

Global Catastrophic Biological Risks

By Cambridge University, Centre for the Study Existential Risks (CSER) August, 2019

Source:<https://www.cser.ac.uk/research/global-catastrophic-biological-risks/>

Pandemics are as old as humanity, but in today's interconnected world we are more vulnerable than ever. The increase in the capability and spread of biotechnology poses new risks, from accidental release to intentional misuse.

We have begun to develop a research agenda for Global Catastrophic Biological Risks. Our work has involved horizon-scanning for emerging issues in biotechnology, analysing gene drives, and debating gain-of-function research. On biosafety, we are developing strategies for promoting responsible research and innovation in collaboration with academics, biotech companies, and bio-hacker communities. On biosecurity, we have developed a collaborative strategy of next steps for the Biological Weapons Convention.

A natural pandemic could kill hundreds of millions of people, an engineered pandemic could kill many more, and threaten civilizational collapse.

Natural pandemic

The last great influenza pandemic killed between 2.5%-5% of the world population in 1918, far more than World War One. As recent scares over bird flu and swine flu show, this risk has not gone away. Though our scientific knowledge has improved, we are more densely populated, interconnected and entangled with zoonotic reservoirs than before. We need better surveillance, better (inter)national health systems, and better development and stockpiles of vaccines and medical countermeasures.

However, there is a trade-off in natural pandemics between transmissibility and lethality – if a pathogen kills its host too quickly, the host can't infect many other people. But due to biotechnological advances, it may soon be possible to engineer pathogens to be more infectious, more fatal, and to have a delayed onset – and so be far more dangerous.

Error or terror: Bad bugs or bad people

New breakthroughs like the targeted genome editing tool CRISPR-Cas9 are increasing our capabilities; and the cost of DNA sequencing/synthesis and the hurdle of expertise are rapidly decreasing. This growing biotechnological knowledge and capability will have many benefits – new and better drugs, improvements to agricultural productivity and environmental protection. But it is a dual-use technology, and so can also be misused in ways that cause harm.

An engineered pandemic could escape from a lab, or it could be deliberately used as a weapon. During the 20th century several countries had state-run bioweapons programmes, and we know of several non-state groups that have attempted to acquire bioweapons.

Almost singlehandedly, one postdoc was recently able to recreate horsepox (similar to smallpox, which killed 300m in the 20th Century) from scratch in only six months. Capabilities that were once only in the hands of governments will soon be within reach of non-state actors.

A novel pathogen, designed to be deadlier than anything in nature, could severely affect the entire world. As Lord Rees has said “The global village will have its village idiots, and they’ll have global range”.

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Cambridge University warns the world must prepare for **biological weapon** that target **ethnic groups based on genetics**. We should be worried about being wiped out by a killer pathogen that is specifically designed to kill people of only a particular **race, based on their DNA, warns** scientists.

Bioweapons designed to kill only people of particular race

The Guardian Newspaper – 20.8.2019

Source: <https://guardian.ng/features/health/bioweapons-designed-to-kill-only-people-of-particular-race/>

***Cambridge University warns world must prepare for biological weapon that target ethnic groups based on genetics**

Scientists warn that humans should be worried about being wiped out by a killer pathogen that is specifically designed to kill people of only a particular race, based on their genetic material/ Deoxy ribonucleic Acid (DNA).

A new report from Cambridge University’s Centre for the Study of Existential Risk says that world governments have failed when it comes to preparing against threats like futuristic bioweapons powered by Artificial Intelligence (AI) and genetic manipulation. **Such weapons would have to power to target specific DNA, and kill certain races of people leaving other swaths of the population unharmed.**

Imagine it being sprayed in the form of the tinfoil hat conspiracy of chemtrails, and wiping out certain portions of the population. The authors warn: “The technology is becoming increasingly sophisticated at ever cheaper prices, democratising the ability to harm more quickly and lethally. In a particularly bad

case, a bio-weapon could be built to target a specific ethnic group based on its genomic profile”.

