

German flooding of the Pontine Marshes in World War II

Biological warfare or total war tactic?

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ABSTRACT. The German army's 1943 flooding of the Pontine Marshes south of Rome, which later caused a sharp rise in malaria cases among Italian civilians, has recently been described by historian Frank Snowden as a unique instance of biological warfare and bioterrorism in the European theater of war and, consequently, as a violation of the 1925 Geneva Protocol prohibiting chemical and biological warfare. We argue that archival documents fail to support this allegation, on several counts. As a matter of historical record, Hitler prohibited German biological weapons (BW) development and consistently adhered to the Geneva Protocol. Rather than biological warfare against civilians, the Wehrmacht used flooding, land mines, and the destruction of vital infrastructure to obstruct the Allied advance. To protect its own troops in the area, the German army sought to contain the increased mosquito breeding likely to be caused by the flooding. Italians returning to the Pontine Marshes after the German retreat in 1944 suffered malaria as a result of environmental destruction, which was banned by the 1899 and 1907 Hague Conventions and by subsequent treaties. In contrast, a state's violation of the Geneva Protocol, whether past or present, involves the use of germ weapons and, by inference, a state-level capability. Any allegation of such a serious violation demands credible evidence that meets high scientific and legal standards of proof.

Key words: Biological warfare, biological weapons, Geneva Protocol, malaria, Nazi Germany, Italy, World War II, environmental modification

A significant literature has documented official allegations of the state use of biological weapons (BW) against civilians in the twentieth century. These charges, relatively few in number compared to the volume of scholarly attention they have received, involve potential violations of several international accords. Most important among those accords is the 1925 Geneva Protocol, which prohibits "the use of bacteriological methods of warfare."¹

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If they are to be credible in defining and prosecuting war crimes and, more generally, in deterring biological warfare, allegations of BW use have to be supported by evidence that meets scientific and legal standards.² Yet the obstacles to marshalling credible evidence are considerable. Political enmity between the accused and the accuser nation, military and government secrecy, and ambiguous circumstances surrounding unusual disease outbreaks invariably force years of delay before access to relevant documents, physical materials, or the conduct of crucial interviews is

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allowed.³ Although the list of allegations is less than a dozen, each has been vigorously investigated, for the most part by independent scholars and analysts, rather than by governmental or international agencies.

For example, beginning in the 1980s, evidence about the biological attacks by the Japanese Imperial Army on the Chinese has become increasingly open, offering a unique window on biological warfare.⁴ In contrast, other allegations have remained unproven. Accusations of biological warfare by North Korea and China against the United States during the Korean War appear to have been based on propaganda.⁵ For years Cuba accused the United States of waging biological warfare, but the evidence was scant.⁶ The 1981 United States allegation that Vietnam, with Soviet assistance, had attacked Hmong tribes in Laos with mycotoxins stands discredited, lacking the kind of convincing evidence—recovered munitions, reliable laboratory analyses, credible witness interviews, and Vietnamese defector and prisoner interrogations—to definitively back the accusation.⁷ From 1978 to 1980, the Rhodesian army was suspected of causing widespread animal and human illness in Zimbabwe, but the lack of data made conclusive attribution impossible.⁸ In each case, the goal of investigators was to weigh the allegations of BW use against alternative causal explanations, such as the breakdown of public health or disease increases related to climate or weather patterns, or the disruptions of warfare.

No case studies or historical overviews of BW in the twentieth century make any reference to the German army's use of biological weapons during World War II or to German development or production of such weapons. To the contrary, a wealth of historical documents and research has indicated Nazi Germany's reluctance to develop biological warfare capability.⁹ In recent years, though, "the German exception" in the history of biological weapons has been challenged. In his 2006 book on malaria in Italy, *The Conquest of Malaria: Italy, 1900–1962*, and in a subsequent paper published in 2008, Yale historian Frank Snowden employs the terms "bioterrorism" and "biological warfare" to describe Nazi military operations in Italy following Italy's capitulation on September 3, 1943, after which Germany became the occupying power.¹⁰

Snowden alleges that Nazi military commanders, assisted by medical scientists, intended to punish Italian civilians by flooding the Pontine Marshes south

of Rome, in order to increase the breeding grounds for the *Anopheles* mosquito and cause a sharp increase in malaria cases. Snowden asserts that the authority for this civilian attack came from the "highest levels" of the German government. The campaign, he writes, is "the only known example of biological warfare in twentieth-century Europe."¹¹ Consequently, "[t]he Germans flagrantly violated both the Geneva Protocol and the [1899 and 1907] Hague Conventions [respectively] by being the first to use biological weapons and by deliberately causing extensive 'superfluous injury' to innocent noncombatants."¹²

Relying on archival materials and military reports, historians have long interpreted the German flooding of the Pontine Marshes as a German tactic designed to slow an imminent Allied infantry advance on Rome and into central Italy, which was still held by German troops.¹³ By late summer, 1943, the Allies controlled Sardinia and Sicily and were bombing railways and staging areas from Naples as far north as Pisa. By mid-September, they were on the move from Salerno northwest to Naples. To obstruct the Allied invasion, the German High Command laid tens of thousands of land mines and destroyed key roads, bridges, aqueducts, power stations, and harbors along Italy's south western coast.¹⁴

The German defensive campaign directly involved the Pontine Plain south of Rome, the extensive marsh area that, under Mussolini, had been drained and repopulated as Littoria Province.¹⁵ In the event of the capture of Naples, this flat, open land could either facilitate or obstruct the penetration of Allied infantry, tanks, and trucks to Rome. The main road from the southern coast to Rome, Highway 7, ran through the Pontine Marshes; the condition of the terrain, whether it was passable or impassable, was crucial. A similar tactic was used inland, near Cassino, where the Germans destroyed a dam and flooded the Rapido valley to a depth of about four feet—an obstacle augmented, as in the coastal areas, by minefields and barbed wire.¹⁶

Already hard hit by Allied bombing and further destroyed by the retreating German army, Naples fell to British and American forces on October 1, 1943. On October 9, after requisitioning the office of the *Consortzio de Latina* which oversaw the Pontine reclamation area, the German occupying forces seized its topographic maps and began to systematically blow

up sea walls, remove or vandalize the pumps at the pumping stations, and dam the sea outlets of rivers and canals in order to flood the Littoria Province. Figure 1 shows a plan of blasting activities from the German army in the Gulf of Gaeta region dated November 9, 1943.

Snowden's claim of German biological warfare—the intentional spread of disease in battle—reconfigures this defensive flooding tactic as a BW war crime. In the context of Allied deliberations in 1944 and 1945 leading to the Nuremberg trials, such attacks might well have merited specific indictments against Nazi leaders and any involved scientists. But making the case for BW use demands solid evidence of purposeful state malfeasance. Furthermore, when an allegation involves the use of weapons of mass destruction (WMD), the past is never simply the past. Rather, each case argument informs the international legal approach for evaluating biological warfare, whether by state or non-state actors.

