



# **When We Cease to Understand the World**

BENJAMÍN LABATUT

Translated from the Spanish by Adrian Nathan West

 New York Review Books New York



Prussian Blue

In a medical examination on the eve of the Nuremberg Trials, the doctors found the nails of Hermann Göring's fingers and toes stained a furious red, the consequence of his addiction to dihydrocodeine, an analgesic of which he took more than one hundred pills a day. William Burroughs described it as similar to heroin, twice as strong as codeine, but with a wired coke-like edge, so the North American doctors felt obliged to cure Göring of his dependency before allowing him to stand before the court. This was not easy. When the Allied forces caught him, the Nazi leader was dragging a suitcase with more than twenty thousand doses, practically all that remained of Germany's production of the drug at the end of the Second World War. His addiction was far from exceptional, for virtually everyone in the Wehrmacht received Pervitin as part of their rations, methamphetamine tablets that the troopers used to stay awake for weeks on end, fighting in a deranged state, alternating between manic furore and nightmarish stupor, with overexertion leading many to suffer attacks of irrepressible euphoria. "An absolute silence reigns. Everything becomes alien and insignificant. I feel completely weightless, as if I were floating above my own airplane," a Luftwaffe pilot wrote years later, as though he were recollecting the silent raptures of a beatific vision rather than the dog days of war. The German writer Heinrich Böll wrote letters to his family from the front asking them to send him additional doses: "It's hard here," he wrote to his parents on November 9, 1939, "and I hope you understand if I can only write you every two or three days. Today I'm doing so chiefly to ask for more Pervitin . . . I love you, Hein." On May 20, 1940, he wrote them a long, impassioned letter that ended with the same request: "Can you get hold of a bit more Pervitin for me, so I can have some in reserve?" Two months later, his parents received a single scraggly line: "If at all possible, please mail me more Pervitin." Amphetamines fuelled the unrelenting German Blitzkrieg and many soldiers suffered psychotic attacks as they felt the bitter tablets dissolve on their tongues. The Reich leadership, however, tasted something very different when the lightning war was extinguished by the firestorms of the Allied bombers, when the Russian winter froze the caterpillar tracks of their tanks and the Führer ordered everything of value within the Reich destroyed to leave nothing but scorched earth for the invading troops. Faced with utter defeat, staggered by the new horror they had called down upon the world, they chose a quick escape, biting down on cyanide capsules and choking to death on the sweet scent of almonds that the poison gives off.

A wave of suicides swept through Germany in the final months of the war. In April 1945 alone, three thousand eight hundred people killed themselves in Berlin. The inhabitants of the small town of Demmin, to the north of the capital, some three hours away, fell prey to collective panic when the retreating German troops destroyed the bridges leading west, leaving them stranded on their peninsula, surrounded by three rivers and defenceless before the dreaded onslaught of the Red Army. Hundreds of men, women and children took their own lives over the course of three days. Whole families walked into the waters of the Tollense tied together with ropes around their waists, as if to play a gruesome game of tug of war, the smallest children weighed down by their schoolbags, laden with rocks. The chaos was such that the Russian troops—who had, up to then, devoted themselves to looting homes, burning buildings and raping women—received orders to put a stop to the epidemic of suicides; on three separate occasions they had to cut down a woman who tried to hang herself from the branches of a massive oak tree in her garden, at the roots of which she had already buried her three children, after lacing their cookies—a final treat—with rat poison. The woman survived, but the soldiers were unable to prevent a young girl from bleeding to death after she opened her veins with the same razor blade she had used to slice her parents' wrists. A similar death

wish took hold of the upper echelons of the Nazi party: fifty-three generals from the army, fourteen from the air force, and eleven from the navy committed suicide, along with the Minister of Education, Bernhard Rust, the Minister of Justice, Otto Thierack, Field Marshal Walter Model, the "Desert Fox" Erwin Rommel and, of course, the Führer himself. Others, such as Hermann Göring, hesitated and were captured alive, but this merely postponed the inevitable. When the doctors declared him fit for trial, Göring was found guilty by the Nuremberg Tribunal and condemned to death by hanging. He requested a firing squad: he wished to die like a soldier and not a common criminal. When he learned of the refusal of this last request, he killed himself by biting on a cyanide capsule he had hidden in a jar of pomade next to which he left a note explaining that he had chosen to die by his own hand, "like the great Hannibal". The Allies attempted to wipe away all traces of his existence. They removed the shards of glass from his lips and sent his clothing, personal effects and naked body to the municipal crematorium at the Ostfriedhof cemetery in Munich, where one of the gigantic ovens was fired up to incinerate Göring, mingling his ashes with those of thousands of political prisoners and opponents of the Nazi regime decapitated at Stadelheim prison, the handicapped children and psychiatric patients murdered by the Aktion T4 euthanasia programme, and countless victims of the concentration camp system. His remains were scattered late at night in the waters of the Wutzenbach, a small brook chosen from a map at random. But these efforts were in vain: to this day, collectors from all over the world continue to exchange keepsakes and belongings of the last great leader of the Nazis, commander of the Luftwaffe and Hitler's natural successor. In June 2016, an Argentine man paid more than three thousand euros for a pair of the Reichsmarschall's silk underpants. Months later, that same man spent twenty-six thousand euros on the copper and zinc cylinder that had once concealed the glass vial Göring ground between his teeth on October 15, 1946.