A biological weapon is any infectious agent, such as bacteria, virus or toxin, which is used intentionally to inflict bodily harm to people, animals or nature. They can be used to cause massive casualties, social disruption, economic losses, and environmental problems as a means of warfare or terrorism. Biological weapons are difficult to handle after release because they are infectious agents that spread uncontrollably beyond the target area.

Rapid scientific developments and the possible misuses of scientific achievements to create biological weapons make this an area of growing concern for the disarmament community.

The only major confirmed use of bio-weapons was the Japanese attack on Manchuria in the 1930s. However the number of states with biological warfare programs has been estimated to be in the range of 16 to 20. The number of states with the capacity to make biological weapons is over 100. Due to the secrecy with which such programmes are conducted and the fact that facilities for producing biological weapons are easier to hide than the ones for nuclear and chemical weapons, it is hard to know exactly how many states possess biological weapons or to detect bio-weapons programmes. A further problem is the dual-use nature of many installations; it is difficult to distinguish defensive from offensive uses.

Biological weapons are considerably cheaper than nuclear and chemical weapons and have a large effect-to-quantity ratio. In other words, a relatively small amount of biological agent can cause a relatively large number of deaths – equivalent, in some assessments, to those resulting from nuclear use. They do not require complex delivery systems, and their ease of manufacture is increasing with advances in science.

Given their relative affordability, effectiveness and flexibility, biological weapons are increasingly being considered as an attractive option by non-state actors, making bioterrorism one of the major threats regarding this type of weapon. The use of biological agents to force the eradication of drug production crops is promoted by the USA, notably in Colombia.

The US is developing infectious agents that kill drug plants. This controversial strategy carries great dangers of undermining international prohibitions on biological weapons, presenting risks for human health and posing dangers to the environment. The 1925 Geneva Protocol outlawed the use of biological weapons as well as chemical ones. However, it contains serious limitations: it does not prohibit the development, production and stockpiling of biological weapons, and some countries assert the right to retaliate if attacked with biological weapons.

The Biological and Toxin Weapons Convention (BTWC), which entered into force in 1975, supplemented the Geneva Protocol. It was the first multilateral disarmament treaty to ban the production and use of an entire category of

weapons. The BTWC has currently 165 States Parties and 12 signatories. It aims at banning the development, production, stockpiling, acquisition, retention, transfer, and use of biological weapons by anyone.

However, unlike the Chemical Weapons Convention, the treaty lacks verification and compliance procedures, and there is no implementing body to monitor observance. An attempt was made in 1991 to establish a verification system, but the talks collapsed due essentially to a withdrawal of cooperation by the USA. Several developments in the 1990s revealed that the BTWC does not prevent states from conducting biological weapons programmes (example: Russia and Iraq, both signatories to the Convention had conducted clandestine bioweapons programmes) showing that the current regime is inadequate.

Effectively countering the threat from biological weapons requires a number of mutually-reinforcing actions, including a strengthened prohibition regime and enhanced political will. It will, over time, increase transparency and build confidence that all States Parties are in compliance with the Convention, as well as deterring would-be violators. But to achieve this there needs to be a greater awareness among the public and pressure on governments to toughen the regime.

The Biden Administration and Genetically Engineered Bioweapons Research

By Gwen D’Arcangelis - Center for Genetics And Society

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Living under the COVID-19 pandemic has justifiably created fear and uncertainty about germs and their evolving contagiousness and lethality. Against the backdrop of the natural evolution of the coronavirus and emerging new strains, many ruminate over further alarming scenarios—from questions about the coronavirus’s [possible lab origins](#), to worry over the possibility of biohackers [engineering new pandemic germs](#).

New gene editing technologies like CRISPR make these scenarios all the more frightening, as they make it relatively easy to modify existing germs into bioweapons or even to create bioweapons from scratch.

Genetically engineered bioweapons are not a fictional or far-fetched notion. Many countries around the world, including the United States,

have long engaged in research tinkering with germ weapons for so-called biodefense. In recent years, military researchers at the U.S. Defense Advanced Research Projects Agency have used synthetic biology to design virus-infected insects for biodefense.

