The Nonproliferation Review

ISSN: 1073-6700 (Print) 1746-1766 (Online) Journal homepage: www.tandfonline.com/journals/rnpr20

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To cite this article: John D. Sislin (2018) Chemical warfare in the interwar period: insights for the present?, The Nonproliferation Review, 25:3-4, 185-202, DOI: 10.1080/10736700.2018.1519343

To link to this article: https://doi.org/10.1080/10736700.2018.1519343

NONPROLIFERATION REVIEW
2018, VOL. 25, NOS. 3–4, 185–202
https://doi.org/10.1080/10736700.2018.1519343

Chemical warfare in the interwar period: insights for the present?

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ABSTRACT

Recent alleged uses of chemical weapons in Syria and Iraq have led to a renewed interest in the topic. The starting point for modern chemical warfare is World War I, of which much has been written. Interestingly, many of the cases of chemical warfare after that war and prior to World War II are not as fully fleshed out as one might expect, since the most recent case was over seventy-five years ago. This study looks at evidence on cases of chemical warfare from 1919 to 1939 to ask what we know about those cases and what remains to be answered. This period, bookended by the birth of modern chemical warfare and the widely noted pattern of non-use during World War II, was a time of uncertainty about whether and how the production and use of chemical weapons might spread. A number of cases, both those generally accepted and those more contentious, are reviewed, and a few common themes are teased out in the final section of the study. In particular, the norm against chemical weapons during these two decades appeared to be limited to the view that states would generally refrain from being the first to use chemical weapons against European, particularly possessor, states, but in other conflicts the employment of such weapons was at least considered, and occasionally carried out. Many information gaps remain, and it is hoped that the descriptions of the cases will encourage others to carry out further research.

KEYWORDS

Chemical weapons; twentieth century; norms; history

The alleged domestic use of chemical weapons (CW) by the Syrian military and by the Islamic State (IS) in Syria and Iraq, as well as Syria's joining the 1993 Chemical Weapons Convention (CWC) in 2013, has sparked a renewed interest in CW and warfare, including such questions as: who has chemical agents; why actors, including non-state actors, might choose to use such weapons; and what can be done about it.[1] Modern chemical warfare, from World War I (WWI) to today, has been infrequent but recurrent. Reviewing earlier cases of chemical warfare is instructive for two reasons. There is a tendency to focus on the more well-known use during WWI and then skip to cases after World War II (WWII). In fact, the interwar period is quite interesting: modern CW were new and not fully understood; norms of restraint were less restrictive

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[1] On the Syrian government's use of chemical weapons, see: United Nations Mission to Investigate Allegations of the Use of Chemical Weapons in the Syrian Arab Republic, "Report on the Alleged Use of Chemical Weapons in the Ghouta Area of Damascus on 21 August 2013," A/67/997–S/2013/553, <http://undocs.org/A/67/997>. On IS use of chemical weapons, see: Chris Quillen, "The Islamic State's Evolving Chemical Arsenal," *Studies in Conflict & Terrorism*, Vol. 39, No. 11 (2016), pp. 1019–30.

and established; and states that had not yet developed the capability were driven by the horrors of WWI to think about how to respond to this threat. Unfortunately, although several of these cases happened over seventy-five years ago, much is still unknown about them. That is, we cannot even *describe* some of them well. Some of these information gaps might be diminished with additional research, facilitating studies that seek to document and explain patterns across cases. Second, historical examples from this period may help us understand present cases and think about future CW threats. Between 1919 and 1939, CW were used on several occasions, most notably by Italy in Abyssinia (today's Ethiopia) and by Japan in China. It may be instructive to compare contemporary uses in Syria or Iraq with these earlier uses, for instance.

First, CW, chemical warfare, and arms control in the period ending with WWI are briefly described. Then, potential cases of chemical warfare carried out by China, France, Italy, Japan, Russia/Soviet Union, Spain, and the United Kingdom are reviewed. The article concludes by comparing and contrasting these cases and asking what continuing relevance they may have.

Chemical weapons, chemical warfare, and arms control through WWI

Chemical warfare has occurred since antiquity, and until the late eighteenth century involved poisons, poisonous substances, and basic chemicals. Examples include the use of toxic smoke in the Peloponnesian War; and "Greek fire," probably invented in the seventh century CE and credited with, among other things, saving Constantinople from invasion.[2] The modern era, from the late eighteenth century onward, with advances in chemistry and industrialization, saw the use of what are today called traditional CW—including choking, blister, blood, and nerve agents.[3]

Efforts to restrain CW parallel their development. During the Middle Ages, the use of poisoned weapons was condemned. According to John Ellis van Courtland Moon, "[b]y the end of the classical period, the prohibition against poison was a principle of customary international law."[4] After the 1648 Treaty of Westphalia, prohibitions could also be found in states' military codes of conduct and in international agreements.[5] For example, according to the Organisation for the Prohibition of Chemical Weapons (OPCW), "[t]he first international agreement limiting the use of CW dates back to 1675, when France and Germany came to an agreement, signed in Strasbourg, prohibiting the use of poison bullets."[6] The Brussels Declaration of 1874 forbade the use of poison or poisoned weapons. Fourteen nations signed the declaration, but it never entered into force.[7] The

[2] For a discussion of examples of the historical use of chemical weapons, see: Kim Coleman, *A History of Chemical Warfare* (Basingstoke: Palgrave Macmillan, 2005), pp. 5–10; Eric Croddy, *Chemical and Biological Warfare: A Comprehensive Survey for the Concerned Citizen* (New York: Copernicus Books, 2002), pp. 127–33; Adrienne Mayor, *Greek Fire, Poison Arrows, and Scorpion Bombs: Biological and Chemical Warfare in the Ancient World* (Woodstock, NY: Overlook Duckworth, 2003).

[3] OPCW, "What Is a Chemical Weapon?," Factsheet #4, November 2017, <www.opcw.org/fileadmin/OPCW/Fact_Sheets/English/Fact_Sheet_4_-_CW_types.pdf>.

[4] John Ellis van Courtland Moon, "Controlling Chemical and Biological Weapons through World War II," in Richard Dean Burns, ed., *Encyclopedia of Arms Control and Disarmament, Vol. II* (New York: Charles Scribner's, 1993), p. 657.

[5] Moon, "Controlling Chemical and Biological Weapons," p. 659.

[6] OPCW, "Origins of the Chemical Weapons Convention and the OPCW," Factsheet #1, revised 12 September 2014, p. 1, <www.opcw.org/fileadmin/OPCW/Fact_Sheets/Fact_Sheet_1_-_History.pdf>.

[7] Moon, "Controlling Chemical and Biological Weapons," p. 659.

Hague Conventions of 1899 and 1907 focused not just on poisons, but also on "the potential use of new weapons, made possible by nineteenth-century advances in synthetic chemistry."[8] Article 23 in the annex to the 1899 Convention prohibited the employment of poison or poisoned arms.[9] A separate declaration required signatories "to abstain from the use of projectiles the object of which is the diffusion of asphyxiating or deleterious gases."[10] These prohibitions were reiterated in the 1907 Convention. Thus, by WWI, arms-control measures existed, but were limited to state signatories, to interstate war, and to the use of CW, not its manufacture or stockpiling.

World War I

Chemical warfare in WWI was a historical watershed. Edward Spiers of the University of Leeds writes, "chemical warfare occurred in the Great War on a scale, and with a sustained application of scientific expertise and effort, never previously witnessed."[11] During the war, "over three thousand chemical compounds were selected and investigated from the approximately four hundred thousand known. About thirty met requirements for actual use and only six were extensively employed by Allied and Central Powers."[12] Excluding the French use of tear gas in 1914, the first major use of CW occurred at Ypres on April 22, 1915, when the Germans released chlorine gas from thousands of cylinders for the purpose of breaking the stalemate of trench warfare.