Historians of biological weapons in the twentieth century have carefully delineated the interplay of civil, military, and scientific leadership that allowed France, Japan, the United Kingdom, United States, and Soviet Union to establish secret, science-based biological warfare programs whose deadly products were aimed almost entirely at enemy civilian targets.¹⁷ Government documents have been a vital source of information about these programs and their activities. In 1945, in order to evaluate the weapons programs of its defeated enemies, the United States investigated both Germany's and Japan's attempts to develop atomic, chemical, or biological weapons.¹⁸ In post-war Germany, more than in Japan, incriminating government documents were plentiful.¹⁹ In addition, many German weapons scientists—physicists, chemists, and biologists—were interrogated by American and British investigators. The post-war WMD investigations were conducted largely by a group called Alsos, the Greek word for “grove” and the code name for the wartime commander of the U.S. atom bomb project, General Leslie Groves. Alsos confirmed that Germany had developed nerve gas and had a fledgling nuclear weapons program. Its investigators also confirmed intelligence from 1944 indicating that Germany—in contrast to Japan—had no biological weapons capability.²⁰ Parallel British inquiries yielded information on German disease experimentation on concentration camp prisoners, but not on germ weapons.²¹

Assessing the alleged German intentional spread of malaria in Italy in 1943 requires a review of what is known about leading state actors and their documented intentions concerning biological weapons, especially between September 1943 and the war's end in 1945. Snowden's charge entails assuming the burden of proof and employing standards of evidence that can, as in other cases of allegation, withstand critical scrutiny. Our purpose with this paper is to weigh the evidence used by Snowden against archival documents and the published literature concerning Germany's wartime BW policies and activities, as well as the German High Command's specific intent in waging a defensive war in Italy in 1943. The absence of evidence of a deliberate German campaign to attack Italians with malaria is, therefore, as important as its presence.

Not at issue in this discussion is the destructive impact of Germany's occupation of Italy. Few would contest that brutal German reprisals against Italian civilians and partisans, tens of thousands of them hunted, tortured, and killed, and the exportation of Italian citizens to death camps simply because they were Jewish, constituted war crimes.²² The precipitous 1944–1945 increase in malaria cases in the Littoria Province to four times its 1941 level is a matter of historical record.²³ Furthermore, the German ruination of fertile Italian farmland and the reintroduction of swamps due to the flooding campaign unquestionably constituted environmental destruction on a regional scale, hardly unusual in contemporary wars, but still contrary to international accords.²⁴

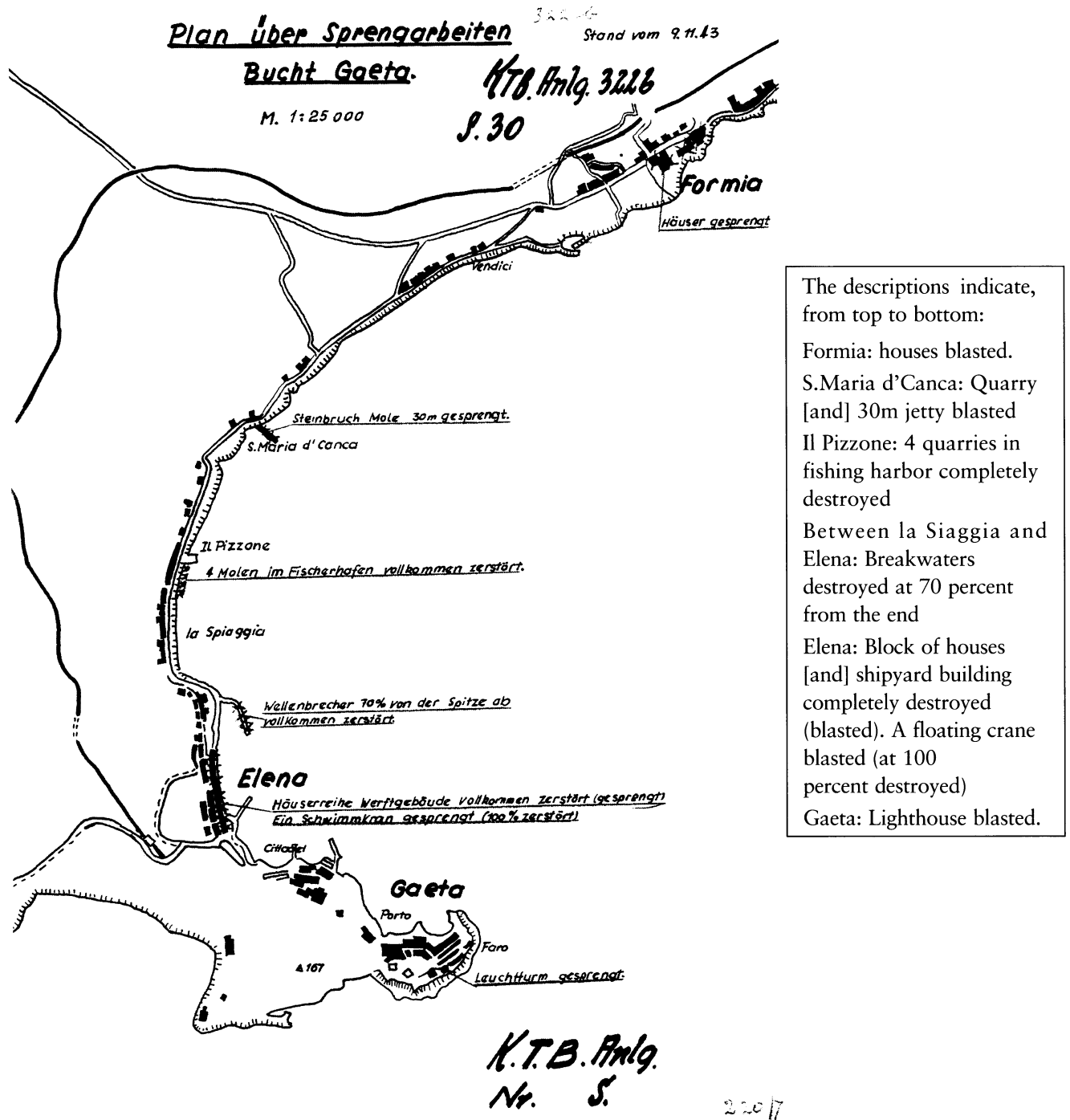
What is contestable is Snowden's claim that the German High Command planned to attack Italian civilians with disease by flooding the Pontine Marshes. At issue here is the legal distinction between a battlefield tactic that results in grievous harm to civilians and the active promulgation of biological warfare.

Germany and biological weapons

In July 1940, the perceived threat of German biological weapons was considered justification for the United Kingdom to create its own BW research unit, in tandem with the longstanding chemical weapons program at Porton Down, this for possible

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Figure 1. Nazi blasting activities around the Gulf of Gaeta.



Source: War Diary of the German Supreme Command of the Army, entries of 11–18 November 1943, attachment 3226. Bundesarchiv Militärarchiv, Freiburg/Breisgau RH20/-10/72.

reprisal against an enemy attack.²⁵ Following suit, the United States initiated its BW program in December 1942. In early 1944, Allied intelligence reported that the Germans were considering loading their V-1 and V-2 rockets with anthrax or botulinum toxin. But toward the end of 1944, American intelligence sources became increasingly certain that the threat of Adolf Hitler's presumed biological weapons had no basis in fact.²⁶ Post-war investigations confirmed the fact that Hitler's Germany, despite its murders of millions of civilians, had never pursued biological weapons capability.

Why Germany, with the full scientific resources to develop germ weapons and few compunctions about mass attacks on enemy civilians, resisted the BW option remains unclear. Perhaps Hitler's extreme personal aversion to germs was an important determining factor; in any event, Hitler communicated to his military advisors that he had strong feelings against this type of weapon. In 1947, after extensive inter-agency consultation, the Technical Intelligence Center of the U.S. Office of Naval Intelligence concluded: "While the German biological warfare program was in general limited in extent and inadequate in experimental tests, this was undoubtedly less due to inability of German scientists successfully to develop such a program than to Hitler's personal opposition to the use of BW."²⁷

During the First World War, secret agents of the German military plotted sabotage to infect Allied pack animals with anthrax and glanders, but even then, the anti-personnel use of bacteria was officially forbidden.²⁸ After defeat, in the interwar years, German officials debated the merits of bacteriological weapons, but they ultimately dismissed them as inefficient compared to conventional weapons and air power—as did the American military at the time.²⁹ In 1929, Germany ratified the 1925 Geneva Protocol. France, which had commenced research on biological weapons in the early 1920s, continued its covert BW program. By 1930, Italy, France, and the United Kingdom were also parties to the Geneva Protocol. The United States was not and, among the Allies, made the largest investment in offensive BW development. In contrast, due to the steadfast objections of its military leaders, Germany rejected biological warfare options during its intensive rearmament during the 1930s and at critical turning points during the war.

