



LONGING FOR ARMAGEDDON

A brief history of non-state actors' pursuit
and use of weapons of mass destruction

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Cover photo: Rabbit used to check for leaks at Sarin nerve gas production plant, Rocky Mountain Arsenal, Commerce City, Colorado, 20 March 1970 (Photo: United States Library of Congress. Duotone added).

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Abstract

Super-villains armed with a weapon of mass destruction is the stuff of countless on-screen thrillers. But the prospect of non-state actors armed with such weapons is far from fantasy. Chemical and biological weapons have been used by terrorist organizations on several occasions, sometimes to devastating effects. Terrorists have been unsuccessful in their attempts at acquiring nuclear weapons, but not for a lack of trying. In this paper I examine the history of non-state actors' pursuit and use of weapons of mass destruction (WMDs).

Introduction

The term 'weapon of mass destruction' was coined by the Archbishop of Canterbury in reference to the horrors of the Spanish Civil War and Japanese invasion of Manchuria in 1937. The German Luftwaffe's aerial bombardment of the Spanish town of Guernica, as a result of which hundreds of civilians are believed to have lost their lives, had occurred just days before the sermon in which the Archbishop used the term for the first time.¹ "Who can think without horror of what another widespread war would mean", Archbishop Lang asked, "waged as it would be with all the new weapons of mass destruction?"² More than actual *weapons* of mass destruction, the Archbishop was referring to new weapons *platforms* and military *techniques* such as the bomber plane and aerial bombardment. In more recent times the term was brought to the public attention through the American authorities' extensive use of the term in reference to Saddam Hussein's alleged stockpiles of chemical, bio-

logical, and maybe even nuclear weapons in advance of the 2003 US led invasion of Iraq.

Terrorists have been unsuccessful in their attempts at acquiring nuclear weapons, but not for a lack of trying

There is no authoritative definition of WMDs, and there is some disagreement over which weapons the label does and does not cover. The term has increasingly come to be conflated with the term 'unconventional weapon' (a term that is itself subject to similar limitations), and is now usually, including in this paper, taken to cover biological, chemical, nuclear, and radiological weapons.³ A common denominator of these weapons is that they cause sickness and disease in addition to injury.

1 Dan Radu Voica, "Weapons of Mass Destruction and Terrorism", in Kenan Tokgöz (ed), *Enhancing Cooperation in Defence Against Terrorism*, Amsterdam: IOS Press, 2012, p. 57.

2 Quoted from The Lambeth Palace Library Blog, "Weapons of Mass Destruction and Archbishop Cosmo Lang". Available at: <https://lambethpalancelibrary.wordpress.com/2013/05/30/weapons-of-mass-destruction-and-archbishop-cosmo-lang/>.

3 See Steven Poole, "WMDs, Unconventional Weapons and the Language of War", *The Guardian*, 4 September 2014. Available from: <http://www.theguardian.com/books/2013/sep/04/wmd-unconventional-weapons-language-war>.

Why worry?

“There are no right hands for wrong weapons”, the United Nations Secretary General said in 2013.⁴ This may be true, but some hands may be worse than others, and in international discussions and policy documents, terrorist organizations are typically regarded as a particularly worrisome threat. Many terrorist organizations profess millenarian or eschatological ideologies that lend themselves well to the idea of mass destruction. Non-state actors’ use and pursuit of WMD has sometimes been motivated by desires to bring on the apocalypse, *malahim*, or some other end-of-time narrative.⁵

Weapons of mass destruction are ideal tools for [terrorists], first, because of their physical effects, and second, because WMDs bring with them an added layer of fear.

According to standard dictionary definitions, terrorism amounts to systematic “use of violence to create a general climate of fear in a population and thereby to bring about a particular political objective”⁶ or the “unofficial or unauthorized use of violence and intimidation in the pursuit of political aims.”⁷ Weapons of mass destruction are ideal tools for such aims, first, because of their physical effects, and second, because WMDs bring with them an added layer of fear.⁸ To the extent that their vocation is “to create a general

climate of fear in a population”, terrorist organizations therefore have a rational interest in giving the impression that they have or are in the process of acquiring WMDs, even if they are not. Out of the 125,087 terror attacks that, according to the Global Terrorism Database occurred worldwide between 1970 and 2013 only a small handful was conducted by means of WMDs.⁹

Due to the increase in wars involving non-state actors, the prospect of proliferation of WMDs to non-state actors has received increased attention in recent years. For example, proliferation concerns feature prominently in the North Atlantic Treaty Organization’s (NATO) latest Strategic Concept,¹⁰ and according to US President Barack Obama, nuclear terrorism represents “the most immediate and extreme threat to global security.”¹¹ As an international measure to curb proliferation of WMDs, UN Security Council resolution 1540 was adopted in 2004. The Resolution obliges all UN member states to adopt legislation to prevent the proliferation of WMDs.¹² UNSCR 1540 is far from a silver bullet for non-proliferation, however. Large geographical areas remain outside the effective control of the Resolution’s scope. In the following I discuss the history of non-state actors use and pursuit of each of the four classes of WMDs.

