

**FAITH**

**1975**

**and**

**vol. 102**

**THOUGHT**

**No.3**

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A Journal devoted to the study of the inter-relation of the  
Christian Revelation and modern research  
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Auschwitz Gas: Medical and  
Chemical Origins

This is the last of a series of four studies by David Brodeur on the Jewish *Diaspora*. Previous articles have dealt with prophecy (1971) and Zionism (1973 and 1974). The present article, inspired by the Holocaust, traces the history of the gas that killed an estimated one million Jews at Auschwitz back to the Kaiser's Chemical War Service established by the Prussian War Ministry early in World War I.

In the summer of 1943 a photo interpretation team at the British Air Ministry were baffled by a curious anomaly. Their perplexity stemmed from the simple fact that a certain twice damaged house situated in an outlying sector of Hamburg had been completely restored within a week or two after the raids. Some months later the speedy repair of the dwelling was recorded on reconnaissance photography for yet a third time. The interpreters concluded that the house belonged to an important personage in the Nazi war machine, possibly even a high party official.<sup>1</sup>

The thrice restored dwelling later proved to be the residence of Dr. Brune Tesch, owner and manager of the local *Tesch und Stabenow Internationale Gesellschaft fuer Schaedlingsbekaempfung M.B.H.* and a highly respected specialist in fumigation techniques.<sup>2</sup> In the Third Reich this firm (which operates today as TESTA GmbH) enjoyed exclusive rights to all industrial and military fumigation work east of the Elbe River. Nonetheless, in 1945 a British military tribunal, sitting in Hamburg, charged Tesch and two other officers of the firm with supplying the substance Zyklon B to the Auschwitz death factory in full knowledge that it was employed to exterminate the inmates. The short trial of Tesch and his associates took place on March 1 to 8, 1946. Documents were produced which revealed that Tesch's deputy, Karl Weinbacher, had tendered for two gas chambers the month that Hitler had unleashed his attack upon Russia.<sup>3</sup>

Tesch and Weinbacher were sentenced to death and executed, just two small cogs in a giant chemical extermination apparatus. The chemical that they distributed was one of three prussic acid fumigants developed and marketed by the German Limited Liability Pest Control Company DEGESCH (*Deutsche Gesellschaft fuer Schadlingsbekaempfung M.B.H.*) of Frankfurt. The major constituent of the product was prussic or hydrocyanic acid (HCN) which was first described in the 1770's by the Pomeranian born Swedish chemist Karl Wilhelm Scheele who dutifully recorded that it exhibited a taste and smell akin to that of bitter almonds. Scheele remained blissfully ignorant of the fact that he had discovered one of nature's most lethal and rapidly acting poisons. In 1886 a Californian horticulturist pioneered the use of HCN as a plant fumigant in the control of citrus scale insects. By 1900 a worldwide market opened up to hydrocyanic acid for the protection of fruit shipments and decontamination of ships, grain elevators and the like. However, used in this manner as a vapour the acid had a severe drawback. It was very dangerous to its handlers, a single inhalation able to cause edema of the lungs. To make the gas safer to handle some German chemists during World War I (WWI) developed the first of several products based on HCN, combined or mixed with stabilising and warning additives. The new material was called *Zyklon* and it was developed in a research project sponsored by the Prussian War Ministry's Chemical Warfare Service. Oddly enough, no history of the *Holocaust* or, for that matter, any other chronicle, has given a full account of the development of the *Zyklons* one of which (*Zyklon B*) took the life of one out of every three Jews killed by the Nazis during World War II.

The development of the *Zyklons* for commercial peacetime use was the work of the aforementioned DEGESCH. During WW2 DEGESCH's director was Dr. Carl Frederick Peters, an accomplished chemist who had risen through the ranks after being initially hired to test *Zyklon B*. After several trials in connection with the *I.G. Farben Case* Dr. Peters was acquitted of complicity in the murder of six million Jews. His firm which remains today one of West Germany's leading pest control developers owed its origins to a certain WWI technical committee, a committee involved in the business of coordinating weapons of human destruction. To see how this came about it is necessary to go back to 1914.

One bright and cold Sunday morning in December 1914, Dr. Fritz Haber the director of the three year old *Kaiser Wilhelm Institute fuer physikalische und Elektrochemie*, situated in Dahlem, Berlin, anxiously received a twenty five year old scientific recruit, Curt Wachtal. Haber wanted the young man to set up a much needed pharmacological unit to support the Institute's chemical warfare development program. Some measure of Wachtal's competence may be gleaned from the fact that after only the barest of formalities Professor Haber entrusted to him the solution of a most critical problem.

He was to try to find out why animals exposed to high concentrations of certain gases died while those exposed to lower concentrations of the same gases, even for longer periods, often survived and recovered. Wachtel was immediately granted unlimited funds and he responded by demanding fully equipped laboratories staffed by chemists, physicians, zoologists and general technicians.<sup>4a</sup>

A few months later Wachtel was joined by Ferdinand Flury (1877-1947) a toxicologist and pharmacologist who to that time had specialized in natural plant and animal poisons. Working with Wachtel, Flury supervised the testing of over 300 gases in chambers constructed by the Institute's mechanics. By 1915 Haber had organized teams of colloidal, physical and biochemists, chemists and pharmacologists, into several units. Invariably hovering in the background were the observers from the Prussian War Ministry who drove over every week to witness demonstrations of Nernst's latest explosive or Haber's newest asphyxiating gas. The combined operations of two chemical institutes, together with the separate institutes for physics and entomology, represented perhaps the first attempt ever to effect continuous daily cooperation in pure research. For the world the results were startling and they contributed mightily to the Kaiser's ability to hold on for a full four years following the reverse on the Marne.