By the armistice, the lethality of chemical agents had increased through refinements in agents and the introduction of mustard gas. Dissemination also improved, progressing from static cylinders to train-mounted cylinders, as well as the United Kingdom's development of the Livens Projector, a mortar-type weapon, in 1916, followed by Germany's use of gas artillery shells. These developments created a chemical arms race between new methods to use gas or improved agents, on the one hand, and new defenses (e.g., masks) on the other.[13] "By the war's end," the OPCW notes, "some 124,200 tonnes of chlorine, mustard and other chemical agents had been released, and more than 90,000 soldiers had suffered painful deaths due to exposure to them. Close to a million more men left battlefields blind, disfigured or with debilitating injuries."[14]

The future of CW use after WWI was unclear for three reasons. First, did CW represent a fundamentally new and more lethal type of weapon, or was it simply another way to kill? Accounts from the front portrayed the horror of the enemy's use of CW, which led to a public perception that these weapons were uniquely evil. Others countered that CW were an example of how new military technologies commonly emerged out of war, and CW in particular were either more humane than traditional weapons, or at least not worse than other ways of being killed. In fact, most fatalities in WWI resulted from

[8] Ibid.
[9] Convention (II) with Respect to the Laws and Customs of War on Land and its annex: Regulations Concerning the Laws and Customs of War on Land, July 29, 1899, Article 23.
[10] Declaration (IV,2) Concerning Asphyxiating Gases, July 29, 1899. See also: Masakhiko Asada, "A Path to a Comprehensive Prohibition of the Use of Chemical Weapons under International Law: From The Hague to Damascus," *Journal of Conflict and Security Law*, Vol. 21 (Summer 2016), pp. 155–56.
[11] Edward M. Spiers, *A History of Chemical and Biological Weapons* (London: Reaktion Books, 2010), p. 27.
[12] Morris Goran, "The Myth of Poison Gas," *Scientific Monthly*, Vol. 53 (October 1941), pp. 375–76.
[13] Frederic J. Brown, *Chemical Warfare: A Study in Restraints* (New Brunswick, NJ: Transaction, 2006), pp. 3–48.
[14] OPCW, "Origins of the Chemical Weapons Convention," p. 1.

weapons other than CW. If CW were "just another weapon," they might have been expected to see more use in later conflicts.[15]

Second, the military utility of CW was also debated. Were CW decisive? Many military commentators thought not, particularly at the tactical or operational level. Additionally, the use of CW was constrained by the perception that there was something unseemly about using the weapons against professional soldiers; by states' declared policies of no first use of CW; and by the general tendency of belligerents to avoid attacking civilians with gas. Doubts over the utility of CW might have been expected to lead to less subsequent use.

Finally, what role would CW arms control play after the war? Pre-WWI arms-control agreements were viewed as ineffective. Germany, for example, contended that its use of CW at Ypres did not violate the Hague Conventions because Germany did not use banned "projectiles," but rather cylinders, which, when opened, released the CW.[16] And some military officials and political leaders felt states would simply abide by legal restrictions until they decided not to. On the other hand, Germany's reference to the Conventions suggests to some scholars that a norm against using CW was at least partially operating.[17] Arms-control efforts did continue in the 1920s, including the Washington Conference on the Limitation of Armaments in 1921—which attempted to prohibit the use of CW, although a treaty was not adopted—and the 1925 Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases, and of Bacteriological Methods of Warfare (the Geneva Protocol), which entered into force in 1928. However the treaty was limited: it was unclear exactly which weapons were prohibited; it only applied to signatories and only during war; it did not include a ban on production; it did not have a verification mechanism; and it did not preclude retaliation in kind. Many signatories included additional reservations. One does not get the impression that countries took comfort in international arms control as a source of protection. Little faith in arms control might have been expected to encourage the use of CW in future conflicts.

Alleged instances of use

This section examines cases of known or suspected CW use between 1919 and 1939.[18] Cases are organized alphabetically by the initiating country. An important limitation of

[15] See for example Brown, *Chemical Warfare*, especially Chapters 2 and 3; Richard Arnold Garnett, "Restraint in Warfare: Strategic Bombing and Chemical Warfare during the First and Second World Wars," PhD diss., University of North Carolina at Chapel Hill, 1993; Christopher A. Warren, "An International Red Line," *Quarterly Journal of Military History*, Vol. 26 (Winter 2014), pp. 40–43; Thomas Faith, "It Would Be Very Well if We Could Avoid It: General Pershing and Chemical Warfare," *The Historian*, Vol. 78 (Fall 2016), pp. 469–85.

[16] Moon, "Controlling Chemical and Biological Weapons," p. 664. See also: Asada, "A Path to a Comprehensive Prohibition," p. 156.

[17] Richard Price, "A Genealogy of the Chemical Weapons Taboo," *International Organization*, Vol. 49 (Winter 1995), pp. 73–103.

[18] One possible case was not included, as only one secondary source of information could be located. This is the case of Afghanistan in 1928–29. The Soviet Union was supporting King Amanullah Khan with arms. In 1928, a revolt broke out against Khan's rule. Faced with this threat, the government requested CW and the Soviets agreed to provide 1,000 chemical rounds. A second request was made for chemical bombs for the Afghan air force. The Soviets responded that they "had no chemical bombs and so could not send any; in their place the Afghans could drop chemical artillery rounds from aircraft." Documentation of these requests is drawn from 1928 Politburo protocols (minutes) held in the Russian State Archive of Socio-Political History (RGASPI). David R. Stone, "Soviet Arms Exports in the 1920s,"

this study is the state of evidence concerning chemical warfare during this era; the available information is sometimes spotty, inconclusive, or contradictory. Most of the material presented here comes from secondary sources, with some archival documents and a few eyewitness reports. Moreover, in some cases, what appear to be several separate sources are in fact several scholars citing the same underlying source, which might mistakenly be taken for corroboration. For each case, the participants and conflict dates are identified, and the conflict is briefly described. Key questions asked, if not always answered, include: Did the attacker clearly have the capability to use CW, and, if so, where did that capability originate? Did the attacker use CW, and, if so, what agents were used and how were they disseminated?

China

Chinese warlords may have obtained and employed CW during fighting in the 1920s.[19] Four warlords were particularly noteworthy: Zhao Hengti, Cao Kun, Feng Yuxiang, and Zhang Zuolin. Their CW capabilities came from imports or limited indigenous production. One of the first examples of a warlord's acquiring CW reportedly occurred in the summer of 1921, when Zhao Hengti received "two cases of gas-producing shells weighing 5,000 pounds from the Wah Chang Trading Company."[20] However, the source of those shells remains unspecified, and several countries were implicated in selling CW to various Chinese factions.

According to a variety of contemporaneous news accounts, the Soviet Union, Germany, the United Kingdom, France, and even an American citizen were all suggested as possible sources of CW. One newspaper account in 1928, for example, claimed that the Soviets shipped 10,000 chemical shells from Vladivostok to Guangzhou in 1926.[21] Feng, in particular, may have received Soviet materiel. At a minimum, he wanted Soviet CW.[22] Documents seized from the Soviet Embassy in Beijing suggested that chemical shells and gas masks had been delivered to Feng's forces.[23]

Germany was also alleged to have provided materiel or experts, according to several newspaper articles written between 1925 and 1930.[24] A newspaper article from July 1925, for example, mentions an exchange among British officials in London, in which Secretary of State for War Sir Laming Worthington-Evans stated "that he had information that Chinese militarists had introduced into China German chemists for the purpose of

Journal of Contemporary History, Vol. 48 (January 2013), p. 66. Whether Soviet arms were sent and whether they included CW is unclear.

[19] Anthony B. Chan, *Arming the Chinese: The Western Armaments Trade in Warlord China, 1920-28*, 2nd edn. (Vancouver: University of British Columbia Press, 2010). Hsi-Sheng Ch'i, *Warlord Politics in China 1916–1928* (Stanford, CA: Stanford University Press, 1976), has one reference to warlords having access to "poisonous gas" (p. 118), which seems more representative of the difficulty of finding English-language information on CW in China during this era.

[20] Chan, *Arming the Chinese*, p. 116.

[21] J.A.J., "The Futility of the Arms Embargo," *China Weekly Review*, February 11, 1928, p. 268.

[22] Stone, reviewing archival documents, notes that the Soviets discussed sending Feng chemical weapons in September 1925 and specifically mentions that Feng was scheduled to receive 15,000 poison gas shells, but it is unclear if any of this materiel arrived. Stone, "Soviet Arms Exports in the 1920s," pp. 70, 72.