Deadliest Bioterror Attack (New York, NY: Times Books, 2011).

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- 4 United Nations, Press release, 2013. Available from: <http://www.un.org/press/en/2013/sgsm14968.doc.htm>.
 - 5 See Mark Juergensmeyer, *Terror in the Mind of God: The Global Rise of Religious Violence*, 3rd ed. (Berkeley and Los Angeles: University of California Press, 2003).
 - 6 *Merriam-Webster Dictionary*, “Terrorism”. Available from: <http://www.merriam-webster.com/dictionary/terrorism>.
 - 7 *Oxford English Dictionary*, “Terrorism”. Available from: <http://www.oxforddictionaries.com/definition/english/terrorism?searchDictCode=all>.
 - 8 See e.g. Jeanne Guillemin, *American Anthrax: Fear, Crime and the Investigation of the Nation’s*

- 9 National Consortium for the Study of Terrorism and Responses to Terrorism, Global Terrorism Database, 2013. Available from: <http://www.start.umd.edu/gtd/search/IncidentSummary.aspx?gtdid=201303190010>.
- 10 See e.g. NATO, “Active Engagement, Modern Defence: Strategic Concept, 2010”, p. 11.
- 11 Barack Obama, “Remarks by President Barack Obama”, Prague, Czech Republic, 2009. Available from: http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered.
- 12 UNSC Resolution 1540 from 2004 “imposes binding obligations on all States to adopt legislation to prevent the proliferation of nuclear, chemical and biological weapons, and their means of delivery, and establish appropriate domestic controls over related materials to prevent their illicit trafficking.” See 1540 Committee ‘United Nations Security Council Resolution 1540 (2004), 2014. Available from: <http://www.un.org/en/sc/1540/>.

Nuclear weapons

The United States' nuclear bombings of Hiroshima and Nagasaki in 1945 remain the only cases of nuclear attacks to date. While nine states retain nuclear weapons, and five states host weapons of another state on their territories, non-state actors have so far been unsuccessful in their pursuit of nuclear weapons capability. Most recently, the Islamic State aired the idea of procuring nuclear weapons through corrupt Pakistani officials.¹³ The probability of executing such a transaction successfully should be viewed as very low, but as long as there are nuclear weapons in the world, the possibility cannot be excluded.

In 1998, stories from multiple sources surfaced about Osama bin Laden, the founder of the militant, Islamist organization al-Qaeda, trying to acquire nuclear weapons. Bin Laden had claimed that acquiring weapons of mass destruction was an "Islamic duty", and an integral part of his holy war.¹⁴ In a video statement some years later, he promised to "use massive weapons to upend the global status quo, destroy the capitalist hegemony, and help create an Islamic caliphate."¹⁵ Osama bin Laden's quest to acquire nuclear arms allegedly dates back to 1993, when he tried to procure highly enriched uranium of South African origin. The al Qaeda leader allegedly also tried to acquire a ready-made nuclear weapon supposedly stolen from Russian stockpiles by Chechen separatists.¹⁶ Indeed, some nuclear warheads, notably from the former Soviet Union, have reportedly gone missing. In January

2001, commenting on the possibility of "loose nukes", a US official noted that "it really boggles my mind [... that] the world isn't in a near state of hysteria about the danger."¹⁷

'it really boggles my mind [... that] the world isn't in a near state of hysteria about the danger.' —US Official

On 8 November 2007, a group of armed men attacked the Pelindaba nuclear facility in South Africa, where several hundred kilograms of weapons-grade uranium was stored.¹⁸ Few details about both the attack and the attackers have been disclosed, but it is reasonable to conclude that the attackers either wanted to use the uranium for weapons purposes themselves, or to sell it to others who wanted it for those purposes.