Sabre-cut and shaven-headed like the Prussian Junkers Wachtel unabashedly admired Fritz Haber who had established himself as the Empire's outstanding physical chemist with publication of his landmark *Thermodynamics of Technical Gas Reactions* in 1905. Haber possessed the steely talents of technical organization and these talents were wedded to the hard work and self-discipline that made Prussia the dread of Europe. He was an internationally recognized authority on the complex relationships of science and chemical industry. He had a special aptitude for bridging the gap between a promising laboratory discovery and its industrial application. When, in 1911, he was appointed director of his own research institution with extraordinary freedom in choosing colleagues and projects, he at last had the opportunity to practice the interdisciplinary approach to research that he had so long espoused. His Institute for Physical Chemistry and Electrochemistry was sponsored by the Kaiser Wilhelm Society for the Advancement of the Sciences but was jointly financed by the Prussian State Government and the Leopold Koppel Foundation of Berlin. The latter had insisted that Professor Haber be made director as the condition of its support.

The major moving forces behind the establishment of the Kaiser Wilhelm Society in 1911 were two distinguished persons. One was physical chemist Walther Nernst (1864-1941) the discoverer of the Third Law of thermodynamics and an important theoretical contributor to Haber's ammonia synthesis process. The other was the eminent church historian Adolph Harnack (1851-1930), a grandson of the

pioneer agricultural chemist Justus von Liebig. The first two institutes were twin institutes devoted to chemical research and they were officially opened by Kaiser Wilhelm on October 23, 1912. Three years later Fritz Haber would display in his study the Kaiser's letter authorizing him to initiate chemical warfare research. After the opening there came in quick succession institutes dedicated to physics, medicine and entomology. The lofty aim of the Society was nothing less than to establish research institutes in every major branch of science, all staffed with the finest talent available in the Empire or wherever obtainable. But the ambitious program was abruptly curtailed by the outbreak of war in August, 1914. And the original blueprint was never fulfilled.

In 1913 Max Planck and Walther Nernst journeyed together to Zurich in order to persuade the reluctant Albert Einstein to take up the directorship of the Physics Institute. Another Jew, Richard Willstaetter, was awarded the equally coveted co-directorship of the Institute for Chemistry despite objections from anti-semitic elements within the Prussian Academy of Science. When Fritz Haber turned over his own chemical institute to war work he immediately recruited Willstaetter to direct gas defense strategy in order to concentrate all of his own creative energies upon the formidable challenge of developing a poison gas strike capability for the Prussian War Ministry.<sup>5</sup> The two famous chemists, both of whom eventually were to receive Nobel prizes for their respective prewar achievements, were soon to make a formidable team. Barely acquainted with one another before the war they now became close friends and were in fact next door neighbours at Dahlem. For the swift development of a most versatile and effective facial respirator or gas mask Richard Willstaetter won the Iron Cross. A quarter of a century later he would flee Nazi Germany, not abandoning, until 1939, his hope that Hitler would give up his course of madness.

Thanks to the interdisciplinary approach adopted on a scale previously unknown in scientific research, the chemical institutes of Dahlem were able to effect, overall, a much more realistic appraisal of the capabilities and limitations of war gases than their Franco-British adversaries who, at the outset of the war, lacked the highly sophisticated research and manufacturing apparatus of the twenty-five German States. At Dahlem Fritz Haber contributed to the efficiency by devising on the spot a simple but extraordinarily effective formula to test the new war gases. This was the so-called Lethal Index or *Haber product W*. By means of the formula  $C \times T = W$  ( $C$  = concentration of gas;  $T$  = exposure time;  $W$  = time when death occurs) the Wachtel team discovered that the  $CT$  of many gases such as chlorine, phosgene and mustard gas was constant; that is, if concentration increased then the length of exposure necessary to induce death at that concentration decreased in inverse proportion. However, the experiments revealed that a few gases did not behave according to the formula. Prussic acid

was one of them. An essentially noncumulative body poison, when the concentration of HCN was lowered below the threshold necessary to kill, it remained toxic to animals but was not fatal to them. Thus cats and dogs were able to endure prolonged exposure to low concentrations of HCN, while higher concentrations caused asphyxiation, sometimes in as little as five minutes. These experiments made clear to Wachtel that hydrocyanic acid would not prove effective as a war gas, for the high concentrations necessary to kill were simply not attainable.<sup>4b</sup>

It is almost comical, upon reflection, to think that these conclusions escaped the French who in the meantime had become positively obsessed with the combat potential of this traditional poison that first gained notoriety when the brilliant German chemist Victor Meyer (describer of mustard gas) took his life with it, in 1897. With enthusiasm the French stored up thousand of HCN compound shells (HCN and phosgene) in early 1916, calling them *Vincennite* after the city of their loading. However, the Parisian cabinet recoiled at the idea of employing so diabolical a weapon even on the Huns and the go ahead for its use was not given until the Battle of the Somme in July. Long after French intelligence reported that prussic acid filled shells were having no noticeable effect upon the Germans the French 75's were still firing them and continued to fire them to the end of the war. German intelligence had learned of the French intent to use hydrocyanic acid only a scant week before the opening of the Battle of the Somme. The Willstaetter team was notified and prescribed one gram of powdered silver oxide to be sandwiched between the potash layers of the Willstaetter gas mask. This effectively neutralized the French weapon.