[23] "Soviet's Peking Spies: Elaborate System of Espionage in the Legations; Lists of Callers and Guests at Dinner Parties; Searches for Secret Documents," *The North – China Herald and Supreme Court & Consular Gazette*, April 30, 1927, p. 194.

[24] According to Rodriguez, the German Foreign Office was very sensitive to reports in the Chinese media regarding German advisors in China and in particular reporting related to chemical weapons. Robyn L. Rodriguez, "Journey to the East: The German Military Mission in China, 1927–1938," PhD diss., Ohio State University, 2011, p. 94.

manufacturing poison gas."[25] However, a few months later, the Secretary of State specifically denied that assertion, based at least in part on a denial from the German government.[26] Another article rumored that Germans visited China in January 1928 for the purposes of developing chlorine gas.[27] Later still, one rumor had it that Germany was shipping gas bombs to China for Jiang Jieshi (Chiang Kai-shek) in 1930, after he had recently become head of the Nationalist forces.[28]

The British may have also provided CW. On June 2, 1923, according to one account, agents of Cao Kun approached "Woolen, Vosy and Company—a firm of British Chemists in Tianjin's French concession. They wanted to ascertain the feasibility of purchasing large bombs filled with poisonous gas."[29] France was another possible source. Tang Jiyao, a warlord in Yunnan Province, allegedly contacted France about supplying "rifles, ammunition and chemical for war purposes" in 1923.[30] Finally, an interesting case concerned an American, Lawrence D. Kearny, who attempted to sell Russian arms to the Chinese and was subsequently charged in the US Court for China in 1923 (*United States* v. *Kearny*) for violating Sino-American treaties regarding arms sales. During testimony reported in the Chinese press, one witness alleged that Kearny proposed that Russian chemists and aviators would drop gas bombs on Shanghai.[31]

Other warlords attempted to make their own CW with foreign assistance. Feng Yuxiang possibly employed German and Soviet chemists to develop and manufacture CW.[32] It speaks to his intentions that Feng established a Chemical Research Society by 1928 to study chemical warfare, according to the Ta Chung News Agency.[33] But in 1929, he denied he intended to construct poison-gas plants.[34]

Zhang Zuolin seems to have been the most dogged in his attempts to acquire CW. In 1925, a German contractor, Witte, completed construction of a chemical plant in Shenyang, where Zhang employed German chemists and at least one Russian to manage production of chlorine, phosgene, and mustard gas. In 1927, a Norwegian firm shipped chemical equipment to the arsenal, enabling "extensive production" of chemical bombs.[35] Prior to this, in 1924, Zhang, in an interview with *Chicago Daily News* foreign correspondent Junius B. Wood, admitted to being "armed to the teeth," and Wood wrote that gas chemists were among those "either training the troops or advising in the manufacture of munitions of war."[36]

[25] "Chinese Making Poison Gas: British Official Information; Foreign Chemists Specially Brought in," *The North – China Herald and Supreme Court & Consular Gazette*, July 18, 1925, p. 29.
[26] Reuters, "No Germans Engaged to Produce Poison Gas for War Here," *China Press*, February 25, 1926, p. 6.
[27] "Chemical Warfare in China," *China Press*, May 8, 1930, p. 12.
[28] "Poison Gas for China?" *The North – China Herald and Supreme Court & Consular Gazette*, March 11, 1930, p. 380.
[29] Chan, *Arming the Chinese*, p. 115. See also: "Frightfulness in China," *The North – China Herald and Supreme Court & Consular Gazette*, June 16, 1923, p. 720. The article claimed that two Chinese had "been making inquiries in the British Concession there [in Tientsin] for poison gas or the means to manufacture it."
[30] "Appointment of Gen. Shen as Tuli: Alleged Importation of Arms from France," *The North – China Herald and Supreme Court & Consular Gazette*, April 7, 1923, p. 16.
[31] "Astounding Story in the Kearny Case: Witness's Allegations of Proposed Sack of Shanghai and the Poisoning of Its Inhabitants by Gas Bombs; Ex-employee's Tale of the Plot," *The North – China Herald and Supreme Court & Consular Gazette*, October 13, 1923, p. 128.
[32] Chan, *Arming the Chinese*, p. 116.
[33] Ta Chung News Agency. "Chemical Warfare," in "Brevities: Local and General," *T China Press*, 6 April 1928, p. 13.
[34] "Feng Yu-hsiang Denies Construction of War-Gas Plants in Shensi." *China Weekly Review*, January 19, 1929, p. 346.
[35] Chan, *Arming the Chinese*, p. 116.
[36] "Prospects of General War in China," *China Weekly Review*, March 8, 1924, p. 64.

What little evidence there is that any warlords actually used CW also comes from newspaper accounts containing accusations of CW use or reports of the procurement of gas masks (from which one may infer that there was at least a fear of use). One newspaper account, for example, mentions that troops were affected by gas shells on October 28, 1924. The type of chemicals used was not named, but the article notes that gas masks were issued to the troops, which suggests an asphyxiating gas.[37] A second example involves Zhang's Fengtian army dropping gas bombs on troops of Wu Peifu, reportedly sometime during 1924 or 1925.[38] Reuters published a possibly related news article, "Wu Pei-fu Wants Gas Masks," on September 15, 1924.[39] Finally, another news article notes that Fengtian forces fired gas shells at the town of Choazhou, as it was then known, during a siege there from late 1927 into the beginning of 1928.[40] The use occurred in late 1927, and at least one news report at the time contradicts the earlier example of CW use by claiming, "As far as is known, this is the first time poison gas has been used Chinese warfare."[41] Zhang Zuolin denied using gas in the attack.[42] Thus, there is little evidence about which agents were used, beyond choking agents, and two dissemination methods—bombs dropped from planes and artillery shells.

France

France produced and used CW during WWI and maintained that capability afterward. During the interwar period, France was involved in four conflicts: the Franco-Turkish War (1919–21), the Franco-Syrian War (1920), the Rif Rebellion (1921–26), and the Franco-Druze War, also known as the Druze Rebellion (1925–27). Of these, there is only limited and contradictory evidence that the French employed CW in one case: the Rif Rebellion.

The Rif Rebellion involved the Berber population in the Rif region of northern Morocco, then under the control of the Spanish and French. The Rif Berbers rebelled against Spanish control in 1921 and attacked the French in Morocco in 1925. While France had the capability to produce CW since WWI, evidence that it used CW against the Rif is limited. According to one source, the French used gas during 1925 on the northern front around Fez.[43] Among scholars who believe that the French used CW, one has identified the chemical agent as mustard gas.[44] Information on the dissemination method is lacking. However, other authors have assessed that the French did not use CW.[45] One strenuous objection came from French General Gaston Vidal, who, responding to a June 1925 article in the *Washington Post* criticizing the efficacy of the French Air Force in Morocco, opined, "As concerns the clouds of asphyxiating gas, France does not want to transfer into Africa

[37] Harry Strachan, "The War Seen from Mukden: What the Communiques Really Can Do with Tales of Victory," *The North – China Herald and Supreme Court & Consular Gazette*, November 15, 1924, p. 268.
[38] Chan, *Arming the Chinese*, p. 116.
[39] Reuter, "Wu Pei-fu Wants Gas Masks," September 15, 1924, in "The Fight For Shanghai," *South China Morning Post*, September 16, 1924, p. 9.
[40] "Poison Gas Now Used," *The North – China Herald and Supreme Court & Consular Gazette*, February 25, 1928, p. 290.
[41] *Chicago Tribune*, "Charge Change Used Gas," *New York Times*, November 25, 1927, p. 32.
[42] "Siege of Chochow," *South China Morning Post*, December 28, 1927, p. 10
[43] "Marshall Petain's Visit to the Front," *The Times*, July 22, 1925, p. 14, cited in Julian Perry Robinson and Milton Leitenberg, "Volume 1: The Rise of CB Weapons," in Stockholm International Peace Research Institute, *The Problem of Chemical and Biological Warfare* (Uppsala: Almqvist & Wiksell, 1971) p. 142.
[44] Martin Thomas, *Fight or Flight: Britain, France, and their Roads from Empire* (Oxford: Oxford University Press, 2014), p. 30.
[45] For example, Sebastian Balfour, *Deadly Embrace: Morocco and the Road to the Spanish Civil War* (Oxford: Oxford University Press, 2002), especially Chapter 5.

such methods of warfare."[46] Additional evidence would be helpful in assessing whether French actions during the conflict included CW use.