Another route by which non-state actors might go about acquiring a nuclear weapon would be to steal a finished object. The nuclear weapons facilities in Pakistan are often considered among the least secure. There is not much publically available information about Pakistan's nuclear facilities, but according to most experts, there is cause for concern. For example, terrorists could attack a nuclear weapons facility—potentially helped by insiders—and attempt to explode one or more warheads where they are. According to Mark Fitzpatrick,

Pakistan has both the world's fastest growing nuclear arsenal, and the largest concentration of groups bent on acts of terrorism. Growing fundamentalism, ethnic violence, weak political institutions and a fragile economy combine to raise questions about the very security of the state and thus the security of its nuclear crown jewels.¹⁹

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- 13 Heather Saul, "Isis Claims It Could Buy Its First Nuclear Weapons from Pakistan within a Year", *The Independent*, 23 May 2015. Available from: <http://www.independent.co.uk/news/world/middle-east/isis-claims-it-could-buy-its-first-nuclear-weapon-from-pakistan-within-12-months-10270525.html>.
 - 14 Note, however, that the Shiite cleric Ayatolla Ali Khamenei, Supreme Leader of Iran, issued a fatwa against nuclear weapons in 2005.
 - 15 Rolf Mowatt-Larssen, "Al Qaeda's Pursuit of Weapons of Mass Destruction", *Foreign Policy*, 25 January 2010; Kimberly McCloud and Matthew Osborne, "WMD Terrorism and Usama bin Laden", *CNS Reports*, Monterey Institute of International Studies.
 - 16 Graham T. Allison, *Nuclear Terrorism: The Ultimate, Preventable Catastrophe* (New York, NY: Owl Books, 2005), pp. 26–32.

17 *Ibid.*, p. 9.

18 Matthew Bunn, "The Risks of Nuclear Terrorism—And Next Steps to Reduce the Danger", Testimony of Matthew Bunn for the Committee on Homeland Security and Governmental Affairs, United States Senate, 2 April 2008, p. 1.

19 Mark Fitzpatrick, *Overcoming Pakistan's Nuclear Dangers*, London, Routledge, 2014, p. 2. See



Osama bin Laden sits with his then adviser Dr. Ayman al-Zawahiri during an interview with Pakistani journalist Hamid Mir, 8 November 2001 (Photo: Hamid Mir / Creative Commons).

The Pakistani government, on its side, insists that its security arrangements are “fool proof”.²⁰

Acquiring sophisticated delivery platforms like missiles, planes, or submarines would not be necessary to conduct a terrorist attack. Conceivably, a nuclear bomb could be transported and detonated in a large truck or container. “Suitcase nukes” or “mini-nukes” have been suggested as another viable alternative. Manufacturing nuclear weapons of such a small size is technically very difficult, however, which arguably makes their acquisition more difficult. Only Russia and

the United States are believed to have developed such weapons.²¹

Acquiring sophisticated delivery platforms like missiles, planes, or submarines would not be necessary to conduct a terrorist attack.

In 2005, a large group of proliferation experts in the United States were surveyed on their assessment of the probability of a terrorist nuclear attack occurring in the United States within ten years. 40 of 82 experts believed the probability was higher than 50 per cent.²² We are now on overtime.

also Stephen M. Walt, “Three Questions About Pakistan”, *Foreign Policy*, 24 April 2014. Available from: http://www.foreignpolicy.com/posts/2009/04/24/three_questions_about_pakistan; David Kilcullen to Paul McGeough, “West Warned on Nuclear Terrorist Threat from Pakistan”, *The Age*, 12 April 2009. Available from: <http://www.theage.com.au/world/west-warned-on-nuclear-terrorist-threat-from-pakistan-20090412-a40m.html>.

20 Stephen M. Walt, “Three Questions About Pakistan”, *Foreign Policy*, 24 April 2014. Available from: http://www.foreignpolicy.com/posts/2009/04/24/three_questions_about_pakistan.

21 See Katherine Shrader, “Suitcase Nukes Closer to Fiction than Reality”, *ABC News*. Available from: <http://abcnews.go.com/Technology/Story?id=3848473&page=1>.

22 Richard G. Lugar, “The Lugar Survey on Proliferation Threats and Responses”, United States Senate, June 2015.

Chemical weapons

Chemical weapons and biological weapons are easier to manufacture than nuclear weapons, and unlike their nuclear counterparts, both biological and particularly chemical weapons have been used on several occasions to devastating effects. Chemical weapons are “toxic synthetic chemicals that can be dispersed as a gas, liquid or aerosol or as agents absorbed to particles to become a powder.”²³ Modern chemical weapons are typically delivered by means of a missile or gravity bomb. They may be grouped in a variety of ways, according to class of compound, effects on humans, and lethality.²⁴ Developing modern chemical weapons is fairly resource demanding, and manufacture of the most dangerous gases, such as sarin, requires specialized equipment and know-how.²⁵

The infamous German gas attack on 22 April 1915 at Ypres is often counted as the first chemical weapons attack. Since then, chemical warfare agents have been used on many occasions,²⁶ including by non-state actors.