The National Socialist party elite received similar capsules at the end of the last concert given by the Berlin Philharmonic before the city fell on April 12, 1945. Albert Speer, Minister of Armaments and War Production and official architect of the Third Reich, organized a special programme that included Beethoven's Violin Concerto in D major, followed by Brückner's Fourth Symphony—*The Romantic*—and ending, appropriately, with Brünnhilde's aria, which closes the third act of Richard Wagner's *Götterdämmerung*, in which the Valkyrie immolates herself on an enormous funeral pyre, the flames of which spread to consume not only the world of men but the halls of Valhalla and the entire pantheon of the gods. When the audience filed towards the exits, Brünnhilde's cries of pain still resounding in their ears, members of the Deutsches Jungvolk—a section of the Hitler Youth composed of children under ten, as the teenagers were already off dying at the barricades—handed out cyanide capsules in small wicker baskets, like votive offerings at mass. Göring, Goebbels, Bormann and Himmler used these capsules to commit suicide, but many of the Nazi leaders chose to shoot themselves in the head at the same moment they bit down, afraid that they had been sabotaged, that the capsules were deliberately adulterated to provoke not the painless, instant death that they desired but the slow agony they deserved. Hitler became so convinced that his dosage had been tampered with that he chose to test its effectiveness on his beloved Blondi, a German shepherd that had accompanied him to the Führerbunker, where she slept at the foot of his bed, enjoying privileges of all kinds. The Führer preferred killing his pet to letting her fall into the hands of Russian troops who had already surrounded Berlin and were inching closer to his subterranean refuge by the minute, but he was too cowardly to do it himself; he asked his personal doctor to break one of the capsules in the animal's mouth. The dog—who had just given birth to four puppies—died instantly when the minuscule cyanide molecule, formed by one atom of nitrogen, one of carbon and one of potassium, entered her bloodstream and cut off her breath.

The effects of cyanide are so swift that there is but one historical account of its flavour, left behind in the early twenty-first century by M. P. Prasad, an Indian goldsmith, thirty-two years old, who managed to write three lines after swallowing it: "Doctors, potassium cyanide. I have tasted it. It burns the tongue and tastes acrid," said the note found next to his body in the hotel room he had rented for the purpose of taking his own life. The liquid form of the poison, known in Germany as *Blausäure* or blue acid, is highly volatile: it boils at twenty-six degrees Celsius and gives off a slight aroma of almonds, which not everyone can distinguish, as doing so requires a gene absent in forty per cent of humanity. This evolutionary caprice makes it likely that a significant number of the Jews murdered with Zyklon B in Auschwitz-Birkenau, Majdanek and Mauthausen did not even notice the scent of cyanide filling the gas chambers, while others died smelling the same fragrance inhaled by the men who had organized their extermination as they bit down on their suicide capsules.

Decades before, Zyklon A—a precursor to the poison employed by the Nazis in their concentration camps—had been sprayed on California oranges, as a pesticide, and used to delouse the trains in which tens of thousands of Mexican immigrants hid when entering the United States. The wood of the train cars was stained a beautiful blue, the same colour that can be seen even today on certain bricks at Auschwitz; both hearken to cyanide's authentic origins as a by-product isolated in 1782 from the first modern synthetic pigment, Prussian Blue.

