Chemical Warfare Research and Human Trials in British India

Colonel (Dr.) Divakaran Padma Kumar Pillay, SC (Retd.)

Colonel (Dr.) Divakaran Padma Kumar Pillay, SC (Retd.) is a Research Fellow at the Manohar Parrikar Institute for Defence Studies and Analyses

Summary

This article investigates the British Empire's chemical warfare research in India, focusing on covert tropical trials conducted across military stations from Rawalpindi to Kannur to test agent usage and equipment efficacy in tropical regions.

Introduction

When history examines the British Raj, the record goes straight to catastrophic imperial famines[1], the crushing burden of revenue extraction and high taxation, the relentless recruitment and forced indenture of labor[2], the massive drainage of national wealth[3], the stark disparities of pay, and the deeply entrenched racism of the ruling apparatus. Yet beneath these widely documented pillars of colonial exploitation lies a darker, deeply suppressed underbelly of imperial science: the covert chemical warfare research and human experimentation conducted on indigenous troops in the Indian Sub-continent.[4]

Following the catastrophic industrial slaughter of the First World War, the international community sought to constrain the horrors of asymmetric gas warfare.[5] The Geneva Protocol of 1925 formally prohibited the use of asphyxiating, poisonous, or other gases in war, as well as all analogous liquids, materials, or devices. However, a fatal legal loophole remained: the protocol did not ban the development, production, or stockpiling of chemical weapons, nor did it restrict research into defensive measures.[6] Major military powers, operating under the ruthless logic of interwar rearmament, treated the prohibition as a restriction on battlefield deployment rather than scientific inquiry. The United Kingdom's primary research hub, the Chemical Defence Experimental Establishment at Porton Down[7] in Wiltshire, spearheaded these defensive and experimental efforts.[8]

As the British Empire prepared for potential conflicts across diverse global theaters, ranging from the humid, dense jungles of Southeast Asia to the arid, scorching plains

of the Middle East and the rugged frontier terrain of the Indian subcontinent, scientists encountered a critical technical obstacle. In controlled European laboratories, chemical delivery systems and protective textiles were calibrated against moderate baseline temperatures. High ambient temperatures severely accelerated the evaporation rates of volatile compounds and drastically increased percutaneous absorption rates, with vesicants like sulfur mustard penetrating human skin far more rapidly when the epidermis was warm and moist, transforming what might have been a moderate exposure in Wiltshire into a severe systemic casualty in the Punjab or the Burmese frontier. Furthermore, organic materials, rubber seals, and charcoal filter beds within British-issued respirators degraded rapidly under intense ultraviolet radiation, monsoonal humidity, and fungal rot, rendering standard-issue defense equipment dangerously unreliable in the field.

This technical urgency was compounded by the alarming intelligence surrounding Imperial Japan's covert biological and chemical warfare programs, most notably through the operations of Unit 731 based in Harbin, Manchuria.[9] Commanded by General Shirô Ishii, Unit 731 subjected hundreds of thousands of prisoners, primarily Chinese, Russian, Korean, and Mongolian captives, to horrific human experimentation, including vivisections without anesthesia, forced pathogen infections, and field testing of chemical and biological weapons on civilian populations.[10] Operating under a brutal racial hierarchy and with utter disregard for the Geneva Protocol of 1925, Japanese forces actively deployed chemical and biological agents across Chinese cities, creating an acute panic among Allied planners who feared similar asymmetric attacks as Japanese troops rapidly overran British colonial possessions in Malaya, Singapore, and Burma. Driven by the imminent threat of invasion through the eastern frontier near Assam and the absolute necessity of preparing retaliatory countermeasures, British military authorities were compelled to establish rigorous tropical testing programs across imperial stations in India to evaluate how protective equipment and chemical agents functioned under the harshest real-world operating conditions.[11]

From Rawalpindi and Deolali to Cannanore: Human Subjects of the Empire

The scientific and military apparatus of the British Empire viewed the Indian subcontinent not merely as a territory to be governed, but as a vast, highly variable laboratory. This geographic and climatic diversity made the subcontinent an ideal proving ground for evaluating how military technology, ordnance, and chemical agents performed under the harshest operational realities of the empire. The colonial administration treated indigenous soldiers and local civilian participants as entirely expendable subjects in the pursuit of imperial tactical readiness. Informed consent was systematically absent, and troops were rarely, if ever, given comprehensive disclosures regarding the long-term, debilitating health consequences of sulfur mustard exposure, which included permanent blindness, severe cutaneous scarring, chronic bronchitis, pulmonary fibrosis, and heightened susceptibility to secondary respiratory infections.

