23</sup> Irony appears to have meddled in many affairs related to the Great War.

A similar irony lies within the question of whether or not WWI was a total wear, meaning that everyone and everything was given to support the war effort. The relevancy of this answer is in the minds of the soldiers, who at one point, disconnected themselves from what was going on around them. Disassociation is a trauma response that one can experience during or in the course of a traumatic event. Symptoms of dissociative disorders, as characterized by the DSM-5, include memory issues, feelings of warped reality and sense of self, and difficulty in remembering one's identity. With this, a person can start becoming unaware of consequences to the body, much like Fritz Meese describes in an account of life in the trenches: "life here isn't worth a damn, one thinks nothing of losing it."<sup>24</sup> In a situation where a person cannot adjust to his surroundings before they change again, disassociation is a defense strategy of the individual soldier to remain distant from the war despite his obvious proximity. History and science alike prove that human nature has adapted over millennia; yet the synthetic weapons of WWI allowed soldiers mere seconds to learn the mechanisms needed for their survival. Of course, this knowledge came at the price of souls that tried to protect their lungs seconds too late.

An instance of detachment in a soldier that was exposed to phosgene is documented from the Battle of Messines. Here, in the summer of 1917, gunner William Pressey of the Royal Artillery awoke to a German gas attack on his quarters. The roof caved in; although, he was saved in time and given a mask to subdue some of the effects caused by phosgene. Unfortunately, he still inhaled enough that he had to be taken to the infirmary, where he slipped in and out of consciousness for some time. There is a dissociative element in the tone of his letter, one that suggests he's describing a story he witnessed rather than experienced. Aside from the passage: "I was always surprised when I found myself awake, for I felt sure that I would die in my sleep," there is little emotion described in this event. Based entirely on context, the author of this passage describes an event he experienced and offers nothing more—a robotic way of describing a near-death experience. Is there a man left within those pages?

The soldiers lost, physically and mentally, to poisonous gases like phosgene were brothers, friends, and husbands. They were men once walking the world suddenly stripped of it entirely, though the dead had more peace than the living. Honest accounts of soldiers from a variety of battles hold no reserve in sharing the gruesomeness of battle and what those moments did to accelerate the gut-wrenching feelings in their minds. One of these accounts comes from Lieutenant Henry Desagneaux, a member of the French Second Infantry Regiment at the Battle of Verdun. Desagneaux describes that he is stuck in a hole along with two other men from his infantry while they cover themselves from a total bombardment by the German offensive: "numb

<sup>23</sup>History.com, "British Soldier Allegedly Spares the Life of an Injured Adolf Hitler," last updated September 25, 2020, <https://www.history.com/this-day-in-history/british-soldier-allegedly-s pares-the-life-of-an-injured-adolf-hitler>.

<sup>24</sup>Jon E. Lewis, *A Brief History of World War I: Eyewitness Accounts of the Great War* (Philadelphia: Running Press Books, 2014), 69.



and dazed, without saying a word, and with our hearts pounding, we await the gas shell that will destroy us.”<sup>25</sup> Accounts like these are not limited to one soldier in one battle. It is easy to forget the minuscule details of such a large-scale war, as the small details make the big picture. Each soldier was fighting against fate, either losing his battle or living long enough to wish he did. The experiences of these men are individual interpretations; yet there are too many accounts of them making similar psychological connections to the events and near godless weaponry they were experiencing.

Drawing connections to the bewilderment described by S. J. M Auld in *Gas and Flame*, a similar sense of speechlessness can be found in an account by Anthony R. Hossack of the Queen Victoria Rifles. Hossack describes a personal account of the First Battle of Ypres, in which he and his fellow soldiers witness a large group of French African soldiers shredding materials off their backs in order to run faster from a terror still unseen. Like out of a twenty-first-century horror movie, one of the Zouave soldiers falls to the feet of Hossack’s officer. Holding his revolver, the officer shouts: “What’s the matter, you bloody lot of cowards?” Upon turning the body over, Hossack describes that the soldier was “frothing at the mouth, his eyes started from their sockets.”<sup>26</sup> The National Institute for the Clinical Application of Behavior Medicine (NICABM) considers memory and trauma to be connected in four different ways: semantic, episodic, emotional, and procedural memory.<sup>27</sup> From this group, episodic and emotional memory are the most relevant when considering WWI soldiers and their recollections of gaseous attacks upon their comrades or other combatants. Episodic memory is the individual experience one has with an event and all of the details they remember about that experience including who, what, and where. According to NICABM, episodic memory is reliant on the hippocampus. This lobe, fixed deep within the center of the brain, is responsible for creating and recalling memories. In a study published by the US National Library of Medicine’s National Institutes of Health, the hippocampus is the center of the brain prone to developing psychological disorders like schizophrenia; however, the study also notes that post-traumatic stress disorders can also be attributed to “hippocampal atrophy.”<sup>28</sup>

On the other hand, emotional memory is controlled by the amygdala. Another component in the dissection of psychological ailments in soldiers comes from the emotions that they associate with events. In the case of Hossack and the officer, both emotional and episodic memory link their trauma to the sight of the wounded Zouave soldier. If either man lived post-WWI, any time they saw a man struggling for air or with reddened eyes, they have the potential of thinking back on that moment and reliving those exact emotions—all as if they were living the war experience for the first time.