As soon as it appeared, Prussian Blue caused a sensation in European art. Thanks to its lower price, in just a few years it had all but replaced the colour that painters had used since the Renaissance to depict the robes of the angels and the Virgin's mantle—ultramarine, the finest and costliest of all blue pigments, which was obtained by grinding lapis lazuli brought up from caves in Afghanistan's Kochka river valley. Crushed to a fine powder, this mineral yielded a lavish indigo, which proved impossible to emulate by chemical means until the eighteenth century, when a Swiss pigmente and dyer by the name of Johann Jacob Diesbach discovered Prussian Blue. He did so by accident: his aim had been to mimic the ruby red made by crushing millions of female cochineals, small parasitic insects that grow on the nopal cactus in Mexico and in Central and South America, creatures so fragile that they require even greater care than silkworms, since wind, rain and frost can easily damage their downy white bodies, while rats, birds and caterpillars continually prey on them. Their scarlet blood—along with silver and gold—was one of the greatest treasures the Spanish conquistadors stole from the American peoples, and it allowed the Spanish crown to establish a monopoly on carmine that would last for centuries. Diesbach tried to put an end to it by pouring *sale tartari* (potash) over a distillation of animal parts mixed by one of his apprentices, the young alchemist Johann Conrad Dippel; but the concoction, instead of producing the furious carmine of the *Dactylopius coccus*, yielded a blue of such beauty that Diesbach thought he had discovered *hsbd-iryrt*, the original colour of the sky—the legendary blue used by the Egyptians to adorn the skin of their gods. Passed down across the centuries, closely guarded by the priests of Egypt as part of their divine covenant, its formula was stolen by a Greek thief and lost forever after the fall of the Roman Empire. Diesbach dubbed his new colour "Prussian Blue" to establish an intimate and long-lasting connection between his chance discovery and the empire that would surpass the glory of the ancients, as it would have taken a much more gifted man—one endowed, perhaps, with the curse of foresight—even to conceive of its future fall. Diesbach lacked not only this sublime imagination, but even the most basic skills of commerce and enterprise needed to enjoy the material benefits of his creation, which fell, instead, into the hands of his financier, the ornithologist, linguist and entomologist Johann Leonhard Frisch, who turned his blue into gold.

Frisch amassed a fortune as a wholesaler of Prussian Blue to shops in Paris, London and St Petersburg. He used his profits to buy hundreds of hectares near Spandau, where he estab-

lished the first silk plantation in Prussia. A passionate naturalist, Frisch wrote a long letter to the emperor exalting the singular virtues of the tiny silkworm; the letter also described an ambitious, transformative agricultural undertaking, an idea that had come to him in a dream: he had seen mulberry trees growing in the courtyards of all the churches of the empire, their verdant leaves feeding the offspring of the *Bombyx mori*. The plan, timidly put into practice by Frederick the Great, was taken up with violence one hundred and fifty years later by the Third Reich. The Nazis planted millions of such trees in abandoned fields and residential quarters, in schoolyards and cemeteries, in the grounds of hospitals and sanatoria, and on both sides of the highways that criss-crossed the new Germany. They distributed guides and manuals of all kinds to small farmers, detailing the state-sanctioned techniques for the harvesting and processing of silkworms: they were to be suspended over a vessel of boiling water for more than three hours, the minimum time required to kill them without damaging the precious material of the cocoons they had woven around themselves. Frisch himself included this procedure in an appendix to his magnum opus, an eighteen-tome work to which he dedicated the last twenty years of his life; these books catalogue, with a scrupulousness bordering on madness, the three hundred species of insect native to Germany. The final volume details the complete life cycle of the field cricket, from its nymph stage to the courtship songs of the males, a chirrup as shrill and piercing as the whistle of a train. Frisch describes this along with their reproductive habits and the oviposition of the females, the eggs of which are surprisingly similar in colour to the pigment that had made him a wealthy man, and which artists across Europe adopted as soon as it became commercially available.

The first great painter to make use of it was the Dutchman Pieter van der Werff, in 1709: in his portrayal of *The Entombment of Christ* clouds mask the horizon, and the blue cloak that darkens the Virgin's face shimmers, reflecting the grief of the disciples who surround the naked corpse of the Messiah, his skin so pallid it illuminates the face of the woman kneeling to kiss the back of his hand, as though wishing to cauterize with her lips the wounds opened by the iron nails.