For their part, the Germans employed various cyano compounds to augment their always limited supplies of chlorine, phosgene and mustard gas. With HCN used in this manner they had hoped to obtain some deadly synergistic effects resulting from complex gas interactions. The Austrian Army pioneered the use of cyanogen bromide, a prewar pesticide, as a weapon in their "CE" artillery shells. The debut was made in September 1916 which was only two months after the French had introduced hydrogen cyanide (Prussic acid) during the Battle of the Somme. Curt Wachtel estimated, excluding other cyanogen compounds, that the more than 4,000 tons of hydrogen cyanide or HCN released over Europe in Vincennite shells by the French, had it been employed instead in gas chambers, would have been adequate to snuff out 20,000 million lives. In 1916 this was equal to some ten times the world population.<sup>4c</sup>

Virtually all of the technical problems encountered in the design of gas chambers for the rapid destruction of human beings were solved by the Kaiser Wilhelm Institute for Physical Chemistry and Electrochemistry after 1914. There, researchers determined that 10 to 40 cubic meters was an efficient capacity for chambers

devoted to the simulation of killing the enemy. In larger chambers an undesirable stratification of the gas developed. The greater concentrations tended to collect in the lower regions. Though this could be offset somewhat by the introduction of fans a further loss was incurred by absorption of the gas upon chamber walls. Finally, it was discovered that this absorption rate varied according to floor, wall temperatures and humidity factors.

In improvisations to simulate human conditions, toxic gas testing was most inventive at Dahlem. For example, it was discovered that the toxicity threshold for monkeys was similar to that of humans. In order to make more accurate evaluations along these lines Flury and Wachtel summoned Emil Pfungst, a specialist in animal psychology, to Dahlem. Pfungst soon concluded that young rhesus monkeys exhibited similar gas reactions to those of young men up to 20 years of age.<sup>4d</sup> It was further discovered that young suckling pigs, whose tender skins resembled those of humans, were almost ideal for testing vesicants such as mustard and lewisite gases for combat potential. However, all these experiments were not conducted without undesirable effects upon the staff. Otto Hahn, father of the nuclear age, wrote concerning his experiences as a member of the Haber wartime team: "As a result of continuous work with these highly toxic substances our minds were so numbed that we no longer had any scruples about the whole thing..."<sup>9</sup>

With such an admission, one wonders if the Wachtel team experienced any revulsion over the destruction in a single day of a thousand puppies pegged to the ground of the Warthe-Lager manoeuvring field in Posen during the first full scale tests on mustard gas, conducted in September or October, 1916.<sup>4e</sup> The French and the English also tested their combat gases upon animals, subjecting dogs to lethal gas barrages laid down on trench systems dug into the quiet hills of Provence.

With both sides the really important consideration was to win -- to win at all costs. The mood then prevailing in Berlin was well summed up by a remark attributed to Paul Friedlaender (1857-1923), synthesizer of artificial indigo. A key consultant to Haber after the chemists Lommel and Steinkopf had failed to solve the intricate mass production problems of mustard gas (which the Germans called *LOSS* after the two chemists) Friedlaender exclaimed "We have no time for satisfying the curiosity of baby chemists."<sup>4f</sup> By this standard Fritz Haber qualified as an adult chemist. Yet his brilliant achievements in peace and war could not prevent Curt Wachtel from writing a quarter of a century after Ypres: "... the superiority of chemists over medical experts proved just as disastrous as did -- everywhere, in all armies -- the superiority of the professional army officer over every kind of scientist."<sup>4g</sup> When they instituted gas testing programs on human guinea pigs the Nazis made sure that medical considerations prevailed in their quest to find the agent that killed the quickest.

A reservist, Fritz Haber enlisted during the great teutonic euphoria of August, 1914 and held the rank of sergeant-major (*Vizewachtmeister*) in the artillery. *Naturwissenschaft*, for which he frequently wrote, reported that he showed a "cool head...and contempt for death under fire in the front line." Nonetheless, when the great sweep to the Channel in which he was participating became unhinged on Paris, Haber excitedly wrote a bold missive to the German General Staff which bore the rather strange title: *Memorial from Sergeant Haber Concerning the Protection of the German Front by Impenetrable Gas Clouds.*<sup>7a</sup> The text of this memorial has, unfortunately, not survived. It is not even mentioned by Haber biographer Goren. Delivered through a Colonel Bauer it had the immediate effect of returning Haber to Dahlem where he initiated experiments with toxic gases.

In September or early October, 1914, physical chemist Walther Nernst was asked by the Prussian War Ministry to suggest some chemicals that would drive the French from their trenches.<sup>8a</sup> Nernst had just completed a tour of duty as a volunteer driver with General Kluck's armies. He suggested the use of some irritating powders, basically non-lethal chemicals that induced coughing, sneezing or tears. In the first month of the war the French had in fact pioneered the use of tear gas with a 26mm rifle grenade containing a mixture of methyl and ethyl bromoacetate, a mixture that had been used to good effect on the Bonomi gang of automobile thieves in pre-war Paris. There is no evidence that Nernst advocated the use of toxic substances. Having witnessed the failure of the Schlieffen plan firsthand he may have felt that no chemical was capable of redeeming the Kaiser's dreams of glory. At Neuve-Chapelle, in France, on October 27, 1914, the Germans tried out some 10.5mm canister shot whose spaces were filled with the irritant chlorosulphonate of ortho-dianisidin. It was ineffective and efforts were next focused upon a series of bromo compounds. The first of these — a mixture of xylyl bromides — was suggested by von Tappen, a chemist under Haber. Named T-stoff (for Tappen) the new material was the first use in modern warfare of a gas of lethal capability. Enclosed in artillery shells, it made its debut on the Russian front on January 7, 1915. But it was not powerful enough and again the Germans were disappointed by the results. According to leading gas specialists in France and England, Fritz Haber was at work on toxic gases as early as August, 1914. A dramatic setback came to his efforts in December when an explosion occurred in an experiment involving cacodyl oxide and phosgene: in this the brilliant Haber protegee Oscar Sachur was killed. Haber turned next to chlorine with which the *Auergesellschaft*, named after Carl Frederick Auer (1858-1929), the metallurgist, had been experimenting at Dahlem since October. The gas was both abundant and cheap as it was widely used in the manufacture of synthetic dyes of which Germany enjoyed a virtual world monopoly. The success of the first great yellow-green chlorine cloud released by Germany near Ypres, in Belgium, on April 22, 1915, surpassed all expectations.