In 2016, U.S. Director of National Intelligence James Clapper lent credence to concerns about the military implications of gene editing when he added it to a list of threats posed by “[weapons of mass destruction and proliferation](#)”—alongside biological, chemical, radiological, and nuclear weapons.

The incoming Biden-Harris administration promises a restoration of the role of science in government, particularly in environment and health. While I welcome this prospect, I join those who want more than a “return to normal.” The presidential transition provides an opening for advocates and activists to push back against systemic problems in the way U.S. science functions: an over-emphasis on innovation without restraint or regard for social consequences, undue corporate influence, and unilateralism in international science policy. In this post, I focus on a techno-scientific area deserving extra vigilance—***gene editing and bioweapons***.

Troubling innovations in bioweapons research

Bioweapons research long pre-dates the development of new gene editing tools like CRISPR. In the advent of the war on terror in 2001, the Bush administration had ramped up research involving lethal pathogens, including [genetically engineered new germ variants](#). As I document in my just-published book *[Bio-Imperialism: Disease, Terror, and the Construction of National Fragility](#)*, this work is typically explained as a way to test new vaccines against or gain knowledge about possible new biological weapons. But as many [critics point out](#), production of weaponized germs for research is largely an issue of semantics—the end result is that U.S. labs are creating dangerous bioweapons.

The Obama administration retreated from the prior administration’s wholehearted plunge into such risky research, and increased scrutiny of synthetic biology. But it was unwilling to assert effective oversight, issuing only [guidance entreating scientists working in academic and corporate laboratories to screen suspicious orders of synthetic DNA](#). In the military realm, the Obama administration cut funding for bioweapons research, [reallocating much of it to pandemic preparedness](#). But it continued the [U.S. refusal to ratify the verification protocols](#) of the Biological Weapons Convention, an international treaty that bans offensive bioweapons, because of objections to its inspection mechanisms by U.S. military and industry interests. In short, the Obama administration walked back the Bush era’s excesses, while leaving intact underlying structures of unfettered innovation, corporatism, and unilateralism.

Similar dynamics are likely with the transition about to take place. While the Trump administration was relatively [silent about biotech innovation](#), in general it embraced profit-driven innovation aligned with its political agenda. For example, it threw significant policy focus, funding, and corporate partnerships into [artificial intelligence and quantum science](#), areas of U.S. competition with China. U.S.

militarism and unilateralism continued, albeit with a more bombastic tone and isolationist tack, perhaps best represented by U.S. withdrawal from the World Health Organization in May 2020, an eschewal of the prior approach of exerting global dominance from *within* the WHO.

What to expect from the Biden-Harris administration

As expected increases in funding from the Biden-Harris administration start flowing to the biosciences, it will be important to remain watchful for a reboot of bioweapons research and development.

On biotech and biomedical research more generally, some indications are promising. For example, Biden plans to ramp up COVID-19 testing, PPE distribution, and other [low-tech endeavors](#) to fight the pandemic, in addition to prioritizing development of vaccines and advanced treatments. Continued pressure to maintain these efforts—and stepping up pressure on the government to disentangle from corporate mandates—are, I believe, a great starting point for enacting a better path for science.

In areas relevant to bioweapons, there are reasons for more concern, among them Biden's long record of supporting U.S. militarism, including his unapologetic support for the 2003 Iraq War. This, then, remains a key target for watchdog groups and activists: to push for further disinvestment in bioweapons research, along with fuller U.S. cooperation with international treaties—starting with U.S. ratification of the Biological Weapons Convention verification protocols at the upcoming 2021 conference.

Let us imagine a future where the United States re-enters international engagements with not only a more humble tone, but also a changed orientation—one not ruled by corporate interests and one where the United States does not place its own interests above the rest of the world's. Coming off a summer of powerful activism that moved the line on so many issues—racial injustice, police brutality, and labor activism—I am hopeful that we can apply this momentum to push for wins that better tether science to social good.

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