Iron, gold, silver, copper, tin, lead, phosphorus, arsenic; at the beginning of the eighteenth century, mankind was aware of only a handful of pure elements. Chemistry had not yet branched away from alchemy, and the compounds known by a myriad of arcane names such as bismuth, vitriol, cinnabar and amalgam were a hatchery for unexpected, often happy accidents. Prussian Blue, for example, would never have existed were it not for the young alchemist working in the pigmentary where the colour was first synthesized. Johann Conrad Dippel presented himself as a Pietist theologian, a philosopher, artist and doctor; his detractors thought him a simple quack. He was born in the small Frankenstein Castle near Darmstadt, and possessed from childhood a strange charisma that affected anyone who spent too much time in his presence. He even took in, for a time, one of the great scientific minds of his era, the Swedish mystic Emanuel Swedenborg, who became one of his most enthusiastic disciples, and later his sworn enemy. According to Swedenborg, Dippel had the gift of dispossessing people of their faith and depriving them of all intelligence and goodwill. He would entice his followers with promises of apotheosis only to "abandon them in a state of delirium". In one of his most impassioned diatribes, Swedenborg likens him to Satan himself: "He is the wickedest of demons, bound by no principle, indeed, generally opposed to all of them." His criticisms had no effect on Dippel, who was immune to scandal after spending seven years in prison for his heretical ideas and practices. His sentence served, he renounced all pretence to humanity, and engaged in countless experiments on live and dead animals, which he dissected with unnatural fervour. His aim was to enter history as the first man to transplant a soul from one body to another, but, in the end, he became infamous for his extreme cruelty and the perverse joy he took in manipulating the remains of his victims. In his work *Maladies and Remedies of the Life of the Flesh*, published in Leiden under the pseudo-

nym Christianus Democritus, he claimed to have discovered the Elixir of Life—a liquid counterpart to the Philosopher's Stone—which would heal any ailment and grant eternal life to the person who drank it. He tried, but failed, to exchange the formula for the deed to Frankenstein Castle, and the only use he ever made of his potion—a mixture of decomposing blood, bones, antlers, horns and hooves—was as an insecticide, due to its incomparable stench. This same quality led the German troops to employ the tarry, viscous fluid as a non-lethal chemical weapon (therefore exempt from the Geneva Convention), pouring it into wells in North Africa to slow the advance of General Patton and his men, whose tanks pursued them across the desert sands. An ingredient in Dippel's elixir would eventually produce the blue that shines not only in Van Gogh's *Starry Night* and in the waters of Hokusai's *Great Wave*, but also on the uniforms of the infantrymen of the Prussian army, as though something in the colour's chemical structure invoked violence: a fault, a shadow, an existential stain passed down from those experiments in which the alchemist dismembered living animals to create it, assembling their broken bodies in dreadful chimeras he tried to reanimate with electrical charges, the very same monsters that inspired Mary Shelley to write her masterpiece, *Frankenstein; or, The Modern Prometheus*, in whose pages she warned of the risk of the blind advancement of science, to her the most dangerous of all human arts.

The chemist who discovered cyanide experienced this danger first-hand: in 1782, Carl Wilhelm Scheele stirred a pot of Prussian Blue with a spoon coated in traces of sulphuric acid and created the most potent poison of the modern era. He named this new compound "Prussic acid" and was immediately aware of the enormous potential of its hyperreactivity. What he could not imagine was that two hundred years after his death, well into the twenty-first century, its industrial, medical and chemical applications would be such that, each month, a sufficient quantity would be manufactured to poison every person on the planet. A genius unjustly forgotten, Scheele endured bad luck his entire life: the chemist with the most discoveries of natural elements to his name (seven, including oxygen, which he called "fire air"), he invariably shared credit for each of his finds with less talented scientific colleagues who anticipated him in making their conclusions public. Scheele's publisher waited more than five years to release the book the Swede had prepared with such love and extraordinary rigour that he went so far as to smell and even taste the new substances he had conjured in his laboratory. Scheele was wise enough not to do so with his Prussian acid, which would have killed him in seconds; still, his bad habit cost him his life at age forty-three. He died with a ravaged liver, his body covered head to toe in purulent blisters, paralysed by the build-up of fluid in his joints. These were the same symptoms suffered by thousands of European children whose toys were painted with an arsenic-based pigment Scheele manufactured, unaware of its toxicity: an emerald green so dazzling and seductive it became Napoleon's favourite colour.

Scheele's green covered the wallpaper of the chambers and bathrooms of Longwood, the dark, damp, rat- and spider-infested residence of the Emperor during his six years of imprisonment by the British on the island of St Helena. The toxins in the paint adorning his chambers may explain the high levels of arsenic detected in samples of his hair analysed two centuries after his death, a possible cause of the cancer that ate a hole in his stomach the size of a tennis ball. In the Emperor's final weeks, the illness devastated his body with the same ruthlessness with which his soldiers had laid waste to Europe: his skin took on a cadaverous grey tone, his eyes lost their brilliance and sank into their sockets, his wispy beard was dotted with scraps of food left behind after his fits of vomiting. His arms shed their musculature, and small scabs covered his legs, as though, all of a sudden, they recollected every tiny cut or scratch they had borne through the course of his life. But Napoleon was not the lone sufferer of his exile on the island: the host of servants imprisoned with him at Longwood left numerous records of their constant diarrhoea and stomach aches, the painful swelling of their limbs, and a thirst that no liquid could quench. Several died with symptoms similar to

those of the man they had served, but this did not prevent the doctors, gardeners and other members of the staff from fighting over the dead emperor's sheets, unmindful of the blood-stains, streaks of shit and blotches of urine that marred them, and of their almost certain contamination with the substance that had slowly poisoned him.