Hitler's prohibition of BW

In September 1939, British Foreign Minister Viscount Halifax informed the German government that France and the United Kingdom would abide by the Geneva Protocol. The German reply was:

The German Government will observe during the War the prohibitions which form the subject of the Geneva [P]rotocol of June 17, 1925 and which are mentioned in the note of Lord Halifax of September 3, 1939.

She reserves complete freedom of action in the event that the provisions of the protocol are violated on the part of the enemy.³⁰

The Italian government issued a similar statement.³¹ Thus, observance by all four nations was contingent on mutual adherence, to which were added other restraints, such as fear of retaliation and lack of military readiness.

Following the June 1940 occupation of France, German experts discovered that French scientists had explored the loading of projectiles and bombs with bacteria, carried out weapons research on anthrax, brucellosis, tularemia, and other diseases, and had conducted field tests of bacterial aerosols.³² The German reaction was to put a bacteriologist, Professor Heinrich Kliewe, in charge of all matters concerning germ warfare. In addition, Kliewe became head of a small laboratory dedicated to BW research, within the constraints of Hitler's policy position.³³

Even under pressure, Hitler refused to condone preparations for biological warfare. In April 1942, for example, the German Intelligence Service received a report that the Anglo-American forces were preparing the use of potato beetles and Texas ticks (vectors of rinderpest) as BW agents against Germany. Hitler's reaction to this intelligence, later shown to be false, was consistent with past policy:

The Führer, upon interview with the Chief of Army High Command, has ordered that no preparations for bacterial warfare are to be made by us. The Führer, however, requested extreme efforts with respect to defensive means and measures against possible enemy bacterial attacks. Therefore urgent information is desired concerning present and future measures for combating the potato beetle and the Texas tick by the responsible civilian and military agencies.³⁴

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Figure 2. Hitler's prohibition of offensive biological warfare.

A b s c h r i f t

2 Abschr. 58
2. Abschr.

Generalstab des Heeres
AN. 55 Gen. d. Hbl. Fr. b. Ob. d. H. (Ib)
 Nr. 297/42 g. K. II. Ang.

H. Qu., den 23. Mai 1942
 Fernspr.: (R) 530

Geheime Kommandosache
3 Ausfertigungen
1 Ausfertigung

Besugl: Genst. d. H./Gen. d. Hbl. Fr. b. Ob. d. H. (Ib)
 AN. 55 Nr. 297/42 g. K. vom 14.5.42.

Betr.: USA-Versuche mit Bakterien / Lieferungen
 nach England.

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AMA/V In

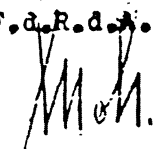
Satz	OKW	53a	OKW
Eingang: 25 FEB 1943			
Str.	12.43.04		
Sint			

K. 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

In Nachgang zum Bezugsschreiben wird mitgeteilt, daß der Führer nach Vortrag des Herrn Chef OKW befohlen hat, daß unsereits Vorbereitungen für einen Bakterienkrieg nicht an treffen sind. Der Führer fordert aber Euererats Bemühungen um Abwehrmittel und Abwehrmaßnahmen gegen etwaige Feindangriffe mit Bakterien.

Es wird daher um beschleunigte Mitteilung gebeten, welche Maßnahmen zur Bekämpfung des Kartoffelkäfers und der Texas-Zecke von den verantwortlichen Zivil- und Heeresstellen bisher getroffen wurden und für die Zukunft vorgesehen sind.

Im Auftrag
 gez. Unterschrift

F. d. R. d. A.

 Major d. G.

Note: Facsimile of the letter informing the German Army Veterinary Inspectorate on May 23, 1942 that Hitler has prohibited offensive biological warfare preparations.

Source: National Archives and Records Administration, College Park, MD. RG 319, Box 3, Folder BW 14.

Figure 2 shows a facsimile copy of the announcement of Hitler's prohibition on offensive biological warfare activities dated May 23, 1942.

Similarly, in October 1942, Hitler's response to ongoing intelligence that the Soviet Union was preparing to attack Germany with plague, anthrax, and typhoid was again to order better national defenses.³⁵ After investigating more than 70 sites in Europe where the Germans had conducted medical research, Alsos experts observed that the Nazi reaction to the potential Soviet BW threat was only defensive, consisting mainly of alerts to agriculture, veterinary, and public health officials about the dangers of biological attack.³⁶ Sabotage by guerillas in Poland and Russia, reportedly with typhoid bacilli, botulinum toxin, anthrax, glanders, and other diseases, generated more defensive research. The Reich's largest defensive measure was taken in 1942, when, after hearing that Soviet troops were vaccinated against plague, the German High Command sent 1 million doses of plague vaccine to the Stalingrad front.³⁷

Hitler's motives for rejecting biological weapons were likely complex, related not only to his personal germ phobia but to fears of Allied retaliation in kind should adherence to the Geneva Protocol break down.³⁸ Whatever his reasons, Hitler's consistent policy—even when intelligence indicated the possibility of British or Soviet germ attacks—allowed only defensive measures, with an emphasis first on troop protection and then on civilian safeguards.

Hitler's decision to maximize defenses against biological weapons spurred the initiation of two competing developments to organize the Reich's response. One was to convene the Army's "Arbeitsgemeinschaft Blitzableiter" (Lightning Rod Working Group), headed by Colonel Walter Hirsch, a chemist.³⁹ To help define the committee's rationale, Heinrich Kliewe, who was one of its members, wrote a comprehensive report that was then submitted to Field Marshal Wilhelm Keitel, the Chief of Army High Command. In his report, Kliewe argued that the Allied and Soviet BW bacteriological warfare programs posed an imminent threat, in spite of the prohibitions inherent in pacts, treaties, and League of Nations' decisions.⁴⁰ Keitel was unconvinced by Kliewe's argument and Hitler remained firmly against military preparations for retaliation in kind. As Kliewe later described:

The Führer was in agreement with the observations made by the Chief of Army High Command and forbade anew the preparations toward making an attack of this sort. Bacteria are not to be used as weapons. Allegedly the preparations on the part of our enemies were insistently pointed out and emphasized that if we did not begin immediately with preparations of our own, countermeasures could not be applied. In spite of all this, the Führer refused. Even bacterial activity through [secret] agents is out of the question.⁴¹

In convening the Blitzableiter group on March 16, 1943, Field Marshall Keitel stated its mission: "Our Führer has given the order to complete defensive measures against enemy use of bacteria with all possible zeal and to maintain the means of defense in convenient readiness. All other preparations are forbidden."⁴²

Independent of that group, Dr. Kurt Blome, the Deputy Reich Chief of Physicians, was instructed by Reich Marshall Hermann Göring to coordinate BW defense activities in the civilian sector. Blome organized a network of seven facilities where preliminary research on germ weapons agents was conducted. In laboratories under military auspices, Kliewe and others also carried out small-scale experiments, but expanded testing or implementation of these efforts remained constrained by Hitler's policy.⁴³