In 1995, the Japanese cult Aum Shinrikyo used sarin gas in a terrorist attack on the Tokyo subway. 13 people were killed, and over 6000 injured. The attacks and the cult itself demonstrated the draw of WMDs. According to Robert Lifton,

It began with Hiroshima-associated terrors and nightmares of world’s end, proceeded to an embrace of weapons of mass destruction and an all-pervasive nuclearism that included omnipotent fantasises of dominating and destroying the world, led to the actual production of various versions of “the poor man’s atomic bomb”.²⁷

Aum Shinrikyo’s manufacturing site, a fairly sophisticated laboratory, had the capability of producing thousands of kilograms of sarin gas per year. It was later disclosed that Aum had killed eight more people with the same gas the year before.²⁸

Al-Qaeda allegedly had—and may still have—an advanced chemical weapons programme. According to the former CIA analyst Rolf Mowatt-Larsen, “experimentation and training in crude chemical agents and pathogens was standard fare in al Qaeda’s camps in Afghanistan before 9/11, their use in attacks appears to have been left to the initiative of individual cells and planners”.²⁹

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- 23 K. Ganesan, S.K. Raza and R. Vijayaraghavan, “Chemical Warfare Agents”, *Journal of Pharmacy and Bioallied Sciences*, vol. 2, no. 3 (July–September 2010), p. 166. The more technical, legal definition of the Convention on Chemical Weapons (Article II (1)) is that a chemical weapon ‘means the following, together or separately: (a) Toxic chemicals and their precursors, except where intended for purposes not prohibited under this Convention, as long as the types and quantities are consistent with such purposes; (b) Munitions and devices, specifically designed to cause death or other harm through the toxic properties of those toxic chemicals specified in subparagraph (a), which would be released as a result of the employment of such munitions and devices; (c) Any equipment specifically designed for use directly in connection with the employment of munitions and devices specified in subparagraph (b).’
- 24 K. Ganesan, S.K. Raza and R. Vijayaraghavan, “Chemical Warfare Agents”, *Journal of Pharmacy and Bioallied Sciences*, vol. 2, no. 3 (July–September 2010).
- 25 Federation of American Scientists, “Chemical Weapons Production and Storage”, undated. Available from: <http://fas.org/programs/bio/chemweapons/production.html>.
- 26 Chemical weapons were used to terrible and lingering effects by Iraq in the Iran–Iraq War and

the Halabja massacre, and by the United States in Vietnam. The latter’s use of ‘agent orange’ allegedly still plagues Vietnamese communities. See Jeremy Laurance, ‘Agent Orange: the Legacy of a Weapon of Mass Destruction’, *The Independent*, 1 April 2006. Available from: <http://www.independent.co.uk/news/world/asia/agent-orange-the-legacy-of-a-weapon-of-mass-destruction-472255.html>.

- 27 Robert J. Lifton, *Destroying the World to Save It: Aum Shinrikyo, Apocalyptic Violence, and the New Global Terrorism* (New York, NY: Henry Holt and Company, 2000), p. 343.
- 28 Richard Danzig et al., “Aum Shinrikyo: Insights Into How Terrorists Develop Biological and Chemical Weapons”, Center for a New American Security (December 2012), p. 21.
- 29 Rolf Mowatt-Larsen, “Al-Qaeda Weapons of Mass Destruction. Threat: Hype or Reality?”, Harvard Kennedy School, Belfer Center for Sci-

CLASSIFICATION OF CHEMICAL WARFARE AGENTS

TYPE OF CHEMICAL WARFARE AGENT	EXAMPLE	EXPOSURE MECHANISM	CONSEQUENCES FOR HUMANS
Choking agents	Chlorine; phosgene; diphosgene	Inhalation	Damage to the respiratory system
Blister/mustard agents	Sulfur mustard; nitrogen mustard; lewisite	Inhalation; contact with skin and eyes	Blindness; burns; blisters; damage to the respiratory system
Blood agents	Arsine; hydrogen cyanide; cyanogen chloride	Inhalation	Suffocation
Nerve agents	Sarin; phosphorus; soman	Inhalation; contact with skin	Suffocation, cramps; vomiting
Riot control agents (tear gas)	Chloroacetophenone; chloropicrin	Inhalation; contact with skin and eyes	Irritation of the eyes and respiratory system
Psychotomimetic agents	3-Quinuclidinyl benzilate; Phencyclidine; LSD	Inhalation; injection	Loss of feeling; paralysis; psychosis; hallucination; coma
Toxins	Botulinum; staphylococcus enterotoxin	Ingestion; inhalation	Paralysis; suffocation; cramps; diarrhoea; vomiting

Source: OPCW, "Types of Chemical Agent". Available from: <http://www.opcw.org/about-chemical-weapons/types-of-chemical-agent/>.