If arsenic is a patient assassin, hiding out in the most recondite of the body's tissues and accumulating there for years, cyanide takes your breath away. In sufficient concentrations, it stimulates the carotid body's receptors all at once, triggering a reflex that cuts off respiration. Medical literature calls this *the audible gasp* that precedes tachycardia, apnoea, convulsions and cardiovascular collapse. The speed with which it acts made it a favourite of countless assassins: the enemies of Grigori Rasputin, for example, hoped to free Alexandra Feodorovna Romanova, the last tsarina of the Russian Empire, from the cleric's spell by poisoning him with petits fours laced with the poison, but for reasons still unknown, Rasputin was immune. To kill him, they had to shoot him three times in the chest and once in the head, wrap his body with iron chains, and throw it into the frozen waters of the Neva. The failed poisoning only added to the mad monk's fame and the devotion the empress and her four daughters felt for his body, which they ordered their most faithful servants to retrieve from the ice and to place on an altar in the middle of the woods, where it remained, perfectly preserved by the cold, until the authorities chose to incinerate it, this being the only way of ensuring its complete disappearance.

Cyanide proved seductive not only for murderers; after he had grown breasts as a side effect of the chemical castration forced on him by the British government in punishment for his homosexuality, Alan Turing, the genius mathematician and father of computing, killed himself by biting into an apple injected with cyanide. Legend says he did so to imitate a scene from his favourite film, *Snow White*, the couplets of which—*Dip the apple in the brew / Let the sleeping death sleep through*—he used to chant to himself while he worked. But the apple was never examined to confirm the hypothesis of suicide (even if the seeds do contain a natural form of it, with only half a cup of them sufficient to kill a human being), and some believe Turing was assassinated by the British secret services, despite his heading the team that broke the code the Germans used to encrypt their communications during the Second World War—a decisive factor in the Allied victory. One of his biographers suggests the ambiguous circumstances of his death (the presence of a flask of cyanide in the room he used as a laboratory, and the handwritten note found next to his bed, containing nothing apart from a list of items to be purchased the next day) were planned by Turing himself, so his mother would believe he had died by accident and would not have to bear the weight of his suicide. This would have been the final eccentricity of a man who brought a unique, personal perspective to each of life's particularities. It bothered him that his office-mates used his favourite mug, so he chained it to a radiator with a padlock; it hangs there to this very day. In 1940, when all of Britain supposed the Germans were soon to invade, Turing used his savings to buy two enormous silver ingots and buried them in a forest close to his work. He drew up an elaborate coded map to recall their location, but hid them so well that he could not find them at the war's end, even with the aid of a metal detector. In his free time, he liked to play "Desert Island", a game that consisted in crafting for himself the largest possible variety of household products: he made his own detergent, soap and an insecticide so potent it decimated his neighbours' gardens. During the war, he rode to his office in the Cypher School in Bletchley Park on a bicycle with a defective chain that he refused to repair. Rather than taking it to the workshop, he would calculate the number of revolutions the chain could withstand, and would jump off and adjust it seconds before it came loose. In spring, when his allergy to pollen became unbearable, he would cover his face with a gas mask (the British government had distributed them throughout the population at the start of the war), sowing panic among those who saw him pass and imagined an attack was imminent.

That Germany would bomb the island with poison gas seemed inevitable in that era. An adviser to the British government estimated that an attack of that kind would cause more than 250 thousand civilian deaths in the first week alone, and even newborn infants received their own specially designed gas masks. Schoolchildren used the Mickey Mouse model: this grotesque nickname attempted to mitigate the horror the little ones felt upon hearing the wooden rattle calling them to cinch the plastic straps around their heads and breathe through the stinking rubber on their faces while they followed the instructions from the Ministry of Home Safety:

*Hold your breath.*

*Hold mask in front of face, with thumbs inside straps.*

*Thrust chin well forward into mask, pull straps over head as far as they will go.*