Thanks to the element of surprise, and supervision of the field work by Haber himself, within a matter of minutes a whole French Moroccan division was wiped out, five thousand soldiers died in agony and another ten thousand, including some British soldiers, were incapacitated. This first massive lethal gas attack in history set the precedent for the mass asphyxiation of millions of Jews and Gypsies in eastern Europe a quarter of a century later. But in 1915 the only immediate dividend for Germany was the acquisition for two or three days of a few hundred yards of Belgian farmland. Due to the lack of respirators in the first two gas attacks it is not surprising that they managed to produce more casualties than any other attacks made during the war despite subsequent improvements in gases and their delivery systems. The weapon from the outset proved inadequate to its task — breaking the deadlock induced by trench warfare. Eventually, the Germans suffered enormous gas casualties of their own — losses that their regimental histories, official statistics and war memoirs notably glossed over. Poison gas proved to be Prussia's Ibsenian 'corpse in the cargo'.

On May 31, 1915, the Germans mounted a massive chlorine cloud attack on the Russian front, selecting as their target the Bzura-Ravka River line. The attack, supervised in the field by Fritz Haber, employed 12,000 cylinders or twice the number used in the Ypres attack. Within a matter of minutes 6,000 Russian soldiers perished and another 3,100 were poisoned.<sup>4h</sup> Impressed, but unable to follow up these coups for lack of reserve chemicals, the Prussian War Ministry gave Haber's institute the green light to develop newer and deadlier gases, failing to realise that the universally adopted facial respirator would largely neutralize the gas weapon on the battlefield.

At first the Entente was poorly equipped to retaliate, having little ready manufacturing capacity for chlorine and phosgene, basic chemicals in Germany's world monopoly on synthetic dyes. At the same time the Entente's mass production capability, as Haber must have known full well from his extended visit to the United States in 1902, greatly exceeded that of Germany. When the Franco-British retaliation finally commenced, in the fall of 1915, it managed to improve upon the German delivery systems and fairly maintained those delivery initiatives, which to some extent offset Germany's superior gas chemistry, to the end of the war. Yet for two critical years — April, 1915 to July, 1917, — and even beyond, the Germans maintained the chemical initiative, Haber's institute being able to introduce a thoroughly tested new gas in as little as three to six months. Generally, it took the Entente twice that long to imitate chemicals that the Germans had already fielded. Yet for reasons still not fully understood the Germans were very slow to copy the effective British Stokes mortar gas shell system, even though Haber himself is said to have suggested the use of gas mortars as early as 1914. When later the British supplemented their small Stokes mortars with

batteries of huge electrically fired Livens projectors, the Germans were still clinging to artillery gas shells and the occasional cloud attack. In 1916 Haber was promoted to Captain and made chief of the Chemical Warfare Service. He and his assistants worked feverishly - sometimes all night - to develop new offensive gases and a dependable 'defensive' gas weapon. In December, Haber requested a personal interview with General Ludendorff. He told the hero of Tannenberg that he was convinced that a certain compound 2,2'-dichlorodiethyl sulphide had ended his search for the ultimate gas defense weapon, that is, one that could be laid down like a carpet to discourage a ground attack or to cover a strategic retreat. The material was not new. It had been discovered in 1880 by the Scots chemist Guthrie and was fully described by the German chemist Victor Meyer in 1886, the year that prussic acid was first used as a pesticide.

Haber's formula,  $C \times T = W$ , showed that mustard gas (as the British dubbed it on account of its garlicky mustard-like odor) was fully effective even at the lowest concentrations, an important consideration in open warfare. The atomized liquid was a powerful vesicant and bronchial irritant and it had the uncanny ability to linger in the ground for days or even weeks. The suffering it caused was intense.<sup>23</sup> Against it gas masks were only partially effective. Little wonder that it caused more casualties on both sides than any other chemical weapon used in the war. With a flair for the historic and dramatic, the Germans introduced mustard gas near Ypres on the night of 12 July 1917, near the site of their first chlorine attack. However, Haber warned the general staff that if Germany did not win the war by June 1918 the Entente would be in a position to retaliate, his gas evaluation committee having told him that it would take England and France about a year to solve the complex mass production problems posed by the chemical. Ludendorff gambled. In June, 1918, as predicted, the Entente began to employ mustard gas, a scant month before the beginning of the last German offensive of the war. The words that Walter Rathenau had applied to unrestricted U-boat warfare in 1917 "... a leap over the abyss only succeeds if its success is a hundred per cent success"<sup>10</sup> suggests that had the World War continued beyond 1918 some kind of doomsday spray might have been the eventual product of the inevitable oneupmanship game of the scientists. The British, in their gas planning for 1919, were looking forward to releasing such deadly concoctions as adamite, lewisite and poisonous particle fogs that were capable of penetrating any gas mask of the day. Rathenau had said it all, even earlier, when he wrote in the March 23, 1913, *Neue Freie Presse*, "Money and armaments alone will not avail to avert our doom. Material forces only call up material forces in reply." However, in 1914, the author of these brave words conceived and directed the War Raw Materials Department in Berlin which succeeded in stockpiling virtually everything that Germany needed in order to wage a prolonged war under blockade.