In Afghanistan, the Taliban has used chemical weapons on numerous occasions, particularly against schoolgirls. Fairly unsophisticated pesticides have allegedly been used, as well as the more potent nerve agent sarin.³⁰ In Iraq as well, insurgents have employed chemical weapons. Between 2006 and 2007, the Islamic State of Iraq—the organization IS originated from³¹—

ence and International Affairs, Cambridge, MA (2010), p. 6.

30 Folad Hamdard, "Afghan Girls' School Feared Hit by Poison Gas", *Reuters*, 21 April 2013. Available from: <http://in.reuters.com/article/2013/04/21/afghanistan-poisoning-idINDEE93K08720130421>.

31 Al-Qaeda in Iraq (AQI) (commonly known as the Islamic State of Iraq) grew out of Abu Musab al-Zarqawi's small terrorist outfit the Party of Monotheism and Jihad, set up in Iraq shortly after the 2003 US invasion. Zarqawi, himself a Jordanian, joined his organization to the al-Qaeda brand in 2004. Zarqawi was killed in 2006, and the AQI movement, which was comprised mostly of foreign fighters, was largely defeated by Iraqi militias on the side of the Western coalition. But when the US withdrew in 2011, AQI re-emerged as an Iraqi based insurgent group under the leadership of Abu Bakr al-Baghdadi, who is now the self-proclaimed Caliph. Upon its entry into the Syrian Civil War in 2013, AQI was renamed Islamic State of Iraq and the Levant (ISIL). For a short and informative introduction, see Bobby Gosh, "ISIS: A Short History", *The Atlantic*, 13 August

was responsible for multiple terrorist attacks in a series of locations across central Iraq using chlorine gas mixed with explosives.³² The total death toll of these attacks was very high, but most casualties are believed to have resulted from the explosive blasts and not the chemicals.³³ These more crude chemical weapons, which are the easiest ones to manufacture, are not nearly as dangerous as the more sophisticated ones. In May 2013, Iraqi authorities uncovered an Islamic State of Iraq chemical weapons manufacturing site, and a plot to smuggle chemical weapons to Europe and North America. The Iraqi police also found a set of toy remote-controlled planes—supposedly intended as platforms for the distribution of the chemical agents.³⁴ As well as the regime forces, which were revealed to have used chemical weapons in the Syrian Civil War, the al-Qaeda linked group Jabhat al-Nusra is also

2014. Available from: <http://www.theatlantic.com/international/archive/2014/08/isis-a-short-history/376030/>.

32 Amy Clark, "27 Die in Chlorine Bomb Attack in Iraq", *CBS News*, 6 April 2007. Available from: <http://www.cbsnews.com/news/27-die-in-chlorine-bomb-attack-in-iraq/>; Damien Cave, "Iraq Insurgents Employ Chlorine in Bomb Attacks

33 BBC, "Iraq Uncovers al-Qaeda 'Chemical Weapons Plot'", 1 June 2013. Available from: <http://www.bbc.com/news/world-middle-east-22742201>.

34 *Ibid.*

believed to have used sarin gas in the Syrian Civil War.³⁵ On 19 March 2013, a rocket loaded with an unidentified chemical agent struck a military pose near Aleppo. At least 25 people were killed, of whom at least nine were civilians.³⁶

The Iraqi police also found a set of toy remote-controlled planes—supposedly intended as platforms for the distribution of the chemical agents

In June 2014, in the process of conquering parts of northern Iraq, IS took control of the al-Muthanna project site, a chemical weapons factory established by the Iraqi dictator Saddam Hussein in the 1980s. Until its operational capacity was almost completely destroyed by US forces during Operation Desert Storm in 1991, the al-Muthanna site was Saddam Hussein's largest chemical weapons facility, and the origins of the chemical weapons used by Iraqi forces in the Iraq–Iran War, including against Kurdish civilians in the Halabja Massacre. At the time of IS' takeover, al Muthanna had not been in operation since Desert Storm. However, the stockpiles of chemical weapons had not been completely dismantled. The site hosted large quantities of both sarin and mustard gas. According to a UN report, one of the bunkers in al Muthanna contained “2,000 empty 155mm artillery shells contaminated with the chemical warfare agent mustard, 605 one-tonne mustard containers with residues, and heavily contaminated construction material.”³⁷

35 Peter Bergen, “Al Qaeda’s Track Record with Chemical Weapons”, CNN, 7 May 2013. Available from: <http://edition.cnn.com/2013/05/06/opinion/bergen-chemical-weapons-syria/>.

36 National Consortium for the Study of Terrorism and Responses to Terrorism, Global Terrorism Database, 2013. Available from: <http://www.start.umd.edu/gtd/search/IncidentSummary.aspx?gtdid=201303190010>. It should be noted that the Syrian government has also used chemical weapons in the Syrian civil war—with even graver humanitarian consequences.