*Run finger round face-piece taking care head-straps are not twisted.*

The gas bombs never fell on England, and the children learned that blowing out while wearing their masks sounded like a flurry of farts, but the horror experienced by the soldiers who survived attacks with sarin, mustard and chlorine gas in the trenches in the First World War had seeped into the subconscious of an entire generation. The greatest testament to the terror caused by history's first weapon of mass destruction was the universal acceptance of the prohibition on gas during the Second World War. The North Americans had enormous reserves ready for deployment, and the British had experimented with anthrax on a remote Scottish island, massacring flocks of sheep and goats. Even Hitler, who showed no qualms when using gas in the extermination camps, refused to do so in fields of war, for although his scientists had manufactured some seven thousand tons of sarin, enough to eradicate the population of thirty cities the size of Paris, he had witnessed its effects first-hand as a foot soldier in the trenches of the First World War, had seen the agony of the dying and had suffered some of its lesser effects himself.

The first gas attack in history overwhelmed the French troops entrenched near the small town of Ypres, in Belgium. When they awoke on the morning of Thursday, April 22, 1915, the soldiers saw an enormous greenish cloud creeping towards them across no-man's-land. Twice as high as a man and as dense as winter fog, it stretched from one end of the horizon to the other, as far as the eye could see. The leaves withered on the trees as it passed, birds fell dead from the sky; it tinged the pastureland a sickly metallic colour. A scent like pineapple and bleach filled the throats of the soldiers when the gas reacted with the mucus in their lungs, forming hydrochloric acid. As the cloud pooled in the trenches, hundreds of men fell to the ground convulsing, choking on their own phlegm, yellow mucus bubbling in their mouths, their skin turning blue from lack of oxygen. "The weatherman was right. It was a beautiful day, the sun was shining. Where there was grass, it was blazing green. We should have been going on a picnic, not doing what we were going to do," wrote Willi Siebert, one of the soldiers who opened the six thousand canisters of chlorine gas the Germans released that morning at Ypres. "We suddenly heard the French yelling. In less than a minute they started with the most rifle and machine gun fire that I had ever heard. Every field artillery gun, every machine gun, every rifle that the French possessed must have been firing. I had never heard such a noise. The hail of bullets going over our heads was unbelievable, but it was not stopping the gas. The wind kept moving the gas towards the French lines. We heard the cows bawling and the horses screaming. The French kept on shooting. They couldn't possibly see what they were shooting at. In about fifteen minutes the gunfire petered out. After half an hour, only occasional shots. Then everything was quiet again. In a while it had cleared and we walked past the empty gas bottles. What we saw was total death. Nothing was alive. All of the animals had come out of their holes to die. Dead rabbits, moles, rats and mice were everywhere. The smell of the gas was still in the air. It hung on the few bushes which were left. When we got to the French lines the trenches were empty but in a half mile the bodies of French soldiers were

everywhere. It was unbelievable. Then we saw there were some English. You could see where men had clawed at their faces, and throats, trying to breathe. Some had shot themselves. The horses, still in the stables, cows, chickens, everything, all were dead. Everything, even the insects were dead."

The attack at Ypres was overseen by the father of this new method of war, the Jewish chemist Fritz Haber. Haber was a man of genius, and the only one, perhaps, capable of understanding the complex molecular reactions that would blacken the skin of the five thousand soldiers who died at Ypres. His mission's success earned him a promotion to head of the Chemistry section of the Ministry of War and a dinner with Kaiser Wilhelm II himself; but when he returned to Berlin, he had to face his wife's fury. Clara Immerwahr—the first woman to receive a doctorate in chemistry at a German university—had not only seen the effects of the gas on animals in the laboratory; she had also nearly lost her husband when the wind suddenly changed direction during one of his field tests. The gas blew straight towards the hill where Haber was directing his troops on horseback. Haber saved himself, miraculously, but one of his students failed to escape the toxic cloud; Clara watched him die on the ground, writhing as if set upon by an army of ravenous ants. When Haber returned victorious from the massacre at Ypres, Clara accused him of perverting science by devising a method for exterminating human beings on an industrial scale. Haber ignored her: for him, war was war and death was death, regardless of the means of its infliction. He used his two days' furlough to invite his friends to a party that lasted until dawn, and, at its end, his wife walked down to the garden, took off her shoes, and shot herself in the chest with her husband's service revolver. She bled to death in the arms of their thirteen-year-old son, who had run downstairs when he heard the shot. Still in shock, Fritz Haber had to travel the following day to oversee a gas attack on the eastern front. Throughout the war, he went on refining techniques for releasing the gas more efficiently, all the while haunted by his wife's ghost. "It really does me good, every few days, to be at the front, where the bullets fly. There, the only thing that counts is the moment, and one's sole duty is whatever one can do within the confines of the trenches. But then it's back to command headquarters, chained to the telephone, and I hear in my heart the words that the poor woman once said, and, in a vision born of weariness, I see her head emerging from between the orders and the telegrams, and I suffer."