The belief that applied science could save mankind from its self destructive tendencies was still widely held in 1917, even when it had been apparent for some time that such a belief was a forlorn hope. Unfortunately, chemists, physicists, in fact all scientists, individually and collectively, possess moral vision which is neither better nor worse than the rest of mankind. In microcosm the folly of science and scientists can be seen in just three Haber achievements that happened to span a seven day period: July 10 to 17, 1917. During that particular week, when the war was nearly three years old, two new Haber lifetaking devices made their battlefield debuts — arsenicals and mustard gas. And a Haber lifesaving device, an acoustical whistle designed to warn coal miners of firedamp, quietly received a Swiss patent. The dilemma of the scientist in war was rather pathetically summed up in 1917 by Walther Nernst, just after he had lost the second of two sons on the western front. In the introduction to one of his works he wrote "Nothing is as good as physics to divert the mind from the present time...which is to be deplored."<sup>8b</sup> Had Nernst lived to 1945 (he died in 1941) he would probably have derived little comfort even in the reading of physics in the light of what *nuclear* physics did to the Japanese that year.

According to Charlotte Haber, whom Fritz married in October, 1917, her husband's eyes were not opened to the prospect that Germany might lose the war until early in 1918. At the home of his friend Albert Einstein the *denizen of Dahlem* was told by Walther Rathenau that a desperate Admiralty was falsifying the tonnages of Entente shipping sunk.<sup>11a</sup> Up to that time Haber's own astonishing achievements as an industrial chemist had contributed to preventing him from entertaining the possibility of defeat. His Haber-Bosch ammonia synthesis process, of which Germany enjoyed exclusive monopoly until 1919, had, after all, helped the Kaiser to keep on fighting for four years after the great reverse on the Marne. The great importance of the process was candidly summed up by Voerster, member of the Prussian House of Deputies, who claimed that "without the new nitrogen process of Professor Haber the war would have been lost in three months."<sup>12</sup>

Just as Haber had embarked in 1904 upon his successful quest to find a method of synthesizing ammonia directly from its elements, nitrogen and hydrogen — for the blessing of mankind — in 1914 his cohorts at the Dahlem Institute probably had just as commendable an objective in mind when they began looking for a pesticide more effective than HCN. In cooperation with their sister Institute of Entomology, they methodically sifted through reports of fatalities by cyano compounds registered over the world. And then they began looking for improved pesticides based on prussic acid, HCN. Between 1915 and 1916 they developed the product *zyklon* (cyclone),<sup>14</sup> later referred to as *zyklon A*. This consisted of a mixture of methyl and ethyl cyanoformates with the addition of about 10% of esters of chloroformic acid to act as a marker.<sup>4</sup> Cyanoformates liberate up to

30% of their weight of HCN in presence of moisture and being much less volatile than HCN itself are less easily blown away and lost. As an insecticide zyklon proved highly efficacious for the destruction of typhus carrying lice amongst civilians and German troops in Poland and Russia in 1917-18. As a war gas it proved rather ineffective, but was sometimes mixed with other gases, especially mustard gas, when these were in short supply.<sup>4</sup>

It appears that after 1919, owing to the prohibition of the manufacture of poison gas by Germany by the terms of the Versailles Treaty, the production of zyklon-A was discontinued.<sup>14</sup> However, research on insecticides continued and by 1924, the technical director of DEGESCH, Dr. Walter Heerdt, had perfected a saleable form of prussic acid. In the pure form HCN is a very volatile liquid and liable to polymerisation. DEGESCH stabilised it with oxalic acid and sold it in sealed hand-sized canisters in which it was absorbed either in kieselguhr (lump form) or in cellulose (cardboard chips etc.). In this form it proved storable and safely transportable. As the DEGESCH company had previously produced zyklon, the name was retained: this time as *Zyklon-B*. Once again some chloroformic ester was added as a warning agent, for it should be remembered that not everyone can smell HCN. Prussic acid in this form was relatively safe to handle in fumigation work.

The third and only other known Zyklon developed by DEGESCH was *Zyklon C*. In a 1926 article in *Disinfektion* chemists T. Pohl and Brune Tesch (the latter the Tesch of the "Zyklon B Case") described it as a mixture of 10 parts HCN, one part of a danger indicator and 0.3 parts of ethylbromoacetate. The danger indicator or warning material was none other than chloropicrin the infamous "vomiting gas" material that the Germans had used in diphosgene "green cross" gas shells in 1916. Like T-Gas (T for Tesch), Zyklon C was adaptable, according to its describers, to the disinfection of isolated flats in apartment houses without disruption to the lives of the adjoining occupants.

Lucy Dawidowicz recently reminded the world that it was Zyklon B which was selected for use at Auschwitz "by a committee of physicians and medical experts, headed by Brandt".<sup>13</sup> The presence of chloroacetate esters, which vigorously attack mucous membranes, especially the eyes, must have proved exceedingly painful to those who were murdered in the gas chambers.

The origins of DEGESCH itself are still a bit obscure. According to Heinz Liepmann, in his 1937 published gas study, Fritz Haber created, during the spring of 1917, a committee affiliated with the Prussian War Ministry. It was called The Technical Committee for the Destruction of Noxious Creatures (*Technische Ausschuss fuer Schadlingsbekaempfung* or *TASCH*.) DEGESCH's fiftieth anniversary plant history, distributed in 1969, states that *TASCH* was established

by Professor Fritz Haber to combat meal worm and various kinds of lice.<sup>14</sup> In the context of the times — typhus caused by lice was a severe problem on the eastern front in 1917 — the DEGESCH statement is credible. However, while DEGESCH confirms that the Committee TASCH was affiliated with the Prussian War Ministry, Liepmann claims that the committee was established for the purpose of coordinating combat gas production from nine German chemical firms including Bayer, Hoechst, BSAF, Grieschein Elektronen and Kalle & Company.<sup>7b,15</sup> The plant history admits to the fact that DEGESCH grew out of *TASCH*. It was then incorporated, on March 13, 1919, as the German Limited Liability Pest Control Company, a joint partnership between government and private enterprise. The company was established along the lines advocated by Walter Rathenau in his writings on War Industry Companies and industrial reform, the same Rathenau made scapegoat for the Kaiser's failures in 1920. He was assassinated by youths in 1922.