Among the seven research centers coordinated by Blome was the Institute for Entomology of the Waffen-SS and Police. Its director, Eduard May, discussed with Blome both defensive and offensive warfare possibilities, including defenses against the potato beetle and other insects.⁴⁴ Notably, one question they asked was whether it was possible "to spread malaria artificially by means of mosquitoes."⁴⁵ In fact, May performed preliminary experiments related to the artificial spread of *Anopheles*.⁴⁶ But these experiments began late in the summer of 1944, nearly a year after the alleged German biological warfare activities in Littoria, and when the battleground had moved north to the Apennines. A recent search of existing German archives reveals no policy changes or any information that would indicate top-down approval of any plan to spread malaria on any front, either among Italian civilians or encroaching Allied troops.⁴⁷

After Allied bombers destroyed Dresden over February 14 and 15, 1945, Hitler may have considered

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changing his mind about the use of chemical or biological weapons. On February 19, he ordered the Supreme Commander of the Navy, Admiral Karl Dönitz, to evaluate the consequences of formally breaking with the 1929 Geneva Convention—which promoted the humane treatment of prisoners-of-war—and other international treaties to which Germany was party, including the 1925 Geneva Protocol.⁴⁸ As documented in briefing notes, the question was whether the looming existential threat from the Allies justified resorting to chemical and biological weapons:

As not only the Russians but also the Western Powers are violating every International Law by their actions against defenseless populations and urban residential districts, it appears expedient for us to adopt the same course in order to show the enemy that we are determined to fight with every means for our existence, and also through this measure to urge our people to resist to the utmost. The Führer orders the C. in C. [Commander-in-Chief] of the Navy to consider the pros and cons of this step and to state his opinion as soon as possible.⁴⁹

Dönitz passed the order to his staff and to the Armed Forces Operation Staff (Wehrmachtführungsstab, WFSt), where Colonel Wolfgang Cartellieri, an expert in international law, was asked to prepare a corresponding assessment.⁵⁰ Separately, the Naval High Command's reaction, focused on chemical weapons, was relayed in a February 20, 1945 telex, copied to Cartellieri. This message warned that “leaving the Geneva Protocol of 1925 might possibly provide the enemy with a welcomed pretext for starting chemical warfare and would have, because of hostile superiority in the air, an adverse effect by elimination of our naval bases as well as on naval armament and construction activities, in contrast to possible advantages to be expected from a possible use of such weapons by us.”⁵¹ Four hours after this telex was sent, Admiral Dönitz briefed Colonel General Alfred Jodl, chief of the WFSt, on the Navy's reluctance to violate the Geneva Protocol.⁵²

That same day Cartellieri completed an overview of the relevant international treaties, starting with the 1907 Hague Convention. With regard to a possible rejection of the Geneva Protocol, he summarized his view of the potential consequences: “The renunciation

would provide the enemy with the pretext to consider the use of any weapon as permitted. Consequence: Fighting against novel weapons (gas, bacteria) is not possible for us with the same success as fighting against those permitted so far (e.g., bazooka against tanks, launcher, etc.)”⁵³

In full agreement with Cartellieri, Jodl revised his draft to make it more convincing. Four days later, on February 23, he reported to Hitler that a renunciation of the 1925 Geneva Protocol would effectively mean that “the enemy has a free hand at all frontiers to use gas and bacilli of any kind. Given their superiority in artillery and in the air, the advantage unequivocally is on the side of our enemies.”⁵⁴ At this point, the Nazis had developed nerve gas and presumed that the Allies had done the same. Jodl concluded by observing: “At the present time at any rate, the disadvantages of a renunciation of the adherence practiced up to now by far outweigh the advantages.”⁵⁵ According to records of the German army, Jodl's presentation convinced Hitler to adhere to the Geneva Protocol and other international agreements.⁵⁶

At the highest levels of Nazi government, the decision was that the German military—for its own self-protection—must adhere to the Geneva Protocol ban on the use of biological and also chemical weapons. This position was consistent with Hitler's previous policy and longstanding aversion to such weapons.

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After the August 1943 capture of Sicily by the Allies, the question became whether the Germans would fight to keep Italy and, especially, Rome, or redeploy over the Alps. Instead of choosing Field Marshall Erwin Rommel, who had advised retreat, Hitler appointed the more optimistic Field Marshall Albrecht Kesselring as his commander of forces in Italy on November 21, 1943. Kesselring promised that he could keep the Allies from taking Rome for six or nine months, into the spring of 1944.⁵⁷ Against the choice of Kesselring was Hitler's perception that he was “pro-Italian.” In Kesselring's favor, however, was the Allies' eventual decision to position ground troops south of Rome, rather than their choosing a combined amphibious and air campaign launched north of Rome, which might have been a more effective strategy.⁵⁸

Situated southeast of Rome were the coastal Pontine Marshes, the ancient, once largely uninhabited malarial “dead zone,” which under Mussolini had been drained and reinvented as a modernistic utopia. Established as Littoria Province in December 1932, the area offered new farms and light industry to thousands of unemployed northerners. Mussolini’s project, known as *bonifica integrale* (integral reclamation), was accomplished by installing pumps that drained the bogs and by digging some 10,000 miles of canals and ditches for fresh water irrigation—the largest being the Mussolini Canal, which was 150-foot wide. Five model towns, 18 villages, and hundreds of stone farm houses were built for the new, mainly agrarian, population of over 60,000. Epidemiological maps obtained from German archives show the extent of malarial outbreaks throughout the Italian peninsula in 1930 and 1940 (see Figures 3a and 3b).

In autumn 1943, having lost the Italian navy, and with its air power and troop strength diminished, the German army under Kesselring had much to fear from an amphibious Allied invasion that would challenge its ground troops with the sheer magnitude and weight of its equipment: “In the number of jeeps, trucks, and earth-moving machinery, and in the techniques of bridge-building, the Allies were far superior to the Germans, who depended on horse-drawn transport and, to a much greater extent than the Allies, on human labor. The 2.5-ton American truck, much better than the 2-ton British lorry in power, capacity, and serviceability, was the workhorse of the war. The engineer bulldozer was invaluable.”⁵⁹

At this juncture, the German army still had three advantages. The first was Italian topology. The mountains southeast of Rome (part of the spine of the Apennines that runs down the peninsula) were suited for defense against a sea invasion. The Mediterranean coastal beachheads were narrow enough to trap the Allies once they landed. Secondly, the German troops consisted of mostly disciplined veterans accustomed to the mountainous Italian terrain and variable climate. A third advantage was that the coming autumn and winter rains would predictably hamper Allied offensive operations, including both air attacks and ground movement. Expecting the Allied invasion, the Supreme Command of the German Wehrmacht envisioned the Pontine Marshes, if they could be

flooded, as a water barrier to the enemy’s tanks, trucks, and infantry. As Kesselring, then Supreme Commander-South, was informed by the Armed Forces Operations Staff, the plan was to slow down Allied cross-terrain progress by damming up rivers and other waterways and by stopping the drainage pumps or setting them to flow in reverse direction, thereby creating impassable swamps.⁶⁰

As noted by Italian health officials, the flooding campaign was aggressive.⁶¹ Contemporary historians agree. “Demolitionists blew up pumping stations, blocked canals, and bulldozed dikes. Seawater flushed the fields.”⁶² Near the coast, at Maccarese, the drainage pumps were switched off and a lock between two channels was opened, draining off fresh water and carrying in salt water. At the same time 3,000 litres of water per second was pumped into the lowlands. Within weeks, 100,000 acres of reclaimed farmland were submerged.⁶³

The German goal was to hold fast against the Allies at the Gustav line, north of Naples, centered in the town of Cassino. On November 17, 1943, it was reported that the right flank of the 10th German army was protected by artificial marshlands in the southeast direction up to the city of Rome.⁶⁴ But on January 22, 1944, the Allies surprised the Germans by successfully landing at Anzio, above the Gustav line, and establishing a beachhead 10 miles deep. American troops, facing an extraordinarily cold, wet winter, were now directly adjacent to the Pontine Marshes. The Mussolini Canal, not destroyed by the Germans, protected the Allies’ right flank; but beyond the canal “except for a few roads along the tops of dykes, so straight as to be startling, so open and exposed as to be frightening, the terrain had reverted to its primitive state, a virtually impassable marsh.”⁶⁵ Meanwhile, the Germans reacted to the surprise invasion by amassing more troops, which were positioned above the plain in the Alban Hills with unrestricted observation of the Anzio beachhead, whose early advantage in the Allied quest for Rome was quickly lost in a stalemate.