Furthermore, this institutional callousness was compounded by a counter-intuitive realization that challenged rigid colonial assumptions: the physiological responses and resistance demonstrated by Indian soldiers under toxic exposure frequently subverted expectations. Rather than conforming to predictable imperial models

of biological inferiority, indigenous personnel exhibited variable physiological thresholds and active physical reactions to chemical agents. This forced British scientists to continuously recalibrate their data, revise protective uniform codes, and grapple with the biological realities of troops whose endurance constantly defied the simplistic categorizations of colonial science.

Porton Down concluded that a casualty-producing dosage could be achieved with sprayed mustard gas. Male participants dressed in khakis were subjected to tests in Madras, leading researchers to conclude that White and Black races showed different degrees of physiological resistance, which necessitated changes in combat uniform codes. The Rawalpindi trials[12] represent a critical foundational chapter in the British Empire's broader program of tropical and colonial chemical testing.

The footprint of chemical testing in India evolved across multiple strategic stages. The earliest test sites were established in Rawalpindi and Deolali (Devlali) near Nashik. Deolali served as a major transit depot and was famously immortalized in British military slang as the origin of the term "doolally tap" or "going doolally," meaning to go mad, eccentric, or temporarily unhinged. The 67th Chemical Warfare Company, equipped with rocket-fired gas canisters, was initially based in Deolali, but as high temperatures caused mustard gas shells to sweat, they were relocated to the eastern front alongside Royal Air Force units tasked with supporting poison gas impact trials on troops.

Conducted over a decade, starting in the early 1930s and extending through World War II, at military installations in Rawalpindi, these experiments directly investigated how sulfur mustard affected South Asian skin compared to European subjects, establishing baseline metrics of percutaneous absorption and blistering thresholds under arid and semi-arid conditions before researchers expanded their scope to humid coastal and jungle environments like Cannanore (Kannur). In 1944, the Chemical Defence Research Establishment (India) (CDRE(I)), headed by J.S. Anderson, was established in Cannanore. The transfer to Cannanore marked a significant escalation in the geographical scope of British chemical warfare field trials in southern India. Operating from the Burnachery cantonment, Porton Down scientists carried out a comprehensive program to test defensive and offensive chemical warfare technology. The CDRE's objective was to develop materials which would protect troops' and working animals' feet and skin when working in jungles contaminated by liquid gas.

All of this came to light only on September 1, 2007, when Evans published a landmark exposé in The Guardian titled "*Military scientists tested mustard gas on Indians*,"[13] which revealed how Porton Down researchers used hundreds of Indian soldiers as human subjects in toxic gas trials during the colonial era. He also expanded extensively on these covert human experiments in his book *Gassed: British Chemical Warfare Experiments on Humans at Porton Down*.[14] Archival records uncovered by Evans reveal the grim reality that hundreds of Indian soldiers and local participants were subjected to controlled toxic exposure. These tests frequently involved dropping or spraying liquid mustard gas or dispersing concentrated vapor within specialized testing enclosures, sealed gas chambers, or controlled open-air plots.

Another source is the historical record surrounding the operations of 1340 Flight (Special Duty) and its deployment of Vultee Vengeance dive bombers in late 1945, preserved primarily through pilot accounts

and veterans' forums. Firsthand accounts from pilots assigned to 1340 Flight (Special Duty) who flew Vultee Vengeance dive bombers in 1945[15] to duplicate poison gas trials previously conducted in Canada and Britain revealed that the core objective was testing whether liquid mustard gas (dichloro diethyl sulphide) could be produced in quantity and sprayed on open ground from underwing spray tanks to deny access to troops as effectively as land mines. Field ranges for these chemical weapons tests were established at Kumbala and Porkhal, while the British chemical weapons unit at Sulur airbase in Coimbatore was deemed unsuitable and relocated to Cannanore.