37 Quoted in Jonathan Spyer, “Media Special Report: Did Isis Use Chemical Weapons Against the Kurds in Kobani?”, *Rubin Center for Research in Interna-*

Chemical weapons are generally quite “spoilable”, but some chemicals last longer than others. According to one commentator, the sarin agents stored in al-Muthanna will probably have lost their toxicity and be useless for weapons purposes. However, “the mustard agent will still be viable”.³⁸ Potent mustard agents were allegedly found at Halabja in Kurdistan 26 years after use. Chemical weapons could be used by IS in regular combat operations or in a terrorist attack. According to accounts from the Kurdish areas in northern Iraq, this has already happened. Reports from 2014 indicate that IS used a blister agent—possibly mustard gas recovered from al Muthanna—against the Kurds in Kobani.³⁹

On 23 January 2015, Abu Malik, one of IS' chemical weapons experts, was killed in a coalition airstrike near Mosul, Iraq, in order to “degrade and disrupt” IS' ability to produce and use chemical weapons. Malik had been a chemical weapons engineer under Saddam Hussein before joining al-Qaeda and then IS. According to the BBC, “there have been frequent reports of IS using chlorine gas” in Syria and Iraq.⁴⁰

Reports from 2014 indicate that IS used a blister agent [...] against the Kurds in Kobani.

tional Affairs, 12 October 2014. Available from: <http://www.rubincenter.org/2014/10/meria-special-report-did-isis-use-chemical-weapons-against-the-kurds-in-kobani-warning-graphic-content/>.

38 Hamish de Bretton-Gordon, “ISIS Has Chemical Weapons and Uranium, Can It Produce WMD?”, 2 Paragraphs, 15 July 2014. Available from: <http://2paragraphs.com/2014/07/isis-has-chemical-weapons-and-uranium-can-it-produce-wmd/>.

39 Jonathan Spyer, “Media Special Report: Did Isis Use Chemical Weapons Against the Kurds in Kobani?”, *Rubin Center for Research in International Affairs*, 12 October 2014. Available from: <http://www.rubincenter.org/2014/10/meria-special-report-did-isis-use-chemical-weapons-against-the-kurds-in-kobani-warning-graphic-content/>.

40 BBC, “IS Chemical Weapons Expert Killed, Says US Military”, 30 January 2015. Available from: <http://www.bbc.co.uk/news/world-middle-east-31070249>.

Biological weapons

Biological weapons are pathogens (bacteria, virus, toxins, or fungi) used with the aim to inflict harm to humans. Throughout the ages, infectious disease has probably been the most common cause of human death,⁴¹ and the potential of biological weapons to cause mass suffering has been deemed very high. The Black Death of the 14th century, probably the most disastrous pandemic in history, killed up to 60 per cent of the population of Europe.⁴²

The history of biological warfare goes back a long way. During the Neshite–Arzawan Conflict of 1320–1318 BC, both belligerent parties are believed to have used animals contaminated with tularemia (a bacteria) with the aim to infect their opponent.⁴³ Throughout history, poisoning wells or sending contaminated animals into enemy ranks or territory has probably been the most common way of employing biological weapons.⁴⁴ This practice was carried on into the First World War, when Germany supposedly attempted to infect animals and animal feed in enemy countries.⁴⁵

More sophisticated weaponization of pathogens through the isolation and development of specific stocks was made possible by advances in medical research and microbiology in the 19th

century.⁴⁶ All the major powers in the two World Wars are believed to have had large biological weapons programmes during most of the 20th century,⁴⁷ but despite advances in microbiology, weaponization of pathogens in bombs or other non-organic objects still remains both difficult and hazardous for their users: A Japanese biological weapons attack on the Chinese city of Changde in 1941 resulted in the death of around 10,000 people, of whom about 1700 were Japanese troops.⁴⁸ Notwithstanding their theoretically immense destructiveness, the humanitarian consequences of biological weapons have never reached the levels predicted in worst-case scenarios. This is probably due to the technical difficulties associated both with the cultivation of pathogens and with weaponizing the agents.

Throughout history, poisoning wells or sending contaminated animals into enemy ranks or territory has probably been the most common way of employing biological weapons.

Reports about terrorists trying to weaponize pathogens have surfaced repeatedly both before and after 9/11. The management of al-Qaeda's biological weapons programme was ostensibly assumed by Ayman al-Zawahiri (the present leader of al-Qaeda)⁴⁹ in 1998, but the organization does not appear to have managed to control the pathogens it is believed to have developed.⁵⁰

41 Centres for Disease Control and Prevention, "Achievements in Public Health, 1990–1999: Control of Infectious Diseases", 30 July 1999. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4829a1.htm>.

42 Diane Zahler, *The Black Death* (Minneapolis, MN: Twenty-First Century Books, 2009). The plague is not as threatening today, as it can be treated with simple antibiotics.