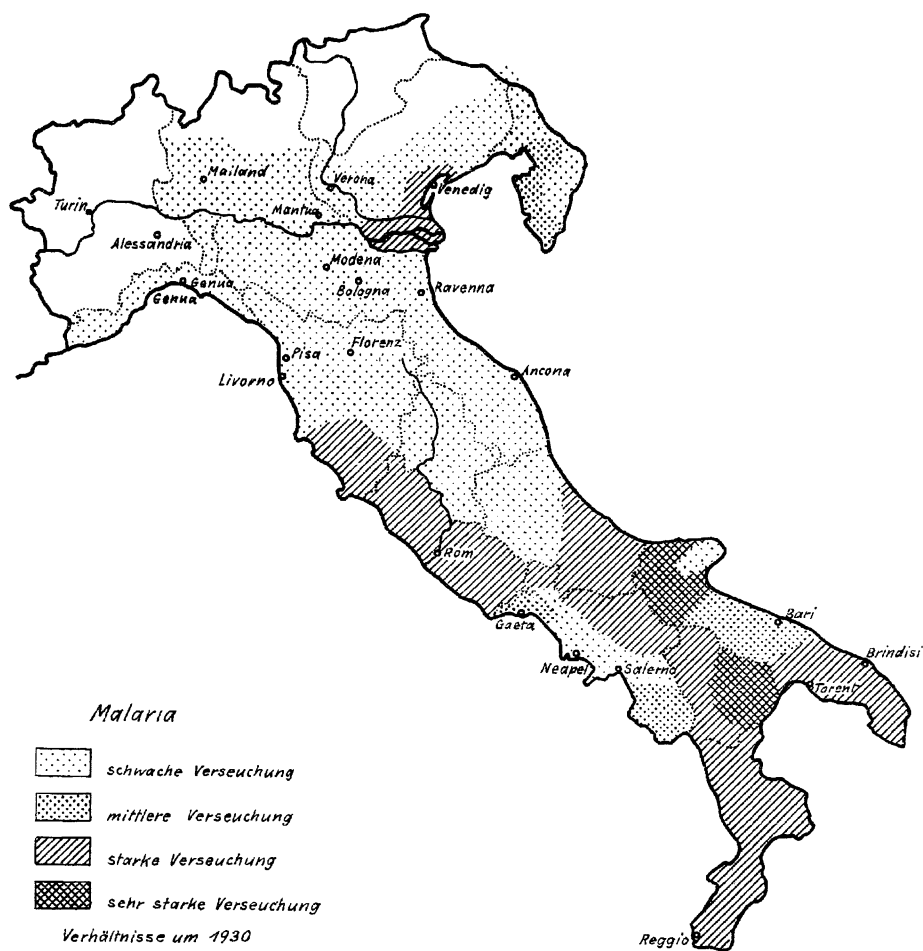
As late as May 1944, Kesselring believed that the region south of Rome would be protected “to the highest degree by technical means and flooding activities.”⁶⁶ But by mid-May, U.S. army engineers were repairing Highway 7 in the Pontine Marshes, to facilitate the march on Rome:

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Figure 3a. Epidemiological map of malaria in Italy, 1930.

Verbreitung der Malaria

Skizze 6



Note: The small boxes in the lower left indicate (from top to bottom) different degrees of incidence of malaria in different municipalities, from “weak,” to “medium,” to “high,” and “very high” occurrence. They do not refer to districts where malaria occurrence is restricted to single local foci.

Malaria

- schwache Verseuchung
- mittlere Verseuchung
- starke Verseuchung
- sehr starke Verseuchung

Verhältnisse um 1930

Die Angaben beziehen sich auf die Verwaltungseinheiten und nicht auf die örtlich beschränkten Malaria-Herde.

Source: Militärgeographischer Überblick über die Halbinsel Italien (ohne Italienisches Alpengebiet) (Entwurf) [Military geographical survey on the Italian peninsula (except Italian Alp districts) (Draft)]. Secret survey of the German General Staff, Department of Military Maps and Surveying, 1 June 1943. Bundesarchiv Militärarchiv RHD 21/203

All the engineers available worked around the clock repairing and maintaining three routes through the marshy flats. The Germans had attempted to flood much of this region but were only partially successful; the water was low in the streams and canals. Neverthe-

less, the engineers had to do considerable filling along the main routes as well as some bypassing and bridging. When Highway 7 and the supplementary routes were open to the Anzio beachhead, troops and supplies came up from the southern front in an uninterrupted stream.⁶⁷

Figure 3b. Epidemiological map of malaria in Italy, 1940.

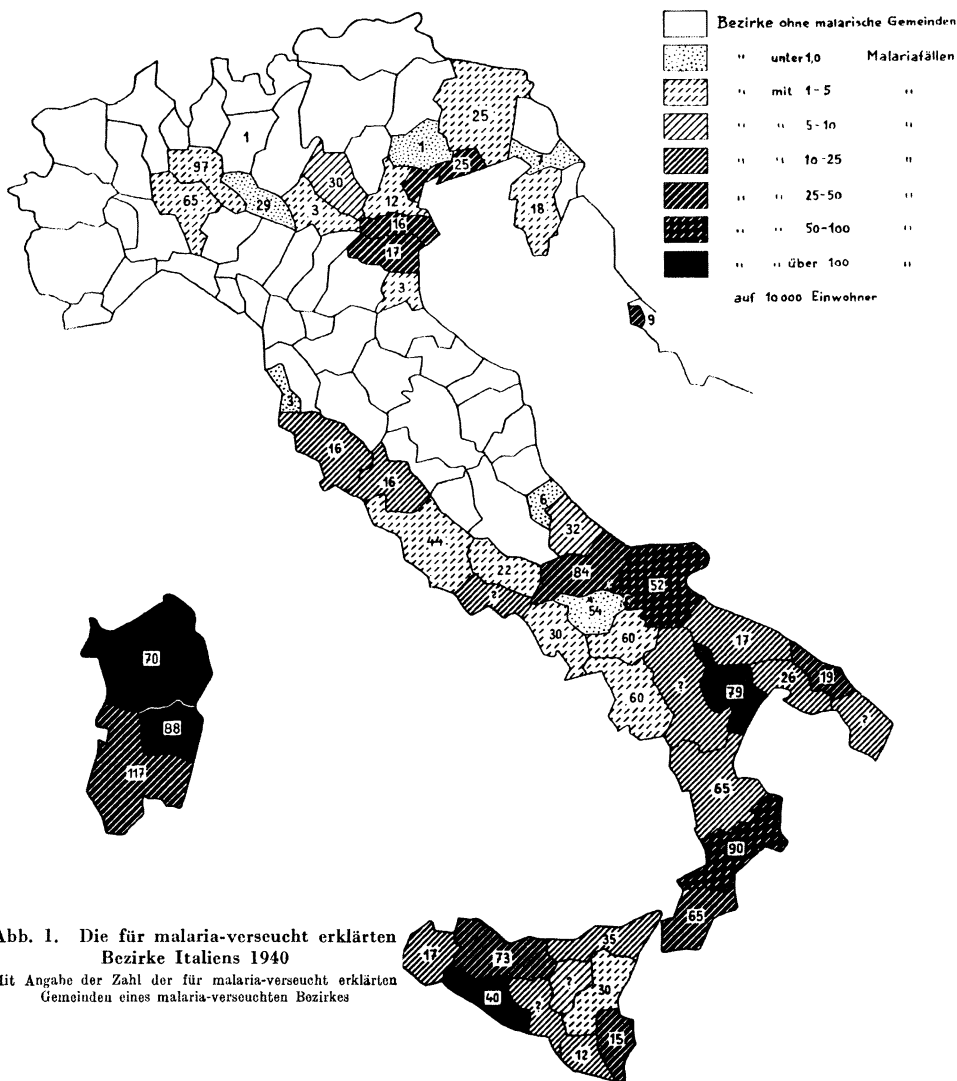


Abb. 1. Die für malaria-verseucht erklärten Bezirke Italiens 1940
Mit Angabe der Zahl der für malaria-verseucht erklärten Gemeinden eines malaria-verseuchten Bezirkes