After the 1918 armistice, Fritz Haber was declared a war criminal by the Allies, though they were no less keen in their use of gas than the Central Powers. He was forced to flee Germany, and he took up residence in Switzerland, where he received notice that he had won the Nobel Prize for Chemistry for a discovery he had made not long before the war, one that would alter the destiny of the human race in the coming decades.

In 1907, Haber was the first to obtain nitrogen, the main nutrient required for plant growth, directly from the air. In this way, from one day to the next, he addressed the scarcity of fertilizer that threatened to unleash an unprecedented global famine at the beginning of the twentieth century. Had it not been for Haber, hundreds of millions of people who until then had depended on natural fertilizers such as guano and saltpetre for their crops would have died from lack of nourishment. In prior centuries, Europe's insatiable hunger had driven bands of Englishmen as far as Egypt to despoil the tombs of the ancient pharaohs, in search not of gold, jewels or antiquities, but of the nitrogen contained in the bones of the thousands of slaves buried along with the Nile pharaohs, as sacrificial victims, to serve them even after their deaths. The English tomb raiders had exhausted the reserves in continental Europe; they dug up more than three million human skeletons, along with the bones of hundreds of thousands of dead horses that soldiers had ridden in the battles of Austerlitz, Leipzig and Waterloo, sending them by ship to the port of Hull in the north of England, where they were ground in the bone mills of Yorkshire to fertilize the verdant fields of Albion. On the other side of the Atlantic, the craniums of more than thirty million bison slaughtered on the plains were

scavenged by poor Native Americans and peasant farmers, picked up one by one and sold to the Northwestern Bone Syndicate of North Dakota, which stacked them into a pile the size of a church before sending them to the carbon works that ground them to produce fertilizer and “bone black”, the darkest pigment available at the time. What Haber achieved in the laboratory, Carl Bosch, the chief engineer of the German chemical giant BASF, refined into an industrial process capable of producing hundreds of tons of nitrogen in a factory the size of a small city, operated by more than fifty thousand workers. The Haber–Bosch process is the most important chemical discovery of the twentieth century. By doubling the amount of disposable nitrogen, it provoked the demographic explosion that took the human population from 1.6 to 7 billion in fewer than one hundred years. Today, nearly fifty per cent of the nitrogen atoms in our bodies are artificially created, and more than half the world population depends on foodstuffs fertilized thanks to Haber’s invention. The modern world could not exist without “the man who pulled bread from air”, in the words of the press of the day, though the immediate aim of his miraculous discovery was not to feed the hungry masses but to provide Germany with the raw materials required to continue manufacturing gunpowder and explosives during the First World War once the English fleet had blocked its access to Chilean nitrate. Haber’s nitrogen allowed the European conflict to drag on for two more years, raising the casualties on each side by several millions.

One of those who suffered from the prolongation of the war was a young cadet of twenty-five; an aspiring artist, he had done everything in his power to avoid military service, until at last the police arrived at 34 Schleißheimer Straße in Munich in January 1914. Threatened with prison, he appeared for his medical check-up in Salzburg, where he was declared “unfit, too weak to bear arms”. In August of that year—when thousands of men registered for the army voluntarily, unable to contain their enthusiasm to participate in the war to come—the young painter’s attitude suddenly changed: he wrote a personal letter to King Ludwig III of Bavaria, petitioning him for the right to serve as an Austrian in the Bavarian army. His permission arrived the next day.