The year after it was founded DEGESCH moved from Berlin to its present location, Frankfurt am Main. However, this was no longer Hermann Hesse's "good old staunchly democratic city of Frankfurt with its markedly Jewish culture, a city which the Hohenzollerns had so thoroughly detested..." but a great commercial metropolis, headquarters of the expanding *I.G. Farbenindustrie* chemical cartel and later the home of the fledgling national airline Lufthansa. In 1922 DEGESCH restructured itself as a purely private company marketing prussic acid and other chemical pesticides. In 1925, it reorganized, once again, deciding this time to restrict its research and marketing structure to cyano compounds which it realised somewhat more quickly than its competitors, were the most effective vermin control agents.

It was for the purpose of carrying out exhaustive tests on Zyklon B that DEGESCH's World War II director, Dr. Gerhard Peters, joined the firm, in 1922. Gradually, DEGESCH gained a monopoly over the marketing of Zyklon and in 1929 divided the world market with American Cyanamid Corporation. It also transferred all marketing rights for Zyklon in Germany to two affiliate firms. One of these was Heerdt-Lingler (HELI) in Frankfurt, under virtually the same management as DEGESCH. The other was the earlier mentioned Tesch and Stabenow (TESTA) of Hamburg, the firm that set up the gas chambers at Auschwitz and supplied them with Zyklon B. In 1930, the omniverous *I.G. Farbenindustrie* cartel expanded its interest in DEGESCH to become a 50% partner. When the Allies broke up the trust in 1945 I.G.'s interest in DEGESCH was simply transferred to Bayer and Company, a chemical giant of the original I.G. structure. In this manner DEGESCH survived the war, its ownership reshuffled on Germany's chemical chessboard.

If DEGESCH's antecedents were not truly a pest control committee in the Kaiser's disintegrating war machine but a critical committee

coordinating the logistics of the ever expanding war gas production, as Liepmann has claimed, then one asks: what possible motive could there have been in giving it such a misleading and banal name? Most likely the answer lies in national security. A disastrous explosion had taken place in May, 1917, at the Berlin works producing the first mustard gas, an explosion which came only a month after America's declaration of war on the Central Powers and which delayed the introduction of the gas by one or two crucial months. Sabotage had been on the increase in the Fatherland, some of it caused by hungry, disgruntled workers, some of it caused by enemy agents. No further setbacks could be tolerated in the mustard gas program and strict new security precautions were instituted. To all this Haber undoubtedly reacted in his typical way. He enjoyed making jokes out of serious occasions, such as the time when he and his Dahlem colleague Frederick Epstein carried on lively discussions of embalming methods at the funeral of Siegfried Haber, enjoying the uncomfortable reactions of the mourners.<sup>16</sup> His charades on family and friends, often accompanied by poems or limericks, were common knowledge. He also had a passion for naming things and he and Willstaetter were encouraged to name the inner streets of the Dahlem complex. The Technical Committee that Haber chaired from 1917 coordinated the war gas and delousing agent production of a great, sophisticated decentralized chemical combine spearheaded by the I.G. Farben trust. Whether Haber gave the committee its *double entendre* name or not, the precedent that the fiction created was to have truly baleful consequences.

DEGESCH's brief corporate history statement admits that the firm was "in a way a child of the First World War", but not that it grew out of a committee that controlled chemical warfare production. The history is more concerned with detailing the postwar throes of the company and is, of course, silent concerning the fact that during the second world war its Zyklon B development facilitated the extermination of perhaps the largest number of people ever massacred in so small a place in so short a time, including the worst devastations of aerial bombardment. One thing remains certain: masking mass murder behind a pest control façade originated not in the sick brains of Himmler and Hitler, during the Third Reich, but within the orbit of the Prussian War Ministry during World War I. It was then that 'medical solutions' for the enemies of the Fatherland were first conceived.

The Prussian subterfuge had its influences on the course of Germany's secret rearming during the 1920's and 1930's. In the early 1920's for example, the Hamburg chemical manufacturer Hugo Stoltzenberg stored phosgene cylinders for gas experimentation in violation of the Treaty of Versailles. To ward off the unwanted snoopings of the peace commission inspectors he was inspired to hang a sign outside one of his plants which read:<sup>7b</sup>

*Technical Committee for the Destruction of Noxious  
Creatures.*

Stoltzenberg began a long chemical career with contributions to the conversion of beet sugar wastes, called *Schlempe*, into useful additives for superphosphates. At the outset of the 1914 war he made contributions to the technology of substitute high explosives in a nitrate starved Fatherland. But it was his postwar work that earned him his notoriety. In 1924 the *Chemische Fabrik* Dr. Hugo Stoltzenberg was awarded a German patent for a new method for destroying swarms of noxious creatures with aircraft and flame-throwers. The idea was to spray the ground with tiny, self-dissolving film capsules enclosing lethal gas. A similar proposal for the spraying of plants "from great heights" secured him a personal patent in 1926. The jargon of these patents and certain Stoltzenberg pamphlets of the period conveys the impression that this Pied Piper of circumlocution was really offering his country some exciting new ways of exterminating its enemies.<sup>17</sup> The last entry attributed to the Hamburg chemist in *Chemical Abstracts* occurs in 1943. It contains a summary of a patent awarded to Stoltzenberg for the design of filters to prevent acid gas from entering breathing air, which sounds suspiciously like gear intended for new model bomb shelters. The previous year, Ferinand Flury the pharmacologist of Dahlem published an article in the *Arch. Gewerbepathologie und Gewerbehygiene* with Walther which discussed, with sincere professional detachment, the effects of liquid prussic acid applied to the skins of mice and rabbits - while as many as 1000 Jews per day were perishing in the carbon monoxide and prussic acid gas chambers in Poland.