Note: The German army evaluated the epidemiological situation in countries that were occupied or otherwise involved in its operations. Erich Martini mapped the incidence of malaria in Italy in 1940 using information provided by his Italian colleagues.

The small boxes in the upper right refer (from top to bottom) to districts either free from malaria or with different degrees of malaria occurrence: from less than 1 to more than 100 cases per 10,000 inhabitants.

The numbers within the districts refer to the numbers of cities and villages where malaria was diagnosed.

VII/3

Source: H. Zeiss (ed.), *Seuchenatlas* [Atlas of Epidemic Diseases], issued by the Supreme Command of the German Army, Army Medical Inspectorate, part VII/3, Julius Perthes, Gotha 1942–43. © Ernst Klett Verlag GmbH. Reprinted with permission.

Malaria outbreaks: BW or unavoidable hazard?

Independent of the tactical value of the flooding, the Germans expected from the very beginning that this campaign might cause a marked increase in malaria

cases, since the low-lying marshlands had historically provided ideal breeding conditions for several species of *Anopheles*.⁶⁸

Since the early 1900s medical scientists have known that malaria in humans is transmitted by the female *Anopheles* mosquito bearing the protozoan parasite

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belonging to the genus *Plasmodium*.⁶⁹ Even one mosquito bite could make a human the complementary host in the plasmodium's life cycle.⁷⁰ Destroy the mosquitoes' habitat and, in theory, one could eliminate malaria from the Pontine Marshes. Mussolini's grand plan was effective, but it required constant maintenance of a large system of drainage networks, water extraction plants, and pumping stations. This system was complemented by a concerted anti-malarial campaign based on local health centers and clinics for treatment. Malaria rates in Littoria declined dramatically during the 1930s, but the disease was never entirely eradicated; there persisted each year around 25 to 50 malaria-related deaths for every 100,000 inhabitants.⁷¹ By 1940, as Snowden and others describe, the recruitment of medical personnel and farm labor to the war effort had set back malaria control in the region, causing "a great upsurge of fever."⁷² The deprivations of war increased the health risks to the population in the area, and those risks only increased as southern Italy became a battleground. Contemporary German assessments came to the same conclusion.⁷³

According to Snowden, the Germans "calculated that, by destroying the hydraulic infrastructure of *bonifica integrale*, they could create ideal conditions for the most deadly vector in Italy."⁷⁴ To support this claim, Snowden emphasizes the general hostility of the German High Command towards Italians. Virtually overnight, Germany's Axis ally had become an enemy and the Nazi army was now an occupying force confronting a widespread insurgency. The vicious treatment of civilians, presented in detail during the war crimes trial of Kesselring, was manifested in the killing of over 40,000 Italians and the deportation and murder of 7,000 Italian Jews in Nazi death camps. Nevertheless, that this German brutality also generated a specific plan to cause malaria epidemics in Littoria requires credible documentation.

As cited by Snowden, several observers, including Americans, described *post facto* the damage to the environment caused by the flooding and commented on the obvious jeopardy it posed to the health of returning inhabitants, who remained largely unprotected by any kind of medical intervention. Of these accounts, Snowden relies most heavily on the diary entries of Alberto Coluzzi, an Italian physician and malariologist, which he characterizes as "the most compelling

account of the events surrounding the epidemic at Littoria." On the scene in 1945 and 1946, Coluzzi suspected that the primary German objective was to create an epidemic of malaria; to his mind, "It was absolutely clear that the work had been carried out in order to create enormous larval nurseries, and for no other purpose."⁷⁵ A few pumps left behind had been positioned to flow in reverse, which Coluzzi interpreted as part of this single-minded attack. He also cited German destruction of flat bottomed motor boats once used to clear vegetation from canals and ditches. Coluzzi further condemned the Germans for confiscating tons of quinine from a storehouse in Rome, which might later have been used for civilians in Littoria and elsewhere.

Coluzzi's passionate assertion of German motivation for the destruction, two to three years after the fact, ignores Kesselring's military objectives. Coluzzi also makes no note of the overarching Reich policy to leave no resource intact as they retreated, as, for example, in the demolition of docks and boats at Naples. Coluzzi's diary appears to be Snowden's foremost historical source concerning German intent. Snowden also reports that, in a 2003 interview, Coluzzi's son, malariologist Mario Coluzzi, argued that "this is certainly a war crime, and a representative of the German government should apologize to the Italian people."⁷⁶

Martini, Rodenwaldt, and the German High Command

According to Snowden, two German experts in malariology, Professors Erich Martini and Ernst Rodenwaldt, were the architects of the German plan to spread malaria in Littoria. In 1940, Rodenwaldt became head of the Institute for Tropical Medicine of the Military Medical Academy in Berlin. That same year he appointed Erich Martini as head of the institute's Department of Malariology. Long before this, Martini and Rodenwaldt and other Germans had been collaborating with Italian colleagues in research on malaria. As allies, the two Axis powers had a common interest in defeating the disease among troops in occupied areas, particularly in North Africa, Albania, and Greece. Martini and Rodenwaldt had been heavily involved in troop defenses against the disease.⁷⁷

Martini is described by Snowden as “a devout member of the Nazi party” and “a protégé of Heinrich Himmler and an authority on germ warfare,” and Rodenwaldt as a member of the Nazi party.⁷⁸ The commission of atrocities against the Italian people was part of a “war against civilians” in Italy, of which the flooding campaign, by Snowden’s extrapolation, was a part.⁷⁹ Thus, under Kesselring’s direction, Rodenwaldt and Martini “devised a plan to take full advantage of the unusual breeding habits of *Anopheles labranchiae*,” one of the major vectors of malaria in the region.⁸⁰ According to Snowden, they gave advice to “German engineers on how best to flood the Pontine Marshes during the rainy season between October 1943 and March 1944... Their plan was to put the water pumps into reverse action so that they drew seawater onto the plain [which] would create a vast swamp of brackish water in which *Anopheles labranchiae* alone would be able to flourish.”⁸¹ This was the species principally responsible for transmitting both falciparum and vivax malaria. As Snowden concludes, Martini and Rodenwaldt “calculated that by destroying the hydraulic infrastructure of the *bonifica integrale*, they could create ideal conditions for the most deadly vector in Italy.”⁸²