43 S.I. Trevisanato "The 'Hittite Plague', an Epidemic of Tularemia and the First Record of Biological Warfare", *Medical Hypotheses*, vol. 69 (2007); s. Gürkan (2014) "Epidemiology of Tularemia", *Balkan Medical Journal*, vol. 31, no. 1 (2014), p. 3.

44 Stefan Riedel, "Biological Warfare and Bioterrorism: a Historical Review", *Proceedings*, vol. 17, no. 4 (2004).

45 Friedrich Frischknecht, "The history of Biological Warfare", *Embo Report*, 2003. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1326439/>.

46 Stefan Riedel, "Biological Warfare and Bioterrorism: a Historical Review", *Proceedings*, vol. 17, no. 4 (2004), p. 401.

47 The Russian bioweapons programme employed between 25,000 and 30,000 people in 1995. See *ibid.* p. 405.

48 *Ibid.*, p. 402.

49 Zawahiri holds a master's degree in surgery. See BBC, "Profile: Ayman al-Zawahiri", 27 September 2004. Available from: http://news.bbc.co.uk/2/hi/middle_east/1560834.stm.

50 Another person involved in al-Qaeda's biological weapons research was the former Pakistani gov-

Since the late 1990s, al-Qaeda has conducted research on anthrax, botulinum, and other pathogens in various locations, notably Afghanistan and Iraq.⁵¹ According to Mowatt-Larsen, al-Qaeda's biological weapons programme, in which anthrax received the most attention and resources, was "probably meant to serve as another means to achieve the same effect as using a nuclear bomb, given doubts that a nuclear option could be successfully procured."⁵² Possibly the greatest risk for the future would be the effective weaponization of designer genes or viruses. Such new threats could be made possible by the increasing scientific knowledge of the human genome. In a worst-case scenario, a pathogen resistant to antibiotics or antiviral agents could be created.⁵³

In the summer of 2014, a computer left behind in an IS hideout in Idlib was retrieved by moderate Syrian rebels. The computer had been owned by the Tunisian chemistry and physics student "Mohammed S.", and contained detailed recipes for bomb-making, including a 19 page document on weaponizing bubonic, or "black", plague. The laptop further contained a copy of the fatwa by the Saudi cleric Nasir al-Fahd, claiming that if "Muslims cannot defeat the *kafir* [unbelievers] in a different way, it is permissible to use weapons of mass destruction", even if it "kills all of them and wipes them and their descendants off the face of the earth."⁵⁴

Biological weapons have been used in acts of terrorism on a few occasions. In 1984, members

of the so-called Rajneesh Movement intentionally contaminated ten salad bars in Oregon with salmonella. 751 people contracted salmonellosis, but no fatalities were reported. Aum Shinrikyo, the group responsible for the sarin gas attack on the Tokyo subway in 1995, is reported to have had a biological weapons programme, and to have made three unsuccessful attempts at attacking civilians with anthrax and botulinum. The cult had also attempted to acquire the Ebola virus from the Democratic Republic of Congo (then Zaire). Large amounts of botulinum were also found in a Red Army Fraction laboratory in Paris during the mid-1990s.⁵⁵

The cult had also attempted to acquire the Ebola virus from the Democratic Republic of Congo

Potent biological pathogens are difficult to develop, and even more difficult to weaponize. Both processes are hazardous for the manufacturer. Furthermore, the effects of biological weapons are almost impossible to control; biological weapons are among the most indiscriminate weapons imaginable. Accordingly, both the manufacture and use of biological weapons carry great risks for the people contemplating their use. This is presumably a large part of the reason why biological weapons are more popular on screen than in real life.

ernment biologist Rauf Ahmed. See Rolf Mowatt-Larsen, "Al-Qaeda Weapons of Mass Destruction. Threat: Hype or Reality?", Harvard Kennedy School, Belfer Center for Science and International Affairs, Cambridge, MA (2010), p. 12.

51 *Ibid.*

52 *Ibid.*, p. 6.

53 Arturo Casadevall, "The Future of Biological Warfare", *Microbial Biotechnology*, vol. 5, no. 5 (2012); Michael J. Ainscough, "Next Generation Bioweapons", in *The Gathering Biological Warfare Storm*, Barry R. Schneider and Jim A. Davis, eds. (Westport, CT: Praeger, 2004), p. 181.

54 Harald Doornbos and Jenan Moussa, "Found: The Islamic State's Laptop of Doom", *Foreign Policy*, 28 August 2014. Available from: http://www.foreignpolicy.com/articles/2014/08/28/found_the_islamic_state_terror_laptop_of_doom_bubonic_plague_weapons_of_mass_destruction_exclusive.