Chemical weapons trials in Malabar continued until February 1946, culminating in the formal disbandment of 1340 Flight (Special Duty) shortly thereafter on March 31, 1946. While official government documentation regarding the precise disposal methodology of the remaining chemical stockpiles remains scarce or redacted, veteran testimony preserved on the Professional Pilots Rumour Network (PPRuNe) indicates that the surplus munitions were disposed of at sea in the Arabian Sea, mirroring standard post-war dumping practices utilized by Allied forces, such as the United States Army Air Forces. As reported by Sgt. Warren Unna in the CBI Roundup article from March 14, 1946, the U.S. forces systematically dumped surplus chemical munitions and conventional explosives directly into the Bay of Bengal.[16]

Connecting this documented U.S. Army Air Forces practice in the Bay of Bengal with the veteran accounts from the Arabian Sea highlights a massive, region-wide maritime dumping operation carried out by Allied forces at the close of World War II, leaving an unacknowledged environmental and toxic legacy across both coasts of the Indian subcontinent.

Logistics, Supply, and Chemical Defense Readiness and Doctrinal Integration

While the manufacture and bulk stockpiling of offensive chemical agents remained largely centralized in the United Kingdom and core industrial zones of the Empire, the British Indian Army maintained an intricate logistical apparatus for chemical defense across the subcontinent. By the late 1930s, heightened anxiety regarding potential chemical warfare utilization by adversaries by Imperial Japan in the eastern theaters prompted the large-scale procurement and distribution of protective equipment. Millions of Indian soldiers and auxiliary personnel were issued respirators, anti-gas capes, oilskin trousers, and bleaching powder decontamination kits. The systematic implementation of chemical warfare experimentation across British India required a specialized logistical network. This apparatus relied heavily on technical engineer formations and specialized units, including the 67th Chemical Warfare Company (tasked with chemical ordnance management and rocket-fired canister deployments), as documented in archival research compiled by military historians on the WWIITalk historical platform.[17]

Indian Official History for the Indian Engineers details the establishment of a Chemical Warfare Training Centre in May 1942 at Deolali, set up with the assistance of the "Chemical Warfare Group, R.E." (Royal Engineers). During this period, the Sappers and Miners Groups were tasked with raising specialized chemical warfare units. Seven Chemical Warfare (Mortar) companies were formed (numbered 361 through 367), alongside Headquarters Chemical Warfare Groups, specifically H.Q. 51 C.W. Group within the Bengal Group (formed in September 1942) and H.Q. 52 C.W. Group within the Madras Group (formed in

November 1942 by the redesignation of 461 Lines of Communication Troops).[18] Due to shifting operational priorities, these specialized C.W. units had a remarkably brief lifespan. The Chemical Warfare Training Centre and H.Q. 51 C.W. Group were disbanded in early 1943, and the majority of the converted mortar companies reverted to standard field engineer duties.

The No. 1340 Flight (Special Duty) RAF was the specialized squadron operating Vultee Vengeance dive bombers for aerial spraying and munitions trials, with a defensive purpose. The civilian-military scientific cadres were dispatched directly from Porton Down to oversee human subject testing. Military educational institutions, most notably the Staff College in Quetta, incorporated anti-gas warfare and chemical defense training into tactical doctrines. Staff officers were trained to calculate persistent and non-persistent gas hazards, factor wind direction into operational planning, and execute mass decontamination procedures. This reflected the high command's profound anxiety regarding the potential tactical use of gas along mountainous borderlands and contested frontiers, where conventional superiority could be checked by entrenched adversaries.

Conclusion

The history of chemical defense research in British India stands as a sobering testament to the utilitarian calculus of the colonial state, where the safety and operational readiness of imperial forces were routinely weighed against the health, bodily integrity, and lives of indigenous troops. The experiments conducted across Rawalpindi, Deolali, Madras, Sulur, and coastal stations like Cannanore, supported by specialized technical formations such as the Royal Engineers, chemical warfare groups, and RAF squadrons, alongside the broader integration of the Indian Army into the Empire's chemical warfare framework, remain a stark reminder of the human cost embedded in the technological evolution of modern military power.

The Commonwealth, led by the United Kingdom, cannot be defined merely by ceremonial pageantry, sports championships, and shared diplomatic pomp. A true association of nations must also be willing to look unflinchingly into its past and take full moral and historical responsibility for its dark chapters, including the human experimentation, toxic field trials, and secretive ocean dumping conducted across colonial territories. The legacy of these trials extends far beyond historical archives into our shared environmental and moral consciousness. The unrecorded disposal of surplus chemical stockpiles into the Arabian Sea, mirroring offshore munitions dumping in the Bay of Bengal, serves as an enduring reminder of the invisible ecological scars left by past conflicts.