Rather than confirming Snowden’s rendition, material from post-war archives on the roles and actions of Martini and Rodenwaldt, as well as the German High Command, indicate intentions far removed from waging biological warfare. Concerning Martini, his name appears nowhere in existing records as a biological weapons expert. He is not referred to in any of the hundreds of German BW documents apprehended by the Alsos mission, nor is he mentioned in the Alsos document, *Who’s Who: German Scientific, Medical, and Military Personnel Connected with German Work in Biological Warfare*.⁸³ Documents that do concern Martini, filed in the Berlin Document Center in preparation for the Nuremberg trials, contain no reference to biological weapons. Instead, several of his letters give advice on how to control mosquitoes and other insects, with no mention of their possible use to spread disease.⁸⁴ He also advised Eduard May at the Institute of Entomology, where malarial mosquitoes were studied, on how to control lice—a major health threat for troops at the Russian front.⁸⁵

Nor can Martini be accurately characterized as Himmler’s protégé. The Institute for Entomology,

founded in 1942, was Himmler’s favorite and Martini’s name was put forth as a candidate for director.⁸⁶ Himmler explicitly rejected him for the post and assigned him instead to the institute’s advisory board.⁸⁷ Martini’s superior, Rodenwaldt, was a member of the Nazi party in 1932 and 1933, after which he is missing from the rolls. Both may well have been “ideal Nazi doctors,” but their names do not appear in the comprehensive lists of “physicians without humanity” compiled by historians from numerous openly accessible documents and by interviews.⁸⁸

One can offer no defense against war crimes for Heinrich Himmler, who in the name of medical progress permitted the forced human experiments at Dachau to test malaria immunization and treatment. Just prior to the start of the first Nuremberg trial on November 20, 1945, nine Nazi physicians were charged with these particular crimes against humanity in a trial held on the grounds of the Dachau concentration camp and later more information was presented at the “Doctors’ Trial” at Nuremberg.⁸⁹ Himmler was interested in the potential of biological warfare, but documents show that he felt bound by Hitler’s prohibition of active BW preparations.⁹⁰

Regarding the flooding of the Pontine Marshes, documentary proof exists that the Supreme Command of the Wehrmacht undertook numerous defensive measures to *prevent* rather than provoke the spread of malaria. In planning the flooding, the Germans expected from the beginning that its own army would also be threatened by malaria.⁹¹ Coming from geographic regions free from the disease, Reich soldiers were more vulnerable than Italians who had been previously exposed.⁹²

When the flooding campaign began in early October 1943, Rodenwaldt and Martini were not in Italy and there appears to be no documentation that they planned the campaign as a disease attack. In mid-November, however, they were ordered to go to Rome to advise the German Chief Medical Corps-South on the possible deleterious effects of the flooding on the incidence of malaria among the troops.⁹³ The top Italian health authorities had been informed in advance of the German flooding plans and knew of the arrival of Martini and Rodenwaldt. Alberto Missiroli, then head of the malaria department of the Istituto Sanita, immediately wrote the two German physicians to ask for their advice and cooperation.⁹⁴ Martini and

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Rodenwaldt responded by quickly meeting with their Italian colleagues.⁹⁵

In his book, Snowden reproduces a long passage from a November 29, 1943 report on the meeting, written by Italian malaria expert Enzo Mosna. In it, Mosna refers to the “long-standing friendship that binds us to these eminent scientists” and describes a joint on-site inspection at the delta of the Tiber River to estimate the problems that could arise from the regression of the Roman Compagna and the Pontine Marshes to their “ancient swampy condition.” Mosna also lists the recommendations the Italians put forth. One was that salt water not be diverted to the inland “bonified fields,” which they saw as creating more favorable conditions for malaria-breeding mosquitoes. Another was “to suspend the working of the water pumps, but not to create serious damage to the machinery that would be difficult to repair in the years to come after the end of the war.” Mosna added this detail: “Before leaving, Professor Martini was able to assure us that all flooding with saltwater would be avoided, except for restricted zones along the coast, and that all military and civilian personnel would respect the Geneva Convention.”⁹⁶

For what it was worth, Martini had just reiterated Reich policy concerning the treatment of wounded enemy soldiers and prisoners of war. Amendments to the Geneva Convention, first presented in 1864, then in 1906 and 1929, specifically addressed the problem of civilians in war. Snowden ignores the text of the report and invents Mosna as the moral agent in this exchange: “By invoking the Geneva Convention, Mosna explicitly reminded Martini and Rosenwald [sic] that the actions of the German army were bound by a framework of international “Laws and Customs of War.”⁹⁷

As was their responsibility, the two German physicians did make recommendations to the High Command for reducing the risks of malaria for German soldiers. According to Rodenwaldt:

[T]he great health hazard which was caused for the troops by artificial flooding of Italy’s coastal regions was reduced by creating marshlands with fresh water whenever possible. They requested that the new arising lakes should be flooded either with fresh water or with seawater to prevent the development of extended brackish water areas, the preferred breeding places of *Anopheles elutus*. That was possible in many cases. At

other places, the 4 percent seawater was given free access to prevent their becoming breeding places for brackish water species of *Anopheles* (*Anopheles labranchiae*).⁹⁸

To that end, it helped that the German High Command had ordered that the pumps be put into reverse action.⁹⁹ Standing brackish water could be replaced by moving water and, consequently, the threat of an increase in disease incidence might be *reduced*, not enhanced.¹⁰⁰

But what of the impact of ocean water? Snowden bases much of his argument for German “bioterrorism” on the fact that *Anopheles labranchiae* is capable “of breeding in water with a high saline content,” hence the danger of flooding the coastal areas with seawater.¹⁰¹ But Snowden does not define what “high saline content” means. A major paper Snowden cites, published in 1935 and co-authored by Missiroli and the eminent American malaria expert, Lewis Wendell Hackett, refers to conditions of limited rather than high salt content. Based on Hackett’s long-term field observations, the scientific conclusion is that this type of mosquito breeds only in water of up to 1 percent salinity.¹⁰² Hence, in 1945 Missiroli described the unpredicted negative consequences of the German flooding of certain areas with fresh water: “The presence for a considerable time of fresh water on land composed of alluvial deposits which have as their foundations old marine beds has caused a slight salinification of the water, sufficient to favour the breeding of *A. Maculipennis labranchiae*, which has re-appeared immediately in large numbers...”¹⁰³ According to a consultant to the Reich Army Medical Inspectorate, the Germans, “following the advice and knowledge of Italian malariologists, took care to prevent the formation of brackish water swamps. Instead, some coastal areas were flooded with seawater containing salt concentrations high enough that malaria mosquitoes were not able to hatch there.”¹⁰⁴

In the coastal areas, when the German High Command ordered the pumps be put into reverse action, this action likely raised the salt content of the water to concentrations unfavourable for the *Anopheles labranchiae*. After the Germans finished their defensive project and retreated from the area, however, the overall degradation of the Pontine Marshes favoured mosquito breeding in 1944 and 1945.

While its troops remained on the defensive in southern Italy, the German High Command took unusual steps to reorganize the Wehrmacht's sanitary services there.¹⁰⁵ In December 1943, Dr. F.M. Peter, a major in the medical corps, was put in charge of the new Malaria Defense Staff ("Malaria-Abwehrstab"). Its purpose was the "exploration of [...] the areas which are flooded by order of the High Command and continuous observation of the changes which result during the malaria season with regard to these floodings."¹⁰⁶ Another major task of the Malaria Defense Staff was the "organizing and supervision of the control of the breeding places."¹⁰⁷ But control of the larvae was difficult: Allied air superiority made the dissemination of toxic compounds by aerial spray generators nearly impossible.¹⁰⁸ Instead, inflatable boats were used to spread anti-malarial chemicals in the flooded areas.¹⁰⁹ Figure 4 shows a placard issued by the German army during the war warning troops to "Protect Yourself from Malaria!"