Italy

During the interwar period, Italy was involved in two conflicts that saw the use of CW: in Libya and in Abyssinia. According to some accounts, 1924 was an important year for Italy's CW program, as "the Italians established the Centro Chemico Militaire, a unified chemical warfare service and began production of chemical agents."[47]

Italy invaded Libya—at the time part of the Ottoman Empire—in 1911, though it took until 1932 for the Italian military to quash all resistance. During part of this time, probably in the period after 1923, when Fascist Italy renewed its efforts against Libyan resistance, the Italian military appears to have used CW in Libya.[48] However, the dates of use—sometime between 1923 and 1930—and types of CW used remain muddled. One source, for example, claims that Italy bombed and shelled Libyans in 1923–24 and again in 1927–28 with phosgene and mustard gas.[49] Other sources generally overlap on some of the dates. Brian Sullivan of Columbia University suggests that the Italian Air Force employed gas against the Libyans in 1924, and also mentions the presence of mustard gas in the conflict as early as 1926. John Gooch of the University of Leeds mentions an attack on January 6, 1928, when four Ca.73 aircraft dropped gas bombs in Libya.[50] Other authors, such as Jim Davis, former deputy director of the US Air Force Counterproliferation Center, suggest chemical warfare occurred in 1930. Davis writes, "Italy dropped 24 mustard gas bombs on an oasis in 1930 fighting Libyan rebels."[51] Sullivan also suggests that the Italian Air Force employed gas in 1930.[52] There seems to be more of a consensus over the CW—phosgene and mustard gas—and the dissemination method—aircraft.

The second case of Italian use of CW occurred when Italy invaded Abyssinia (Ethiopia) in 1935.[53] Authors have suggested that the generals on the ground—Pietro Badoglio, who

[46] Gaston Vidal, "Air Fighting in Morocco," *Washington Post*, July 22, 1925, p. 6.
[47] Jeffrey Smart, "History of Chemical and Biological Warfare: An American Perspective," in Frederick R. Sidell, Ernest T. Takafuji, and David R. Franz, eds., *Medical Aspects of Chemical and Biological Warfare* (Washington, DC: Office of the Surgeon General, 1997), p. 29.
[48] Angelo Del Boca, "The Myths, Suppressions, Denials, and Defaults of Italian Colonialism," in Patrizia Palumbo, ed., *Place in the Sun: Africa in Italian Colonial Culture from Post-unification to the Present* (Berkeley: University of California Press, 2003), pp. 17–36; Giulia Brogini Kunzi, "Total Colonial Warfare: Ethiopia," in Roger Chickering and Stig Forster, eds., *The Shadows of Total War: Europe, East Asia, and the United States, 1919–1939* (Cambridge: Cambridge University Press, 2003), p. 323.
[49] Balfour, *Deadly Embrace*, p. 128.
[50] Brian R. Sullivan, "A Thirst for Glory: Mussolini, the Italian Military and the Fascist Regime, 1922–1936," PhD diss., Columbia University, 1984, pp. 233, 237–38; John Gooch. "Re-conquest and Suppression: Fascist Italy's Pacification of Libya and Ethiopia, 1922–39," *Journal of Strategic Studies*, Vol. 28 (December 2005), p. 1011.
[51] Jim A. Davis, "A Biological Warfare Wakeup Call: Prevalent Myths and Likely Scenarios," in Jim A. Davis and Barry R. Schneider, eds., *The Gathering Biological Warfare Storm*, 2nd edn. (Maxwell Air Force Base, AL: USAF Counterproliferation Center, 2002), p. 300.
[52] Sullivan, "A Thirst for Glory," p. 247. However, possibly contradictory evidence is offered by Paoletti, who seems to suggest that the Italian Air Force did not use poison gas after 1929. Ciro Paoletti, *A Military History of Italy* (Westport, CT: Praeger Security International, 2008), p. 158.
[53] For example, Robinson and Leitenberg, "Volume 1: The Rise of CB Weapons"; Croddy, *Chemical and Biological Warfare*; Edward M. Spiers, *Chemical Warfare* (Urbana: University of Illinois Press, 1986); Edward M. Spiers, *Chemical Weaponry: A Continuing Challenge* (New York: St. Martin's Press, 1989); Victor A. Utgoff, *The Challenge of Chemical Weapons: An American Perspective* (New York: St. Martin's Press, 1991); Coleman, *A History of Chemical Warfare*; Alberto Sbacchi, "Poison Gas and Atrocities in the Italo-Ethiopian War (1935–1936)," in Ruth Ben-Ghiat and Mia Fuller, eds., *Italian Colonialism* (New York: Palgrave Macmillan, 2005), pp. 47–56.

had command of about three-fourths of the troops, focused on the Eritrean and Somali fronts, and Rodolfo Graziani, who commanded the remaining troops in Mogadishu—found the use of CW acceptable, as did Benito Mussolini.[54] Further, the plan to use gas was decided as early as the spring of 1934.[55]

According to Julian Perry Robinson and Milton Leitenberg, based on Soviet sources, the Italians "brought about 700 tons of CW agents into Ethiopia during the war, of which 60 percent were vesicants and 40 percent asphyxiants."[56] Giorgio Rochat, cited by Giulia Brogini Kunzi, "calculated that before January 1936 about 300 tons of mustard gas were used on the northern front. On the southern front, 30,500 kilograms of mustard gas and 13,300 kilograms of phosgene were put to use."[57] Spiers and Eric Croddy note how the Italians escalated CW use: the Italians first used lachrymators or tear gas, but were unable to create high concentrations of the agent. Similarly, asphyxiants also had problems because they were not so persistent. Thus, the Italians turned to mustard gas, which lasted longer, and used airplanes because they could.[58] Lina Grip and John Hart note that sulfur mustard was very effective because the Ethiopians' attire, which included sandals or going barefoot, meant that their skin was more exposed to the agent.[59]

According to Ethiopian government reporting, the Italians employed CW in December 1935, attacking about a dozen Ethiopian towns.[60] The date of first use is debatable, however, one scholar proposing an earlier date of October 10, 1935.[61] The goal was "to contaminate areas that would have to be traversed in order to attack the flanks of Italian columns, to disrupt the operations of important Abyssinian communication centres; and to raise casualties among defeated Abyssinian forces in the hope of demoralizing the troops and turning retreats into routs."[62]

According to Croddy, the memory of Italy's experiences of being attacked by Germany with chemical agents during WWI "served to intensify a keen interest in CW by the Italian military."[63] Major Norman Fiske, an observer with the Italian army, thought the use of CW was "nothing more than an experiment," a view echoed by others.[64] In addition, gas was thought to offer Mussolini a quick victory prior to the start of the rainy season, to show Italy was strong, and to get in and out before anyone responded with international sanctions. The Italians claimed they were using gas in retaliation for the barbaric treatment of Italian prisoners of war and the use of dum-dum bullets by the Ethiopians.[65]

[54] Kunzi, "Total Colonial Warfare," p. 323. Denis Mack Smith, *Mussolini* (London: Paladin, 1983), pp. 231–32.
[55] Kunzi, "Total Colonial Warfare." Walter J. Eddington speculated in an article in the *Washington Post* in August 1935 that the Italians had equipped its army with poison-gas bombs and chemicals. Walter J. Eddington, "Great Military Machine Ready in Eritrea for an African War," *Washington Post*, August 25, 1935, p. B9.
[56] Robinson and Leitenberg, "Volume 1: The Rise of CB Weapons," p. 143.
[57] Rochat, *Militari*, doc. No. 29, 378, cited in Kunzi, "Total Colonial Warfare," p. 324. See also: Sbacchi, "Poison Gas," for estimates of how many CW were used. While there are differences among authors, all suggest that the amount was in the hundreds of tons.
[58] Spiers, *Chemical Weaponry*; see also Croddy, *Chemical and Biological Warfare*.
[59] Lina Grip and John Hart, *The Use of Chemical Weapons in the 1935–36 Italo-Ethiopian War*, (Stockholm: SIPRI Arms Control and Non-proliferation Programme, 2009), p. 2.
[60] Grip and Hart, *The Use of Chemical Weapons*, p. 4.
[61] Sbacchi, "Poison Gas," p. 49.
[62] Utgoff, *The Challenge of Chemical Weapons*, p. 27. Grip and Hart, *The Use of Chemical Weapons* and Coleman, *A History of Chemical Warfare* also support this view.
[63] Croddy, *Chemical and Biological Warfare*, p. 153.
[64] Cited in Coleman, *A History of Chemical Warfare*, p. 47. See also: Robinson and Leitenberg, "Volume 1: The Rise of CB Weapons," p. 145; Kunzi, "Total Colonial Warfare," p. 322.
[65] Sbacchi, "Poison Gas," pp. 49–50. Or else that the Ethiopians were the ones using gas. See Smith, *Mussolini*, pp. 231–32.