Adi, as he was affectionately known to his comrades in the List Regiment, was sent directly to the battle that would come to be known in Germany as the *Kindermord bei Ypern*—the massacre of the innocents at Ypres—for the forty thousand young enlistees who lost their lives in only twenty days. Of the two hundred and fifty men who made up his company, only forty would survive. Adi was one of them. He received the Iron Cross, was promoted to lance corporal and named message-runner for his regiment, so spent several years at a comfortable distance from the front, reading political texts and playing with a stray dog he adopted and named Fuchsl—little fox. He filled the dead hours of war by painting bluish watercolours and making charcoal sketches of his pet and of life in the barracks. On October 15, 1918, while he lay about waiting for new orders, he was briefly blinded in a mustard gas attack launched by the English, and spent the final weeks of the war convalescing in a hospital in the small town of Pasewalk, in the north of Pomerania, his eyes transformed into two red-hot coals. When he learned of Germany’s defeat, and of the abdication signed by Kaiser Wilhelm II, he suffered a second attack of blindness, different from the one caused by the gas: “Everything went black before my eyes. I tottered and groped my way back to the dormitory, threw myself on my bunk, and dug my burning head into my blankets and pillow,” he remembered years later, in a cell in Landsberg prison, accused of treason as leader of a failed putsch. He spent nine months there, consumed by hatred, humiliated by the conditions the victorious parties had imposed on his adopted country, and feeling betrayed by the cowardice of the generals, who had surrendered rather than fighting to the last man. He planned his vengeance from prison in a book that described his personal struggle and outlined a plan to raise Germany above all the nations of the world—something he was prepared to do with his own hands, should it prove necessary. In the interwar years, while Adi climbed to the summit of the National Socialist

Workers' Party, shouting the racist and anti-Semitic harangues that would eventually see him crowned Führer of all Germany, Fritz Haber was making his own efforts to restore his homeland's tarnished glory.

Emboldened by his successes with nitrogen, Haber proposed to reconstitute the Weimar Republic and pay the war reparations that were strangling its economy through a process as wondrous as the one that had won him the Nobel Prize: harvesting gold from the waves of the sea. Travelling under a false identity to avoid raising suspicions, he gathered five thousand samples of water from assorted seas across the globe, including bits of ice from the North Pole and Antarctica. He was convinced he could mine the gold dissolved in the oceans, but after years of arduous labour had to accept that his original calculations had overestimated the quantities of this precious metal by several orders of magnitude. He returned to his country empty-handed.

In Germany, he found refuge in his work as director of the Kaiser Wilhelm Institute for Physical Chemistry and Electrochemistry as anti-Semitism continued to flourish around him. Protected, for the moment, in his academic oasis, Haber and his team produced a number of new substances: one of them used cyanide in a pesticidal fumigant so destructive it was dubbed *Zyklon*, the German word for *cyclone*. The compound's extraordinary effectiveness stunned the entomologists who used it for the first time to delouse a ship covering the Hamburg–New York route. They wrote directly to Haber to praise "the extreme elegance of the eradication process". This new success led to Haber's promotion to National Commissioner for Pest Control, from which post he organized the extermination of bedbugs and fleas on the navy's submarines, and of rats and cockroaches in the army barracks. He fought against a veritable legion of moths that attacked the flour the government stored in a network of silos that stretched from Flensburg to Freiburg, which Haber described to his superiors as "a biblical plague that threatens the well-being of the German *Lebensraum*", unaware that they had already begun the persecution of all those who shared his Jewish roots.

Haber had converted to Christianity at twenty-five years old. He identified so closely with his country and its customs that his sons knew nothing of their ancestry until he told them they would have to flee Germany. Haber escaped after them and sought asylum in England, but his British colleagues scorned him, aware of his instrumental role in chemical warfare. He had to leave the island not long after arriving. Thenceforth, he would travel from country to country in the hope of reaching Palestine, his chest gripped with pain, his arteries incapable of delivering sufficient blood to his heart. He died in Basle in 1934, clutching the canister of nitroglycerine he needed to dilate his coronary vessels, not knowing that, years later, the Nazis would use in their gas chambers the pesticide he had helped create to murder his half-sister, his brother-in-law, his nephews and countless other Jews who died hunkered down, muscles cramping, skin covered with red and green spots, bleeding from their ears, spitting foam from their mouths, the young ones crushing the children and the elderly as they attempted to scale the heap of naked bodies and breathe a few more minutes, a few more seconds, because Zyklon B tended to pool on the floor after being dropped through hatches in the roof. When ventilators had diffused the cloud of cyanide, the bodies were dragged to enormous ovens and incinerated. The ashes were buried in pit graves, dumped in rivers and ponds, or scattered as fertilizer in the surrounding fields.

Among the few possessions Fritz Haber had with him when he died was a letter written to his wife. In it, he confessed that he felt an unbearable guilt; not for the part he had played, directly or indirectly, in the death of untold human beings, but because his method of extracting nitrogen from the air had so altered the natural equilibrium of the planet that he feared the world's future belonged not to mankind but to plants, as all that was needed was a

drop in population to pre-modern levels for just a few decades to allow them to grow without limit, taking advantage of the excess nutrients humanity had bestowed upon them to spread out across the earth and cover it completely, suffocating all forms of life beneath a terrible verdure.