The Wehrmacht also evacuated tens of thousands of Italians, some by boat, from the territories to be flooded.¹¹⁰ By Snowden's interpretation, "[t]his removal of the inhabitants from the war zone ensured that there were no eyewitnesses to German actions."¹¹¹ Since the flooding activity had been reported to Missiroli and his colleagues and others who could observe its impact, the elimination of witnesses seems a less convincing explanation than the fact that civilian homes in Littoria would soon become unliveable. For many thousands, their sources of livelihood—farms and small factories—were also about to be obliterated and the area turned into a battle zone. In addition to removing civilians from destroyed terrain, the evacuation would also have had the effect of reducing the risks of malaria among those remaining, especially German troops, since the larger and denser the human host population, the more its spread accelerates.¹¹²

In January 1944, the Allies landed at Anzio, north of Naples. The nearby disturbed terrain of the Pontine Marshes—soon dubbed the "Wadi" or gully country for its canals and water-filled ravines—remained contested. "With the winter rains the whole plain was waterlogged and the drainage ditches showed the water level only a few feet down."¹¹³ Protected by Atabrine and by the use of DDT, the Allied troops were able to keep their malaria cases to a minimum during the siege, which lasted until May.

Figure 4. "Protect Yourself from Malaria!"



Note: Placards warning of the danger of malaria were produced by the Army Medical Inspectorate and distributed to German army bases.

Source: Ernst Rodenwaldt and Werner Junge, "Die Malaria der deutschen Truppen in Albanien und Montenegro im zweiten Weltkrieg" [Malaria among German troops in Albania and Montenegro during World War II], *Wehrdienst und Gesundheit*, 1962, 6:71–174, p. 143. © Wehr und Wissen in der Mönch Verlagsgesellschaft mbH, Darmstadt/Bonn. Reprinted with permission.

Finally, in addition to evidence indicating no intention on the part of German High Command to wage biological warfare, a further absence of proof detracts from Snowden's claim. Lt. Col. Dr. Giuseppe Morselli was a staff member of the Italian biological weapons facility, the Laboratory of Microbiology in the Rome-based Ministry of War. In 1944, Morselli informed the Alsos Mission about Italian BW activities but made no mention of malaria or the flooding campaign.¹¹⁴ Morselli, who was forthcoming with Anglo-American weapons experts, would likely have been informed had the German army planned the spread of malaria.

Infrastructure destruction in war

The war crime in question—the 1943 German destruction of inhabited terrain in Littoria and the resulting increase in malaria—does not constitute

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biological weapons use but does constitute an assault on vital infrastructure and the environment, which was internationally banned at the time. In the language of the 1899 and 1907 Hague Conventions: “The occupying State shall be regarded only as administrator and usufructuary of public buildings, real estate, forests, and agricultural estates belonging to the hostile State, and situated in the occupied country.”

Despite those accords, environmental destruction by all sides in World War II expanded almost beyond imagination, with the full force of industrial technology and military invention. The aerial bombings of ports, bridges, and factories at the start of the war quickly escalated to broad scale incendiary attacks on industrial cities and, ultimately, to the American use of atomic bombs on Hiroshima and Nagasaki in 1945. The large-scale devastation of habitats and terrains continued to characterize warfare in the second half of the twentieth century, with developing areas of the world bearing the brunt of the damage. As public health experts have noted, the direct and indirect consequences of contemporary war on economic infrastructure and the environment is extreme, to the point where entire societies and ecosystems are threatened.¹¹⁵

The Environmental Modification Convention of 1977 is explicit in its prohibition of “any technique for changing—through deliberate manipulation of natural processes—the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere, and atmosphere” such that it would have “widespread, long-lasting, or severe effects as the means of destruction, damage, or injury to any other State Party.” Also in 1977, Berne Protocols I and II were added to the Geneva Convention of 1949 to reinforce prohibitions against the destruction of “objects indispensable to the survival of the civilian population, such as foodstuffs, crops, livestock, drinking water installations, and supplies and irrigation works...whether in order to starve out civilians, cause them to move away, or for any other motive.” Article XV of Berne Protocol II directly addresses infrastructure destruction:

Works or installations containing dangerous forces, namely dams, dykes and nuclear electrical generating stations, shall not be made the object of attack, even where these objects are military objectives, if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population.

In contemporary times, warfare has also increased the risks of infectious diseases to non-combatants. In past wars, soldiers had been the main victims, but civilians in war zones increasingly suffer the worst consequences of epidemics, as they did during the renewed malaria outbreaks in Italy in 1944 and 1945. As Snowden notes, northern Italy also suffered an upsurge in malaria due to environmental degradation and the deprivations caused by the war—reaching alarming proportions in 1944.¹¹⁶ Who bears responsibility for this kind of “collateral damage” remains a troubling question. Concerning the 1991 Gulf War, legal scholar David Kennedy reflected on the cholera outbreak that followed when United Nations forces decided to bomb electrical generators in Iraq and destroyed clean water supplies and sewage systems.¹¹⁷ Were the many resulting civilian deaths from cholera avoidable? And who was responsible for them—the military command, the bomber pilots, or political leaders on both sides?

Parcelling out responsibility and ensuring that everyone evaluates the proportionality of what they do can also ensure that no one notices the likely deaths from cholera. And, if no one noticed, and it was no one’s job to notice, then perhaps no one was responsible, no one did decide—[the victims] just died. Or maybe it was all Saddam Hussein’s fault, after all, he started the war, and afterwards, he could have sped repairs of the electricity grid rather than his own grid of palaces and security.”¹¹⁸

The German flooding of the Pontine Marshes was considered a necessary means to a military end, as was the extensive environmental destruction in the Littoria Province that was caused by invading Allied troops. Indeed, Linoli described extensive destruction of the Pontine area by Allied forces “between Borgo Podgora and the town of Aprilia, with serious damage to dwellings and rural infrastructure.”¹¹⁹ But wartime environmental destruction and disruption that also increases the incidence of disease cannot be equated with biological warfare.

BW and dispassionate assessment

The uncritical acceptance of Snowden’s allegation that the Germans used biological weapons in Italy in

World War II demonstrates the ease with which terms like “biological warfare” and “bioterrorism” can be attributed to a despised regime, even in the absence of facts. Rick Atkinson incorporated Snowden’s charge in his 2007 volume on the war in Sicily and Italy.¹²⁰ Randall Packard, a noted historian of medicine, cited it in his 2007 overview of the history of malaria.¹²¹ Reviews of Snowden’s book in *Nature* and elsewhere accepted the assertion that Hitler’s Germany waged “biological warfare” in Italy.¹²² The book, which appears otherwise based on sound research, has won two awards for historical merit. Instead of dispassionate assessment, the subject of the intentional use of disease against masses of civilians, with all its connotations of evil, has recently lent itself to fictionalized horrors and the conflation of one kind of political threat, for example, Saddam Hussein’s Iraq, with the threat to the United States of germ weapons such as anthrax or smallpox.¹²³

The many atrocities that Nazi Germany perpetrated on enemy civilian populations, including Italians, bore no relation to a biological warfare program or BW use. Snowden nonetheless extrapolates that: “The plan devised by Martini and Rodenwaldt, therefore, was consistent with the punitive tenor of the Wehrmacht occupation strategy and with Kesselring’s well-documented *modus operandi*.”¹²⁴ If there was a German plot at the “highest levels” to inflict malaria on Italian civilians, credible evidence for such an allegation is lacking.

Estimating the risks of BW use constitutes a significant area of national security analysis, marked by trepidations about potential treaty violations as well as foreign and domestic bioterrorism.¹²⁵ It remains difficult to make objective assessments of violations of either the Geneva Protocol or the Biological Weapons Convention and to resist the politicization of facts.¹²⁶ Still, the essential contribution that historians and other analysts make to the process of international justice and arms control is adherence to standards that set a high, yet reasonable, bar for proof.

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