In October, 1919 a disillusioned but still energetic Fritz Haber established his famed Colloquium, which was inspired by the Nernst Colloquium of earlier years. In February he reorganized the Dahlem Institute of Physical Chemistry and Electrochemistry, adding new departments in pharmacology, organic chemistry, textiles and insect pests to existing departments in physics, colloidal, physical and electrical chemistry. The insect pest unit, euphemistically called Economic Entomology, was the natural outgrowth of four concentrated years of experimentation with lethal war compounds. Just twelve months after the reorganization, on February 7, 1920, an Entente commission asked the Weimar government to cooperate in the extradition of some 895 German "war criminals". Among the distinguished names in science on the list were those of Dr. Carl Duisberg, director of the Leverkusen works, chairman of the wartime chemical

industries board and a sometime consultant to Dahlem; Walther Nernst whose development of the *Flammenwerfer* and substitute high explosives had earned him the Iron Cross; and Fritz Haber. Ironically, Duisberg, a double doctorate and *father* of the *I.G. Farbenindustrie* cartel, woke up one morning in 1945 to find himself once more branded a war criminal.

Haber reacted to the 1920 inquest by fleeing to his chalet in Switzerland. According to Charlotte Haber he did not mind being judged by some neutral tribunal but he would have none of the vindictiveness of the victorious 'Entente'.<sup>11b</sup> He returned to Germany on his own accord when the inquiry proved to be more rhetoric than action. All the same it is known that Haber was himself deeply disturbed by the charges laid against him. His health began to deteriorate. But, in the 1920's he found fresh hope in a new cause: extraction of gold from sea water in order to repay Germany's staggering reparations. The ill-fated undertaking, which spanned several years, was initially financed by the German Gold and Silver Refining Company of Frankfurt (*Die Deutsche Gold-und Silber-Scheideanstalt*) a firm which was, in 1919, according to DEGESCH's history, the leading firm in the manufacture of prussic acid pesticides and poisonous cyano compounds.

In April, 1933, less than three months after Hitler's accession, the NAZI Ministry of Art, Science and Popular Education ordered Haber to dismiss his lower echelon Jewish staff members at Dahlem. When two of his top colleagues resigned in protest Haber proudly tendered his own resignation. The son of several generations of assimilated Jews, he had converted to Christianity to further his chemical career. Suddenly, in the wake of this disaster, his faith in Judaism was rekindled. He resumed his middle name *Jakob* and embraced the political Zionism which he had tried so hard to discredit. But he was a dying man. In succession he visited Spain, France, Switzerland and England for a new perspective, advice and medical treatment. When in Switzerland for treatment he accepted a research post at Rehovoth from a once hostile Entente chemist, Chaim Weizmann. But before he could set out he died, in 1934, his weak heart fatally taxed by asthma.

When Haber left Germany in the late summer of 1933, the president of the Kaiser Wilhelm Society for the Advancement of The Sciences (today the Max Planck Society) asked Otto Hahn to take over Haber's institute and also to continue in his capacity as director of the Institute for Chemistry. In 1915 Haber secured for Otto Hahn special noncombat duty with a group of 'active specialists' one of whose tasks was to investigate firsthand in the field the effects of poison gas on the enemy. Of a certain visit to the Russian front made in this connection, Hahn later wrote "I felt profoundly ashamed and perturbed. After all, I shared the guilt for this tragedy."<sup>6b</sup> He went on to describe the scene: "First we attacked



the Russian soldiers with our gases, and when we saw the poor fellows lying there, dying slowly, we tried to make breathing easier for them by using our own life saving devices on them. It made us realize the utter senselessness of war."<sup>6c</sup> The impression that Hahn tries to give is of an act of spontaneous compassion, but in fact his activity was only the logical extension of the medical-pharmacological approach to chemical killing practiced at Dahlem. The Nazis later made good use of such techniques when they conducted their first gas tests on prisoners in the basement of a Bavarian castle from 1938 to 1941. Simon Wiesenthal has estimated that in Hartheim Castle's gasrooms as many as 30,000 political prisoners, many of them dissident Christian clergymen, perished.<sup>18</sup> There, the most effective killer proved to be Zyklon B, the fatal dose being 1 milligram per kilogram of body weight. Years before at Dahlem the dosage for inducing immediate death by HCN had been calculated: 300 milligrams per cubic meter of air, or 270 parts per million.<sup>19</sup> To the victims it would not, of course, make a particle of difference.

Hitler's ultimate extermination weapon against the Jews, lethal gas, was not only the natural extension of the carbon monoxide fuelled euthanasia program of 1939-1941 through which thousands of Germany's aged, infirm, insane and deviate were slain.<sup>20a</sup> It was the ultimate extension of the application of science to mass murder based upon medical research largely completed during World War I. Dr. Robert Servatius, counsel for Adolph Eichmann, revealed his addiction to the Nazi pseudo medical subterfuge when he declared before the Jerusalem tribunal that his client was innocent of any responsibility for the "collection of skeletons, sterilizations, killings by gas, and similar medical matters." When interrupted by the incredulous judge, Servatius coolly explained: "It was indeed a medical matter, since it was prepared by physicians; it was a matter of killing, and killing, too, is a medical matter."<sup>20b</sup>

Since the Germans regarded many of their adversaries in World War II as *Untermenschen* it must be assumed that Servatius intended that killings on the battlefield should be included in his macabre diagnosis on grounds of consistency if on no other basis. Doubtless only a few at the Eichmann trial were sufficiently acquainted with the details of the gas operation at Auschwitz to recall that the Zyklon B canisters were transported from depot to gas chamber in panel trucks bearing the Red Cross emblem, or that German victims of the guillotine, a device originally suggested by a French physician, whose name is immortalized thereby, the method by which Nazi Peoples' Courts carried out their sentences, often as not wound up preserved in Lysol bottles for instruction in the medical schools.<sup>21</sup> But all present at the Jerusalem Tribunal, upon hearing Dr. Servatius speak, must have been reminded that a physician, Dr. Mengele, made the final selections for the gas chambers at Auschwitz which was hardly more perverse than the fact that orderlies and guards at

Dachau hurriedly donned Red Cross armbands and scurried about attending to the hopelessly broken in body and spirit when Patton's tanks came crashing through the gates.