Japan

The first known case of CW use by Japan occurred in Formosa (now Taiwan) in 1930. Japan had occupied the island in 1895, but was faced with an insurgency. In the Wushe region, local citizens had massacred Japanese nationals; the Japanese responded by attacking the rebels. Japan became interested in CW around the end of WWI, and the Japanese were producing chemical agents as early as 1929.[66] Japan is said to have used CW to quell the uprising. The agent used was possibly tear gas, but could have been something deadlier.[67]

The better-known, second case involves the Japanese invasion of China in 1937, when the Japanese almost immediately authorized the use of tear gas against the Chinese.[68] Between 1931 and 1945, Japan produced over 7,000 tons of a range of agents and filled over seven million shells and rockets. It seems clear that Japan used CW in China between 1937 and 1945. This included tear gas, vomiting agents, phosgene, diphosgene, chloropicrin, hydrogen cyanide, mustard gas, and lewisite.[69] Japan started with less lethal agents, but moved on to more lethal ones over time: from tear gas in 1937 to vomiting agents in 1938, and then to blistering agents in 1939.[70] From summer 1939 onward, Japan used mustard gas. The weapons included bombs dropped from aircraft, artillery shells, and toxic candles that released an irritant when lit. Interestingly, Robinson and Leitenberg note that the Japanese experience, similar to Italy's, may also have been at least partially a case of "technical field trials of experimental weapons."[71] Ping Bu, drawing on a review of multiple sources, suggests that over 2,000 chemical attacks were carried out.[72]

Japan's use of CW is particularly interesting because Japan did not have the same set of experiences as the Western powers during WWI. Victor Utgoff writes, "The Japanese certainly felt few objective restraints against the use of chemicals."[73] At the time of the attack, Japan did not expect retaliation in kind from China or its allies. The Japanese "employed chemical weapons in part because they wanted a better understanding of their potential usefulness on the battlefield."[74] Bu concurs: "On occasion, the Japanese even carried out chemical warfare experiments on the battlefield."[75] One legacy of this use are the hundreds of thousands of abandoned CW in China that are currently being destroyed by the Japanese under the terms of the CWC.[76]

Russia/Soviet Union

By the conclusion of WWI, Russia was in turmoil. An initial revolution in the spring of 1917 had been followed by a second revolution in November, led by Vladimir Lenin.

[66] Ping Bu, "A Research Report on Japanese Use of Chemical Weapons during the Second World War," *Journal of Modern Chinese History*, Vol. 1 (2007), pp. 155–72.
[67] Croddy, *Chemical and Biological Warfare*, p. 152; Rod Thorton, "Wushe Incident," in Eric Croddy, James Wirtz, and Jeffrey Larsen, eds., *Weapons of Mass Destruction: An Encyclopedia of Worldwide Policy, Technology, and History; Volume I: Chemical and Biological Weapons* (Santa Barbara, CA: ABC-CLIO, 2005), p. 334.
[68] Ping Bu, "A Research Report," pp. 155–72.
[69] Robinson and Leitenberg, "Volume 1: The Rise of CB Weapons," p. 147.
[70] Spiers, *Chemical Warfare*, pp. 99-102; Ping, "A Research Report on Japanese Use."
[71] Robinson and Leitenberg, "Volume 1: The Rise of CB Weapons," p. 150.
[72] Bu, "A Research Report on Japanese Use."
[73] Utgoff, *The Challenge of Chemical Weapons*, p. 29.
[74] Ibid.
[75] Ping, "A Research Report on Japanese Use," p. 165.
[76] Mike Brombach, *Abandoned Chemical Weapons in China: The Unresolved Japanese Legacy* (Washington: Global Green USA, 2011). See also the Japanese Abandoned Chemical Weapons Office website: <wwwa.cao.go.jp/acw/index-e.html>.

This revolution was followed by a civil war that lasted until 1920. Some authors claim that CW were used by one side or the other during the civil war. According to Alexander Bobkov, "Recently new, or more correctly 'well forgotten old' testimony has come to light, making it possible to state that artillery firing with chemical shells in Civil War battles was a common occurrence. Gas munitions were used by all sides taking part in the conflict, on all fronts, and whenever convenient."[77]

An infamous case, though also in some doubt, concerns the 1921 rebellion against the Bolsheviks in Tambov Province.[78] The Soviet Red Army responded with troops under General Mikhail Tukhachevsky, who apparently favored the use of poison gas against the Tambov rebels.[79] Archived telegrams showed a request for 2,000 chemical shells and 250 chemical balloons. The former probably contained chloropicrin, while the latter probably contained chlorine.[80] Whether gas was actually used is less clear.[81]

There may be additional examples of Soviet chemical warfare. There is some evidence that the Soviets may have contemplated using CW against China in the Sino-Soviet war of 1929. One newspaper account prior to the outbreak of hostilities noted that the Soviets were moving trainloads of materiel, including "poison gas apparatus," according to an unidentified source. The source went on to compare the Soviet and Chinese troops, saying the biggest difference was "in the use of poison gas. The Soviet troops are equipped with most modern gas outfits and the Chinese have no protection whatever. Poison gas combined with armoured cars and machine guns should prove one of the decisive, if not the decisive, factor in a summer campaign, should war actually break out."[82] A second article, describing a Soviet offensive in November, also noted that at least some Soviet units were equipped with poison gas.[83]

Second, Jonathan B. Tucker mentions that "Soviet forces [used CW] against Muslim insurgents in Central Asia in 1934."[84] This may refer to Soviet efforts to suppress the Basmachi Revolt, centered in the Ferghana Valley. Finally, during the Manchukuo frontier clash in 1936, Japan accused the Outer Mongolians of using gas, presumably from the Soviet Union, though the Soviets denied this.[85] All of the alleged cases of Soviet use after the Tambov incident would benefit from further investigation.

[77] Alexander Bobkov, "On the Issue of Using Asphyxiating Gas in the Suppression of the Tambov Uprising," *Journal of Slavic Military Studies*, Vol. 25 (2012), p. 103. See also: Lev Aleksandrovich Fedorov, *Chemical Weapons in Russia: History, Ecology, Politics* [*Khimicheskoye Oruzhiye V Rossii: Istoriya, Ekologiya, Politika*], Moscow: Center of Ecological Policy of Russia 1994. Krause and Mallory mention the threatened use of chemical shells against rebels in Yaroslavl in 1918 and a contingency plan was apparently drawn up for attacking Kronstadt if conventional munitions failed to take the fortress. See: Joachim Krause and Charles K. Mallory, *Chemical Weapons in Soviet Military Doctrine* (Boulder, CO: Westview Press, 1992).

[78] Seth Singleton, "The Tambov Revolt (1920–1921)," *Slavic Review*, Vol. 25 (September 1966), pp. 497–512.

[79] Croddy, *Chemical and Biological Warfare*. Bobkov argues that the idea to use gas may not have originated with Tukhachevsky ("On the Issue of Using Asphyxiating Gas," p. 67, footnote 7).

[80] Bobkov, "On the Issue of Using Asphyxiating Gas," pp. 69, 72, 75.