Alternatively, one could argue that traumatic memories could increase the chances of survival. In the book *Memory, War, and Trauma*, Nigel Hunt proposes that a traumatic memory could be a positive element of evolution—that if someone lives through war and has trauma after, given the same instance, that person should have a better chance of survival if he does everything as he did before. Yet, at what point is physiological preservation more important than psychological? At what point is too far in terms of offering the psyche to save the body? Shell shock was a term used for many ailments felt by soldiers during the war, although in more modern settings it is more commonly attributed to just describing post-traumatic stress disorder (PTSD). Though war

<sup>25</sup>Lewis, *Brief History*, 218.

<sup>26</sup>Lewis, 90.

<sup>27</sup>National Institute for the Clinical Application of Behavioral Medicine, “How Trauma Impacts Four Different Types of Memory,” 2017, [https://www.naadac.org/assets/2416/2019NWRC\\_Michael\\_Bricker\\_Handout4.pdf](https://www.naadac.org/assets/2416/2019NWRC_Michael_Bricker_Handout4.pdf).

<sup>28</sup>Kuljeet Singh Anand and Vikas Dhikav, “Hippocampus in Health and Disease: An Overview,” *Annals of Indian Academy of Neurology* 15, no. 4 (2012): 239-246, <https://www.annalsofian.org/text.asp?2012/15/4/239/104323>.

trauma could be connected to PTSD, they are not entirely synonymous. War trauma only crosses into a medical diagnosis of PTSD when the events of the traumatic past begin to affect the social or domestic functioning of the patient. Though no documentation is tied to his whereabouts after the breakdown, Arthur Osborne, a soldier in the British army, details the loss of his officer to shell shock:

It was a case of complete loss of nerve and self-control. Driven mad with terror, slobbering and moaning, he clawed and scrabbled violently in the mud, his head under the chair. It was like a terrified and overrun fox going to ground, trying to dig his way back to safety through the very bowels of this Earth. His behavior was simply less than human. Extreme terror had driven him back through a thousand generations to some pre-human form of life.<sup>29</sup>

Based on the description above, one could ascribe the beginnings of PTSD to the symptoms of this sergeant; however, there is no indication that the officer even survived, let alone if he experienced these symptoms outside of the war. There is no way to consider which event dismantled his mind: the effects gas, rapid-fire bullets, or becoming so accustomed to death that it felt like second nature. The instance is an important one to note, however, because as one man is lost within himself and the horrors of war, another is desensitized to all of it.

Painstakingly so, there were soldiers who did not realize the value and potential their lives still had until it was too late. Confirmation of this revival of life can be accredited to the journal of Arthur Lapointe of the 22nd French-Canadian Battalion. In his words, preserved now for the remembrance of the horrors of war, Lapointe describes zero hour at Passchendale in the summer of 1917. Through inconsolable fear, Lapointe wrote: “Yesterday, I believed I could die with something approaching indifference. Now I am aware of intense desire to live. I would give anything to know beyond doubt that I had even two whole days ahead of me.”<sup>30</sup> The horror of living second-by-second, entirely unsure of one’s fate, is enough to create an incredible amount of stress in the brain that has the potential of permanent deterioration. A study conducted by the Canadian Academy of Geriatric Psychiatry suggests that chronic stress can lead to a later development of neuropsychiatric disorders like depression and dementia.<sup>31</sup> Of course these ailments would arise post-war or further in the span of one’s life, so a soldier unfortunate enough to experience these neurological illnesses was somehow lucky enough to survive one of the most gruesome afflictions in modern world history.

Whether the scars of survival are attributed to luck or another otherworldly force, the same cannot be said of the gaseous agents that were created by Fritz Haber to aid the German war effort. The brutalities the men of the Great War faced are some of the most complex, horrendous acts of man. Tom Cook cites in his book, *No Place to Run*, that the *New York Herald* for some time after the war was filled with columnists expressing their fears of more dangerous gases being produced to succeed phosgene and mustard gas. One of these columnists proclaimed: “if this be a chemist’s idea of humane warfare, God deliver the world from chemists.”<sup>32</sup> Numerous groups and individuals were in a similar state of opposition after the conclusion of the war. Government officials from every country within the Alliance combined forces to ensure that the use of chemical agents such as sulfur mustard and phosgene were never again used to the inhumane degree seen in World War I.

<sup>29</sup>Lewis, *Brief History*, 383.

<sup>30</sup>Lewis, 383.