In bringing these concealed histories to light, we owe an immense debt of gratitude to diligent investigators and researchers like Rob Evans, whose archival perseverance exposed the Porton Down files, and scholars like Shri Manmadhan Ullattil, whose detailed studies have preserved the regional truth of these events. Their rigorous work is more than historical recording; it is an essential act of justice that restores dignity to those who bore the silent brunt of empire and reinforces our collective commitment to transparency, human dignity, and the absolute prohibition of chemical weapons in a civilized world.

Views expressed are of the author and do not necessarily reflect the views of the Manohar Parrikar IDSA or of the Government of India.

Endnotes:

[1] D.P.K. Pillay and T.K. Manoj Kumar, "Food Security in India: Evolution, Efforts and Problems," *Strategic Analysis* 42, no. 6 (2018): 595–611.

[2] T. K. Manoj Kumar and D. P. K. Pillay, "The Formation of the Indian Diaspora," *Strategic Analysis* 45, no. 4 (2021): 308–323.

[3] D. P. K. Pillay, *India at War: Empires, Battles and the Making of a Nation* (New Delhi: Penguin Random House India), Chapter 5.

[4] D. P. K. Pillay, *Lethal Autonomy in the Age of AI: The Intersection of History, Technology and International Law,* Manohar Parrikar Institute for Defence Studies and Analyses, Chapter: "Historical Evolution of IHL",pp 28-50.

[5] Ibid pp 32-36.

[6] The legal loophole that enabled these trials under the Geneva Protocol of 1925 was that the treaty explicitly prohibited only the *use* in war of asphyxiating, poisonous, or other gases, but failed to outlaw: (1) Research, Development, and Production, imposing no restrictions on scientific development, laboratory testing, manufacturing, or stockpiling of chemical agents; and (2) Defensive Testing, permitting research into protective measures and equipment (such as respirators, anti-gas ointments, and specialized textiles) which imperial authorities and military scientists used as a legal pretext to conduct live-agent experiments.

[7] Porton Down, founded in 1916, is the oldest chemical warfare research installation in the world. Until the 1950s, Porton developed chemical weapons such as mustard gas and nerve gas. In the 1940s and 1950s, Porton also devised biological weapons, chiefly anthrax bombs.

[8] Ulf Schmidt, *Secret Science: A Century of Poison Warfare and Human Experiments* (2015), detailing how metropolitan research facilities utilized the defense-versus-use distinction to justify continuous experimentation. He helps examine the institutional framework of Porton Down, the codification of human subject experimentation within British military science, and the systematic expansion of poison gas research across imperial networks.

[9] Sheldon H. Harris, "Factories of Death: Japanese Biological Warfare, 1932–1945, and the American Cover-Up" (Routledge, 2002). Accessed on 09 November 2026.

[10] D.P.K. Pillay, "Lethal Autonomy in the Age of AI: The Intersection of History, Technology, and International Law" (MP-IDSA Monograph 107, 2026), Chapter 2. Accessed on 09 November 2026.

[11] Maddy, "Cannanore Days", *Maddy's Ramblings*, 20 October 2018.

[12] The National Archives, Discovery Catalogue, UK National Archives. Accessed 9 November 2026.

[13] Evans, R. (2007, September 1). "Military scientists tested mustard gas on Indians". *The Guardian*. 1 September 2007.

[14] Rob Evans, *Gassed: British Chemical Warfare Experiments on Humans at Porton Down.*

[15] As detailed in research documentation shared by Shri Manmadhan Ullattil, key insights into the operations of 1340 Flight in Cannanore (Kannur) stem directly from the firsthand accounts of British pilot and C.O. Dennis O'Leary (known online via the aviation forum PPRuNe as danny42c). O'Leary recounted his operational experiences flying and participating in the chemical trials theater, providing rare primary-source perspectives on the logistical and operational realities of the flight Dennis O'Leary (danny42c), post on "Gaining R.A.F. Pilots Brevet WW II," Professional Pilots Rumour Network (PPRuNe), message #3033, May 2008.

[16] Sgt. Warren Unna, "Ammunition Disposal Finished in 5 Months," *CBI Roundup* (March 14, 1946), accessible via CBI Theater Historical Archive, 14 March 1946.

[17] Historical research documentation and archival forum discussion, "Chemical Warfare Establishment NE India WW2," WW2Talk, 17 November 2018.

[18] This complete roster comprised 361 (Bengal) Field Company (which alone was retained for operational roles after others reverted), 362 (Madras), 363 (Bombay), 364 (Madras), 365 (Madras), 366 (Bengal), and 367 (Bengal).