[81] Bobkov identifies a handful of instances where gas was or may have been used. Bobkov, "On the Issue of Using Asphyxiating Gas." See also: V. Danilov and T. Shanin, *Kresyanskoe vosstanie v Tambovskoi gubernii v 1919–1921* (Tambov: "Redakt͡sionno-izdatel'skiĭ otdel," 1994), cited in Stephane Courtois, Nicolas Werth, Jean-Louis Panne, Andrej Paczkowski, Karel Bartosek, and Jean-Louis Margolin, *The Black Book of Communism: Crimes, Terror, Repression* (Cambridge, MA: Harvard University Press, 1999), p. 767, footnote 1. See also: Croddy, *Chemical and Biological Warfare*, p. 151.

[82] Anonymous, "Troop Movements on the Frontier," *The North – China Herald and Supreme Court & Consular Gazette*, July 27, 1929, p. 122. See also Reuters, "A Russian Attack: Use of Poison Gas against Chinese Troops," *South China Morning Post*, July 23, 1929, p. 10, with allegations of Soviet use.

[83] Kuo Min News Agency. "Major Attack Is Launched by Russians at Chalanor: Furious Offensive Is Begun Suddenly on Western Front," *China Press*, November 19, 1929, p. 1.

[84] Tucker, "From Arms Race to Abolition," p. 172.

[85] Reuters, "Japan and Russia: More Recrimination on Border Combat," *South China Morning Post*, April 4, 1936, p. 15; United Press, "Soviet Indignant: Deny the Use of Poison Gas Moscow," *South China Morning Post*, April 6, 1936, p.16.

Spain

Spain became interested in CW as early as 1918, and pursued their acquisition or development with both Germany and France. By the early 1920s, both countries were helping Spain produce its own weapons. In addition, Spain apparently purchased CW bombs from Germany, which also helped Spain build two CW factories. [86] In July 1921, the Rif Berbers in Morocco subjected Spain to "a devastating defeat in the Battle of Annual."[87] This battle marked a turning point for the Spanish, who began to consider aerial bombardment and the use of CW as justified.[88] The timing of the start of CW use is unclear. Spiers suggests November 1921.[89] The Spanish fired shells with phosgene and chloropicrin. Sebastian Balfour, however, attributes this claim to French reports, and notes that he was unable to find corroborating evidence in Spanish archives.[90] Then, according to Spiers, in 1923, the Spanish Air Force dropped "toxic bombs."[91] They reportedly used mustard-gas shells in July 1923, and by June 1924 the Spanish Air Force was dropping mustard-gas bombs. Robinson and Leitenberg write that the Spanish dropped mustard-gas bombs from aircraft in the spring of 1925.[92] Thus, it appears, that for most of the conflict, the Spanish were employing CW, including, toward the end, mustard gas from aircraft.

It is unclear if any CW were used during the Spanish Civil War (1936–39). Robinson and Leitenberg discuss this issue and conclude that, while there are many reports suggesting CW use in the war, all but one of these remains unproven. In 1936, one report mentioned the government's use of artillery to launch tear-gas shells against insurgent forces.[93] Perhaps additional evidence will surface that might strengthen the case for additional CW uses.

United Kingdom

According to Spiers, after WWI, "[t]he defeat of the German and Ottoman empires had led to an increase in Britain's imperial responsibilities at a time when she was demobilizing her forces and reducing her garrison in India. Faced with growing commitments in Ireland, [then-Secretary of State Winston] Churchill and his military advisors looked to technology in the form of air power and poison gas as partial substitutes for manpower in imperial policing."[94]

Three alleged cases of British CW use stand out, though the United Kingdom probably only used it in one case. Several authors claim that the British used CW against the Bolsheviks

[86] Balfour, *Deadly Embrace*. See also: Sebastian Balfour, "Chemical Warfare in the 1920s & 30s," *History Today*, Vol. 52 (June 2002), pp. 2–3; Maria Rosa de Madariaga and Carlos Lazaro Avilla, "La Guerra Quimica en el Rif (1921–1927): Estado de la Cuestion [The chemical war in the Rif (1921–1927): state of the question]" *Historia*, Vol. 16 (April 2003), pp. 50–87; Albert Presas i Puig, "Technoscientific Synergies between Germany and Spain in the Twentieth Century: Continuity amid Radical Change," *Technology and Culture*, Vol. 51 (January 2010), pp. 84–86; Friedrich Schuler, *Secret Wars and Secret Policies in the Americas, 1842–1929*, (Albuquerque: University of New Mexico Press, 2011), pp. 389–92.

[87] Anna Chotzen, "Beyond Bounds: Morocco's Rif War and the Limits of International Law," *Humanity*, Vol. 5 (Spring 2014), p. 40.

[88] Chotzen, "Beyond Bounds," pp. 33–54. See also: Balfour, *Deadly Embrace*.

[89] Spiers, *A History of Chemical and Biological Weapons*, p. 72.

[90] Balfour, *Deadly Embrace*, pp. 133–34.

[91] Spiers, *A History of Chemical and Biological Weapons*, p. 72.

[92] Robinson and Leitenberg, "Volume 1: The Rise of CB Weapons," p. 142.

[93] Ibid., pp. 146–47.

[94] Spiers, *A History of Chemical and Biological Weapons,* p. 70.

in Russia.[95] Simon Jones, former curator of the King's Regiment Collection at the National Museums and Galleries on Merseyside, notes that the "British occupation of Murmansk in March 1918 and Archangel in August to prevent military stores falling into German possession was by early 1919 an overt anti-Bolshevik intervention in the Russian civil war."[96] Churchill intended to use gas and went so far as to imply, inaccurately, that the Bolsheviks had already done so, thereby justifying the British response as retaliation in kind.[97]

At the end of WWI, the British had developed a smoke generator that released Adamsite, called the M Device.[98] Adamsite is an arsenical irritant or sternutator, whose symptoms may include irritation of the eyes, sneezing, coughing, and vomiting. WWI ended before the British were able to use the M Device. "It is, perhaps, no surprise then that the first opportunity that presented itself was used to test this new device."[99] Churchill favored the use of gas and thought it an ideal way to deal with the Red Army.[100] Fifty thousand M Devices were shipped to Archangel.[101] During the summer of 1919, the British experimented with dropping the bombs from aircraft and the M Device was modified for this purpose.[102] According to Jones, the first definite use of the M Device occurred on August 27, 1919, when the Royal Air Force (RAF) dropped at least 100 bombs against the Red Army in the Archangel area.[103] "Eight attacks were launched between 27 August and 2 September 1919 at three target sites," involving 361 bombs.[104] Subsequent attacks on September 4 on two locations involved a further 198 bombs.[105] In early September, some of the M Devices were sent to British forces in Murmansk and several bombs were dropped on Red Army forces. A bombing attack on September 15 was the last recorded use of the M Device, according to Jones, who noted that on "the night of 17–18 September, the remaining 47,000 M Devices were dumped in the White Sea."[106]

At the onset of the 1920s, the British also faced challenges in the northwest area of India and Afghanistan and in the Middle East. It has been suggested by several authors that the British may have used CW in Afghanistan.[107] While some British leaders, such as Churchill and Brigadier-General Charles H. Foulkes, who was sent to the North-West Frontier in

[95] For example, Robinson and Leitenberg, "Volume 1: The Rise of CB Weapons;" Spiers, *Chemical Weaponry*; Simon Jones, "'The Right Medicine for the Bolshevist': British Air-Dropped Chemical Weapons in North Russia, 1919," *Imperial War Museum Review*, Vol. 12 (1999), pp. 78–88; R. M. Douglas, "Did Britain Use Chemical Weapons in Mandatory Iraq?" *Journal of Modern History*, Vol. 81 (December 2009), pp. 859–87.

[96] Jones, "'The Right Medicine,'" p. 80.

[97] Ibid.

[98] Krause and Mallory, *Chemical Weapons in Soviet Military Doctrine*. Jones, "'The Right Medicine,'" says that the British were aware of the chemical agent by 1917, when they encountered German Blue Cross shells filled with DA (diphenychloroarsine). The British experimented with the chemical. In May 1918, they discovered that DM (diphenylaminochloroarsine or Adamsite) was more effective and easier to manufacture. The smoke from burning led to incapacitation. Major-General Charles Foulkes, director of Gas Services, planned to use hundreds of thousands of devices against Germany, but the war ended before the British could manufacture that many.