<sup>31</sup>Linda Mah, Claudi Szabuniewicz, and Alexandra J. Fiocco, “Can Anxiety Damage the Brain?” *Current Opinion in Psychiatry* 29, no. 1 (January 2016): 56-63.

<sup>32</sup>Cook, *No Place to Run*.

Activism against the use of gas started on a political level a year after the conclusion of the war. The United States, inspired by the Treaty of Versailles that forbid German production and importation of gases, implemented similar language restrictions in the Washington Disarmament Conference of 1922. This conference aimed to limit the use of submarine warfare and noxious gases in warfare. The United States' Senate gave consent for the ratification of the treaty; however, a dissenting vote was never given, so it never entered into force for the United States or France. Little movement was made after this disarmament attempt by the United States until the 1925 Geneva Conference for the Supervision of the International Traffic in Arms. Here, the United States suggested forbidding the exportation of gaseous weapons, while France and Poland suggested creating a protocol banning poisonous gas use and bacteriological weapons, respectively. This Swiss town, a quarter into the twentieth century, marked the banishment of poisonous gases in warfare. While the treaties before it contained language similar to what the final protocol document presented, those treaties did not forbid bacteriological weapons or have the ability of international ratification.

In total, there are a few key reasons to ban chemical weapons in war. First are the tactical considerations for gas in warfare, and considering how uncontrollable gas is once released, there could be instances when the gas worked counterproductively. An example of this could be the movement of phosgene, which depends on the air to spread the gas; therefore, a change in the predicted wind pattern could harm the offense rather than the target, resulting in a greater number of casualties. Additionally, a large quantity of gas needs to be deployed in order to be effective in terms of those impaired by the gas and killed. Haber's theories about the gaseous agents being used in mass quantities were supported through the lack of fatalities at the attack of Ypres. Gas on a large scale ended up harming civilians and innocent bystanders, which became an issue of ethics on top of mass attacks being expensive and hard to orchestrate.

Largely, some sections of the protocol suggest that the use of gas warfare is unethical on participants. John Pershing, commander of the American Expeditionary Force, stated during a report in 1922 that "chemical warfare should be abolished among nations, as abhorrent to civilization. It is a cruel, unfair, and improper use of science. It is fraught with the gravest danger to noncombatants and demoralizes the better instincts of humanity."<sup>33</sup> This widespread belief that gas warfare was unethical may have been the influence for the Geneva Protocol, as government officials felt responsible for presenting change to the public against this unnecessary danger. The protocol itself addresses this worldwide distaste by society: "Whereas the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices, has been justly condemned by the general opinion of the civilized world. . . ."<sup>34</sup> This willingness to address the violence on combatants shows a surface-level sympathy toward those that were injured—psychologically and physiologically—by gas warfare.

Although accountability was taken indirectly by foreign states and their governments, there was no unified agreement to the conditions of controlling gas warfare post-WWI. The Geneva Protocol was the only agreement that ever came close, and while France and other European nations were quick to ratify, the United States had no intentions of doing so. The protocol passed with ease through the landscape where the gas spread; yet the reality of the dangers had not scarred the United States into agreement, leaving the protocol abandoned by the Senate.<sup>35</sup>

<sup>33</sup>Christopher A. Warren, "Gas, Gas, Gas! The Debate over Chemical Warfare Between the World Wars," *Federal History* 4 (January 2012): 44-60.

<sup>34</sup>Protocol for the Prohibition of the Use in War or Other Gases, and of Bacteriological Methods of Warfare, Geneva, June 17, 1925, <https://fas.org/nuke/control/geneva/text/geneva1.htm>.

<sup>35</sup>Warren, "Gas, Gas, Gas!"

Regarding the influence and action of the 1925 Geneva Convention, other historians believe that the 1925 Geneva Protocol was not implemented because of the soldiers, but rather that it was done just to satisfy the public rage. This theory could be hypothesized because of the actions of the United States, as the nation did not ratify the protocol or the later revisions until 1975. However, the response to the convention for the majority of the European sovereignties was positive despite discrepancies. Modern hindsight is more concerned with the mental health of soldiers than ever, and shell shock is a term of the past with the discoveries and stigmatization of post-traumatic stress disorder.

Ultimately, Haber's 180-degree turn from crop hero to mad scientist left the ethics of the political, civil, and militarized world in a cloud of yellow. As some soldiers succumbed to the physical illness of chemical gas, others were morphed into shells of their former selves, locked away in inescapable nightmares. The conclusion of the war brought little peace; however, it did initiate the taboo conversation of gas warfare on a global level. Influenced by the outraged public, nations came together in numerous attempts to agree on dissolving the use of gas from future wars. Of the three attempts, the 1925 Geneva Protocol was the only agreement remotely close to success. Although several world powers held reservations for swift ratification, the governments of the tarnished land where gas walked wasted no time in declaring their distaste for chemical warfare. May the scars over Ypres and the rest of Europe remind humanity of the unfortunate harm we are capable of causing one another, so history does not shake its head, again, in shame.

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