55 Stefan Riedel, "Biological Warfare and Bioterrorism: a Historical Review", *Proceedings*, vol. 17, no. 4 (2004), p. 405.

Radiological weapons

Radiological dispersal devices (RDD), or “dirty bombs”, are weapons in which an explosive material, such as dynamite or TNT, and a radioactive material, are combined to create a blast that inflicts damage both through the immediate explosion and through the ensuing radiation. Dirty bombs are thus related to nuclear weapons, but their explosion is not a product of nuclear fission or fusion. On the one hand, this makes them considerably less destructive than nuclear weapons. On the other hand, their cruder design makes them much easier to manufacture.⁵⁶ Many (but not all) radioactive materials or isotopes found in regular hospitals could be used for a dirty bomb, and the material used would determine the type of radiation created by the bomb (alpha, beta, or gamma). In medicine, enriched uranium is used for a range of purposes, which makes radioactive materials relatively accessible. For example, certain types of medical and industrial equipment, such as irradiators and radiography machines, can be used to manufacture dirty bombs.⁵⁷ In its raw form, uranium cannot be used in a RDD.

certain types of medical and industrial equipment, such as irradiators and radiography machines, can be used to manufacture dirty bombs.

The Islamic State has also been connected with radiological weapons. In June 2014, IS stole nuclear material from the University of Mosul.⁵⁸ According to reports, the materials concerned were 40kg of un-enriched uranium and 0.125

kg of thorium. In order to make a potent dirty bomb, IS would either have to enrich the uranium or transmute the thorium and then separate the resulting uranium-233. At the moment, IS is unlikely to have the technical expertise and equipment necessary to do this.

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There are no examples of successful dirty bomb attacks, but a number of close calls have been detected. In 2002, US customs agents at Chicago Airport arrested José Padilla for conspiring with al-Qaeda to detonate a dirty bomb in the United States.⁵⁹ He was found guilty on all charges. Half a year later, British officials disclosed evidence from Herat, Afghanistan, that al-Qaeda had successfully built a small RDD and had written training manuals for their construction. Al-Qaeda had reportedly acquired radioactive isotopes stolen by the Taliban.⁶⁰

56 US Department of Homeland Security, “News and Terrorism: Communicating in a Crisis”, (2004). Available from: https://www.dhs.gov/xlibrary/assets/prep_radiological_fact_sheet.pdf.

57 H. Rosoff and D. von Winterfeld, “A Risk and Economic Analysis of Dirty Bomb Attacks on the Ports of Los Angeles and Long Beach”, *Risk Analysis*, vol. 27, no. 3 (2007), p. 534.

58 Stephen Hummel, “The ISIL’s Theft of WMD Components in Iraq”, *Combating Terrorism Center*, 30 July 2014. Available from: <https://www.ctc.usma.edu/posts/the-isil-theft-of-wmd-components-in-iraq>.

59 H. Rosoff and D. von Winterfeld, “A Risk and Economic Analysis of Dirty Bomb Attacks on the Ports of Los Angeles and Long Beach”, *Risk Analysis*, vol. 27, no. 3 (2007), p. 533.

60 Frank Gardner, “Al-Qaeda ‘Was Making Dirty Bomb’”, BBC, 31 January 2003. Available from: http://news.bbc.co.uk/2/hi/uk_news/2711645.stm.

Conclusion

Weapons of mass destruction are attractive to terrorists organizations both for their capacity to cause immense physical harm and for their symbolic dimension: the uncanny effects and almost mythical stature of WMDs—particularly nuclear weapons—make them ample instruments to create fear. And as outlined above, non-state actors have used biological and chemical weapons—“the poor man’s atomic bomb”⁶¹—on several occasions. For example, the Japanese cult Aum Shinrikyo attacked random people with both chemical and biological weapons during the mid 1990s. In more recent years, the Taliban, al Qaeda, and the Islamic State have all experimented with such weapons. Non-state actors have never used nuclear or radiological weapons, but as long as the technology and materials are available, the risk that they fall in the hands of terrorists remains. This includes nuclear weapons, which are stockpiled in 14 countries. Some of these stockpiles have been claimed to be poorly secured.

The threat of terrorist WMD attack can be mitigated through disarmament and prophylactic measures such as increasing the safety of radioactive and chemical materials in civilian use. Measures such as the UNSCR 1540 represent attempts by the international community to move in this direction, yet as long as states still develop and stockpile WMDs—and even include them in their official defence doctrines—the risk of non-state actors getting hold of and using these weapons cannot be eliminated.

61 Robert J. Lifton, *Destroying the World to Save It: Aum Shinrikyo, Apocalyptic Violence, and the New Global Terrorism* (New York, NY: Henry Holt and Company, 2000), p. 343.

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