[99] Krause and Mallory, *Chemical Weapons in Soviet Military Doctrine,* p. 30.

[100] Giles Milton, *Russian Roulette: How British Spies Thwarted Lenin's Plot for Global Revolution* (New York: Bloomsbury Press, 2013), p. 252.

[101] Jones, "The Right Medicine," p. 81.

[102] Ibid., pp. 82–83.

[103] Ibid., p. 83. See also: Robinson and Leitenberg, "Volume 1: The Rise of CB Weapons"; Milton, *Russian Roulette*, p. 253.

[104] Spiers, *Chemical Weaponry*, p. 83.

[105] Jones, "The Right Medicine," describes each use and the number of M Devices used.

[106] Ibid., p. 86.

[107] For example, Rosenberg and Leitenberg, "Volume 1: The Rise of CB Weapons," p. 142; Valerie Adams, *Chemical Warfare, Chemical Disarmament* (Bloomington: Indiana University Press, 1990).

1919 and concluded that gas would be useful in future tribal conflicts, were in favor of using CW if expedient; others, such as the Secretary of State for India, Edwin Samuel Montagu, were less inclined.[108] By 1920, London was attempting to get gas materiel sent to India, but it is unclear if this was done: gas does not seem to have been used.[109] Balfour, to the contrary, says that the British launched mustard-gas artillery shells against Afghans in 1919; in other writings, he says the British "dropped phosgene and mustard gas against Afghans and hill tribespeople on the north-west frontier."[110] Spiers counters that there is no documentation to support the view that the RAF bombed Afghans with gas.[111] Thus, whether or not this event should be counted as a case of CW use remains unresolved.

The third case concerns the use of CW by the British in Iraq. According to Spiers, because Iraq was so far away, Churchill strove to reduce costs by using the RAF to police the area.[112] Arabs in Iraq rose up in rebellion in 1919, and in 1920 the British responded with air power, possibly including chemical agents. According to Kim Coleman, the RAF asked for permission to use CW on the rebels "as an experiment." Coleman continues that, in spite of reservations of the British Cabinet, "Eventually the go-ahead to use poison gas was given and an operation was mounted against the Iraqi rebels culminating in the collapse of the rebellion. Churchill later said the mission had an 'excellent moral effect'."[113] Balfour also cites this as a case of British CW use, including mustard-gas-filled artillery shells, during 1920–21.[114] However, scholars have recently contested this case.[115] Having surveyed the literature on this case, Douglas writes,

> In some versions, the … RAF is alleged to have dropped gas bombs from airplanes against rebellious Iraqis in the course of what was euphemistically known as "air policing." In others, the British Army is held to be the responsible party, employing gas-filled artillery shells. Similar disagreements exist about the nature of the chemical agents used, the location of the attacks, and the year or even the decade in which they took place.[116]

Douglas concludes that the evidence in favor of CW use by the British is wanting. Spiers seems to agree, suggesting that, while CW and the planes to use them existed, neither were available when the revolt erupted in 1920.[117]

Synthesis of cases and their relevance today

It is unclear how many cases of chemical warfare occurred between 1919 and 1939. Evidence is stronger for the two Italian cases, Japan in China, Russia during its civil war and shortly afterward in Tambov, Spain in the Rif, and the United Kingdom during the Russian Civil War—or seven likely uses of CW, as noted in Table 1. The other cases,

[108] Spiers, *Chemical Weaponry*, p. 83. See also: Simeon Shoul, "British Tear Gas Doctrine between the World Wars," *War in History*, Vol. 15 (2008), pp. 170–74.
[109] Spiers, *A History of Chemical and Biological Weapons,* p. 71.
[110] Compare Balfour, "Chemical Warfare," p. 2, with Balfour, *Deadly Embrace*, p. 127.
[111] Edward M. Spiers, "Gas the and the North-West Frontier," *Journal of Strategic Studies*, Vol. 6 (December 1983), pp. 94–112.
[112] Spiers, *A History of Chemical and Biological Weapons*, p. 71.
[113] Churchill Papers (CHAR) 20/16/1-3, Use of Gas in Iraq, 1919, cited in Coleman, *A History of Chemical Warfare*, p. 44.
[114] Balfour, "Chemical Warfare"; Balfour, *Deadly Embrace*.
[115] Douglas, "Did Britain Use Chemical Weapons?"
[116] Ibid., p. 859.
[117] Spiers, *A History of Chemical and Biological Weapons*, especially p. 72. Spiers implies gas shells may have been used, so this is somewhat contradictory.

Table 1. Potential incidents of chemical warfare between 1919–39

Attacker	Defender	Date	Noteworthy characteristics	Was CW used?
China	China	1920s	Several foreign powers allegedly supplied CW to the warlords.	Possibly, but only limited evidence for use.
France	Rif in Morocco	1925	Scholarship often lumps France and Spain together as using CW in this war.	Possibly, but limited and contradictory evidence.
Italy	Libya	1923–30?	CW bombs dropped from aircraft.	Probably, but unclear on some details
Italy	Abyssinia (Ethiopia)	1935–36	CW dropped and sprayed from aircraft. Aerial spraying was a novel dissemination technique.	Yes, from multiple sources.
Japan	Formosa (Taiwan)	1930	A very small incident against local insurgents	Possibly tear gas, but only limited evidence for use.
Japan	China	1937–45	Use of several different types of CW. Most experimentation with agents and dissemination of any case.	Yes, from multiple sources.
Russia/USSR	Russia	1918–20?	Bolsheviks fought White Russians in a civil war	Probably, but only limited evidence for use.
Russia/USSR	Russia	1921	Tambov rebellion	Possibly, but limited and contradictory evidence.
Russia/USSR	China	1929	Newspapers reported Soviets possessing poison gas.	Possibly, but only limited evidence for use.
Russia/USSR	Central Asia	1934	Brief mention of Soviets using CW against Muslim insurgents.	Probably, but only limited evidence for use.
Spain	Rif in Morocco	1921–26	CW dropped from aircraft	Yes, from multiple sources.
Spain	Spain	1936–39	Unclear if used during Spanish Civil War	Possibly, but limited and contradictory evidence.
United Kingdom	Russia	1919	M Device (Adamsite) against Bolsheviks. Use of aircraft.	Yes, from multiple sources.
United Kingdom	Afghanistan	1919–20	Claims of artillery and use of aircraft.	Possibly, but limited and contradictory evidence.
United Kingdom	Iraq	1919–21	Use of aircraft claimed	Probably not, but limited and contradictory evidence.

Note: because the evidence is incomplete and at times contradictory and the threshold is so low (any use of CW is chemical warfare), it is more difficult to disprove a possible case than it is to say chemical warfare possibly happened.

involving China, France, Japan in Formosa, Russian cases after 1921, Spain during the Spanish Civil War, and the United Kingdom in Afghanistan/Northwest Frontier Province and in Iraq—at least seven additional cases—are more contentious. Additional research would be helpful in clarifying these potential instances of chemical warfare.

A more important question is whether there are any lessons from the group of cases which may be relevant today. To answer this question, we can group the similarities and differences—both within the cases discussed above—and between the historical cases and the present situation into three categories—international system, state, and individual—as noted in Table 2. At the level of the international system, the cases in the 1920s and 1930s occurred mainly during colonial conflicts or internal conflicts, e.g., in Russia, excepting notably the case of Japan and China. During this era, there were fewer states and many more territories, colonies, and protectorates. Related to this, many of the conflicts during the interwar period took place on a small scale. International arms control—largely the Geneva Protocol, which banned the use of CW—was limited, as was the power of international organizations like the League of Nations. The norm against the use of CW was less widespread and less accepted.

Table 2. Comparison of characteristics of chemical warfare during the interwar years and post-WWII

	Interwar years	Post-WWII
International System	Weak international institution (League of Nations). Weaker norm against CW. Fewer states, but many colonies, where the people were not covered by already limited arms control (Geneva Protocol).	Strengthened system (UN, OPCW), norms against use, arms control (CWC), and strengthened norm of human rights. Post-WWII state building made domestic disputes interstate.
State	CW production enabled by centralized industrial base (see Spain). States, generally, used CW against colonial and insurgent populations and none of those attacked could retaliate.	More potential cases, by rogue or pariah states, mostly, (Iraq, Libya, and Syria) but validating CW uses difficult, in part due to intentional obfuscation. New concern is use by non-state actors, such as terrorists.
Individual	Need pro-CW leader (e.g., Churchill, Mussolini) and someone with scientific knowledge (e.g. Hugo Stoltzenberg) to orchestrate production, logistics, dissemination.	Still true, but a leader who might use CW today more likely to be from a pariah state (e.g., Saddam Hussein, Bashar al- Assad) or a non-state actor (Aum Shinrikyo).