The pharmacologists, physiologists and psychologists — that is, the doctors — associated with the Kaiser Wilhelm Institutes during WWI gassed all manner of animal life for the single minded purpose of devising more effective ways and means of gassing the enemies of the Empire on the battlefield. Wittingly or unwittingly these medicos snuffed out in a stroke the spirit of Hippocrates and gave birth to a ghastly new breed of vivisection (as did their Entente counterparts), a vivisection that had as its ultimate aim not the saving of human life but its destruction. If the Nazis could succeed in finding a political-philosophical rationale to convince Germans and Poles that Jews, Russians and Gypsies were wholly inferior to cats, dogs, and monkeys — in fact mere vermin — then mass murder on Polish soil could be smoothly substituted for animal sacrifice and blandly equated with political or economic expediency. It took the Nazis only a half dozen years following their accession to power to transform the legitimate practice of extermination of vermin on people into acceptance of the principle of exterminating *people as vermin*. The result was Auschwitz, Treblinka, Maydenek, Sobobor, Chelmo and Belzec, all sited in traditionally and historically anti-semitic Poland. This was the ultimate, obscene expression of Hermann Hesse's Germany — a people down 'on pious knees before the god of Applied Science'; of the Hesse who wrote during the summer of 1918 "... we have with smiling arrogance created a science and technology that manufactures explosives and poison gases. Where is the progress? Where is the regression? There is neither."<sup>22</sup> As Lewis Mumford reflected in a memorable March 10, 1975 *New Yorker* essay, "progress was a tractor that laid down its own roadbed and left no permanent imprint of its own tracks, nor did it move toward an imaginable and humanly desirable destination."

Fritz Haber was devoted to his three half-sisters: Else, Helene and Frieda. He called them "the three St's": Stolz (pride), Stuetze (support) and Strafe (punishment). All three made happy marriages, Else and Helene choosing medical men. Helene's was the Stettin orthopedist Dr. Weigert, to whom she bore a daughter Marianne and a son Karl. Frau Weigert was a talented orthopedic therapist who had tirelessly nursed the wounded of WWI. When Hitler came to power the Weigerts decided not to leave Germany though it could easily have been managed by Helene's eminent half-brother. In time they were arrested and dispatched to Theresienstadt, the 'model' Jewish ghetto Heydrich established in 1942 by evacuating the entire native Czech population from an old Bohemian fortress town on the river Eger. Theresienstadt was under the direct authority of Eichmann and housed mainly prominent and elderly Jews, visited by the International Red Cross, a kind of showplace concentration camp.<sup>20c</sup> Although living conditions there were generally far better than in

other camps, the less privileged suffered privations and diseases were rampant. When Dr. Weigert died, Helen, the "support" struggled bravely on nursing the sick, the lonely and the terrified, a pillar of strength to the Jews.

In 1943 the Germans undertook the "thinning out" (Ausfleckerung) of the over crowded houses and hotels of the ghetto, making regular shipments to the Auschwitz extermination centre. One day Helene Weigert found her name on the lists of transports. A chemist inmate urged her to write to Theresienstadt's commandant to remind him what Fritz Haber had done for the German War effort from 1914-1918. Although Helene was probably acquainted with the nature of the fate that lay in store for her at Auschwitz (which the Germans labeled their "worst kept secret"), she hesitated to take the advice as she was disturbed that her brother had introduced Germany to chemical warfare. She pondered her desperate situation. The fact that he had constructed the historic prototypes of the Polish gas chambers she weighed against his gas defence achievements that had saved lives of countless German soldiers.<sup>11c</sup> Painfully she revived memory of Clara Haber who committed suicide after the first Ypres gas attack when she failed to convince Fritz that he should quit the lethal gas war. She may also have pondered the words of the prophet Hosea who warned his people, "For they sow to the wind and they shall reap the whirlwind." In the end she wrote the letter, received no reply, and found her name stricken from the list of transports. Renewed in spirit she returned to nursing the sick and comforting the dying. Helene Weigert survived Nazi Germany, as did her daughter and her sister Else. Nearing 80 years of age on her liberation Helene accepted an invitation from her son Karl to come to America, supporting herself in her last years as a companion to the elderly.

In 1952, ceremonies commemorating the fortieth anniversary of the founding of the Kaiser Wilhelm Institute for Physical, Chemistry and Electrochemistry were postponed two months in order to make them coincide with the 84th anniversary of the birth of Fritz Haber. A plaque was unveiled honouring Fritz Haber, the inscription praising his service to his country and to mankind, services which included wresting bread from the air. No mention, of course, was made of the fact that he had also devoted four years of his life to wresting breath from life. The rebuilt complex is now known as the Fritz Haber Institute. The first four decades of this dark century has demonstrated, such as no previous century has, the truly schizophrenic nature of applied science, that house divided against itself in peace and in war. As it entered the second half of the twentieth century perhaps it was fitting that Haber's Institute should carry on its work in a *divided city*.

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