At the state level, important characteristics include production of CW and use. Two noteworthy points are that, first, production was often a large, state-run endeavor, as, for example, in dedicated factories in Spain. Moreover, CW expertise and equipment and the weapons themselves were exported around the world. Germany, in particular, seemed to be involved in a few of these efforts, helping Spain and the Soviet Union develop their industry, and possibly selling materiel to Chinese warlords. Secondly, during the interwar years, chemical warfare, like warfare in general, involved complicated logistics. In particular, the problem of getting CW to the battlefield could take months or longer—a problem that the British encountered.

During this period, CW were clearly used against civilians, unlike during WWI in Europe. Balfour writes,

> a distinction was made by all colonial powers between the treatment of fellow Europeans and that of colonials who resisted European advance. The standards of warfare that could be applied to the colonial enemy were different because these opponents were not "fully civilized". Thus, in addition to bombing the civilian population in parts of Africa or the Middle East, the colonial powers turned to chemical warfare not just at soldiers, as in the First World War, but against old men, women, and children in the recalcitrant parts of would-be colonies.[118]

Possibly excepting the cases of the Russian Civil War and the Chinese warlord period, none of those attacked could retaliate in kind. This is striking because, in a few instances, the attackers falsely claimed the opposing side has used CW first. Additionally, the attackers explored new ways to disseminate the CW (e.g., the Italians in Ethiopia dropping gas bombs or employing aerial spraying). It seems clear that CW were viewed by at least some in the leadership as a normal part of a nation's menu of weaponry (e.g., the United Kingdom) or as a new weapon that was worth testing on the battlefield (e.g., Japan).[119]

[118] Balfour, *Deadly Embrace*, p. 123. See also: Price, "A Genealogy"; Richard Price and Nina Tannenwald, "Norms and Deterrence: The Nuclear and Chemical Weapons Taboos," in Peter J. Katzenstein, ed., *The Culture of National Security: Norms and Identify in World Politics* (New York: Columbia University Press, 1996), pp. 114–52.

[119] For the British case see: Jones, "'The Right Medicine,'" p. 80. For the Japanese claim, see: Anonymous, "Gas Alleged Used by Chinese: Japanese Produce Shell for Correspondents: Mayor Yui Issues Strong Refutation," *The North – China Herald and Supreme Court & Consular Gazette*, October 20, 1937, p. 102; Anonymous, "Britain Accused of Assisting China in War: Munitions Alleged to Be Shipped through Hongkong," *China Press*, November 30, 1937, p. 6. The Japanese claimed the United Kingdom was sending phosgene and other poison gas.

With the possible exception of the Italians at the time and the Spanish after the fact, there was not much of an effort to hide CW use, although, in some cases, the lack of documentation may reflect an effort to suppress evidence of use.

At the level of the individual, we can focus on two types of people who were critical at the time. The decision of a leader such as Churchill or Mussolini was necessary, if not sufficient in the British case, for CW use. Likewise, some cases needed a scientist to enable development—a role fulfilled by Hugo Stoltzenberg, a noted German chemist and engineer, for Spain, for example.

Do any of these conditions apply to the world today? The United Nations is stronger than the League of Nations. International arms control—in the form of the CWC, which seeks to prohibit CW but not beneficial uses of chemicals—is almost universal, representing the broadest effort to control CW ever. The norm against CW is arguably stronger than it was during the interwar period. However, it is possible that the pattern of use of CW in Syria has weakened this norm. In a worst-case scenario, a weakened CWC leads to questions about the strength of other arms-control agreements. At the state level, it is unlikely—Syria notwithstanding—that a state without CW would consider a program of production, or that a state with CW would use CW widely today in a conflict. Geoffrey Chapman, Hassan Elbahtimy, and Susan Martin focus on such a thesis: how the Syrian regime's use of CW may affect the thinking of other states. Focusing on military utility and the international reaction, they conclude that most states are unlikely to conclude that the lesson is that developing or using CW is a smart move.[120] However, states may consider turning toward chemicals other than those traditionally used in warfare for inter- or intrastate conflicts. As they are not listed in the current CWC schedules, adding such compounds to the CWC could unintentionally undermine the effectiveness of the treaty, as could ignoring the same. A hypothetical sedative, for example, used in situations other than those intended by the manufacturer (e.g., in a hospital setting), seems to go against the spirit (if not the letter) of the current CWC. A more likely, albeit still rare, scenario is production or use by a non-state actor, such as a terrorist group. As IS shows, some non-state actors do not need to rely on acquiring CW, in some fashion, from a state; rather they are likely able to produce basic CW. IS for example used chlorine and sulfur mustard, or WWI agents. This may inspire other groups in the future, but the decision making of non-state actors of various kinds appears complex.[121] In addition, it must be remembered that non-state actors planning acts of violence have a range of other dangerous conventional weapons to consider, as well as toxic chemicals not usually considered CW.[122]

Finally, turning to dissemination, the creative dissemination of CW during the interwar years remains an issue. The prospect of unmanned aerial vehicles armed with CW is particularly frightening. That said, as William Morgan Alley and Jessica Jones note, historically, ingestion is a prominent method of dissemination.[123] Thinking about how to deal

[120] Geoffrey Chapman, Hassan Elbahtimy, and Susan Martin, "The Future of Chemical Weapons: Implications from the Syrian Civil War," *Security Studies* (August 13, 2018), DOI: 10.1080/09636412.2018.1483640.

[121] See, for example, Geoffrey Chapman, "Islamic State and Al-Nusra: Exploring Determinants of Chemical Weapons Usage Patterns," *Perspectives on Terrorism*, Vol. 11 (December 2017), pp. 112–21. Chapman seeks to explain why IS used CW while apparently Al-Nusra did not.

[122] William Morgan Alley and Jessica L. Jones, "An Analysis of the Threat of Malicious Chemical Use by Nonstate Actors: Quesioning the State-Based Approach to Chemical Nonproliferation," *Nonproliferation Review*, Vol. 22 (2015), pp. 301–19.

[123] Alley and Jones, "An Analysis," especially pp. 308–9.

with non-state actors with CW has become a larger issue both as an arms-control problem and as a counterinsurgency or counterterrorist problem, where military forces may face violent nonstate actors possibly armed with CW. Not only is identification important for appropriate countermeasures, but, as seen in the Syria case, attribution is a much weightier issue than before, even as it has become harder to hide CW use in the age of social media and other ubiquitous sources of information and communication.

Finally, at the individual level, it is still the case that policy makers and scientists have a role to play: in the case of Aum Shinrikyo, it was the willingness of the leader, Chizuo Matsumoto (later known as Shoko Asahara), to use CW, and the presence of highly educated scientists, that enabled the synthesis and use of CW.[124]

Conclusions

There is still research to be done on the use of CW during the interwar period, including determining which of the contentious cases occurred, if any; expanding our knowledge of which chemical agents were used and how; and better understanding the behind-the-scenes decision making. Certainly, historians with access to archival materials and the appropriate language skills may fill in some holes in our understanding. Although relatively rare, chemical warfare is destructive to those involved and ripples through the international system. Some CW are simply too easy to make and may be too tempting to a small number of non-state actors willing to use violent methods to achieve their goals. While chemical warfare since WWI has occurred mainly against people who had no defense, there are more opportunities today to deter its use or mitigate its effects.

Disclaimer

The views expressed here are those of the author and do not reflect the official policy or position of the National Intelligence University, the Department of Defense, or the US government.

[124] See, for example, A.T. Tu, "Aum Shinrikyo's Chemical and Biological Weapons: More than Sarin," *Forensic Science Review*, Vol. 26 (2014), pp. 116–19, for a discussion of the work of Masami Tsuchiya, a chemist and cult member.