

The Mailing of Bioagent and National, Food Security: Lesson from the Arrest of Foreign Students in the U.S., any Effect on Future Legitimate Research? My Opinion

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Abstract

Bioterrorism remains a major threat to global security, a concern for any scientist, public health professional or medical responder. A threat, that is so insidious, that, its effects only became known days or weeks after the attack or release of the microbial agent. How can these agents be identified and tackled quickly remains a major challenge for microbiologists and scientists, especially as microorganisms are ubiquitous, and ease of acquisition increasingly less difficult, while those who are willing and ready to strike fear, are living within. Dissemination via mailing is gaining the concern of many as a route or possible vulnerability that the microscope must be focused on. Few cases are enumerated here, to stimulate discussion, in other to facilitate policy development to assist in identification of threat, while not negatively impacting the usefulness of mailing of specimens for meaningful scientific research.

Keywords: Bioagents; Bioterrorism; Point of Entry; Courier or Mailing Route Vulnerability

Introduction

Biowarfare is as old as human's escapade with expansion of empires, and individuals act to get revenge or just pure evil. We have read about the use of naturally occurring microbial organisms in wars, or terrorism, these however became more of an international issue that activated the global community prohibiting the development, production, or stockpiling or uses of either biological or toxin weapons during wars with the establishment of the "Biological Weapons Convention (BWC)" of 1972 [1]. In the United States (U.S.), immediately after the September 11, 2001 terroristic plane attacked on the twin World Trade Towers, the country was thrown into a more state of fear when it was reported that Anthrax-tainted letters were sent to so certain individuals in and around the District of Columbia and other East coast states. Bioterrorism threat, was in the air, panic all over!

So, while the global community has recognized the serious effect in the use of microbiological agents, simply termed as bioagents or biological agents for terror or war, the enforcement of anti-bioagent policies, for identification, and preventive measures of these agents or threats, remains very challenging, especially when it involves the transportation of the agents or their cultures via international boundaries or within states, by those with either pure intention or nefarious intent.

This opinion write-up is driven by the concern of this writer, who not only trained as a microbiologist, but had to undergo certain additional preparations as a military person during the global war on terrorism as regards responding to biological threats. While on

such deployment, he raised concern about the feasibility and possible vulnerability with the transportation via point of entries (POE) by terrorists or those with intent to do evil, he enumerated some of these vulnerabilities in his doctoral dissertation in 2015, and many articles published to raise concern about biological agents [2-6].

U.S. and border security and point of entry (POE): Trump administration

POE: Point of Entry can be literally defined as the legitimate route designated by the government or authority responsible for the sovereignty of the territory or enclosure, for people, commodity or animals etc., to legally ingress or egress from the country or enclave. These, POEs are meant to ensure security or scrutinizing objects, persons, or items into the country. This is where border security enforcement comes in.

Since the change in government in the United States, following the election on the November 5th 2024, the Republic inaugurated a president that campaigned vigorously to halt the massive invasion of the Republics' borders in an uncontrollable numbers during the prior government, with reports of illegal entering, and the arrest of possible terrorists or intelligent agents of countries not in good terms with republic [7]. This threat assessment by the Homeland Security Department enumerated a lot about the negative and national security impact of illegal migration without adequate verification and documentation of those entering the Republic, but like this writer as hypothesized many times; what about those coming in through the legal route of entry or bioagents via other routes?

During this writer's second doctoral research, he looked into the possibility of breaching a POEs, like what happens, if a person with evil intentions, self-inoculated with a bioagent with intension to transport certain microorganism, or just a petri dish, or more subtle small vial tube or Eppendorf tube of cell lines of growing cells (of any bioagent), travelling legally through any POE. Is there, or, are there any technology to effectively and accurately identify, detect this bioagent on a person? Are the personnel at the POE adequately educated, or trained to positively identify these microbial agents, and not just relying on answers provided by the traveler? [2-6].

Any person with the intent to do harm will never answer positively to carrying any vial with growing cells of serious health threat to human or animal, or even to the food system. The other possible route to get biological agents into countries that this writer is aware of, includes the legitimate route for sending isolates or (microbial/parasitic) agents via courier or international post to laboratories for further investigation or evaluation to confirm what was isolated in foreign countries with better identification technologies. So, the other route is courier, or mailing of biological agents for research, legitimate research for scientific purposes, however, just like legal human migration, this route can become a vulnerability too.

Cases

1. In the month of February 2025, the US Department of Justice (DoJ) reported they arrested a Russian allegedly "attempting to smuggle clawed frog embryos and embryonic samples" into the United States [DoJ 1] [8]. The suspect, Kseniia Petrova, age 31 is reported to have been arrested at the Logan International Airport in Boston, after arriving from a flight from Paris. Her items were reported found after a routine further screening of her luggage, and it seems she failed to declare these biological products to Customs and Border Protection (CBP) at the point of arrival as required by law. The biological items: "a foam box containing clawed frog embryos in microcentrifuge, as well as embryonic samples in paraffin well stages and on mounted dyed slides" were discovered by CBP officer (USICE) [9]. This suspect was reported to have been employed by the Institute of Genetic Biology in Moscow.
2. In the month of Jun, 2025, the DoJ reported the arrest of two Chinese citizens, with strong link as members of the Chinese Communist Party, and scientists in a Chinese university, Yunqing Jian, 33, and Zunyong Liu, 34. Jian was arrested in connection with the allegations that Jian and his boyfriend Liu, smuggled into the US a fungus, *Fusarium graminearum*, a fungus that is said to cause head blight disease in wheat, barley, maize and rice, and that is classified as a potential bioagent for agroterrorism, so a agroterrorism weapon. Liu is reported to have initially denied but later agreed to the charge of smuggling this fungus through the Detroit Metropolitan Airport. He claimed this organism was for research at a University of Michigan laboratory [DoJ 2] [10].

Jian was arrested as she arrived from China where she is pursuing doctoral degree at the Huazhong University of Science and Technology in Wuhan, with intension to complete her project at the University of Michigan. It is reported she and her boyfriend were sending the biological agents via shipments in “envelope stuffed inside a book”, without adequate labelling or documentation as required by law. Shipments were intercepted by the CBP following inspection [11].

Border security

The U.S., hopefully like many other countries, do have some procedures in place to screen items being shipped or transported into the country via legitimate route of POE. This is to ensure the Republic is protected from potential biological threat that will affect the food, water systems or health security of its citizens, and thus, national security. To ensure this, the government or its agencies have set laws or policies and regulations on how to transport biological items into the republic. Some of these policies and guidelines that routinely enforce this protection, can be found in the following site: www.fda.gov, www.dhs.gov, www.nei.nih.gov, www.dot.gov, www.fedex.com, www.cdc.gov/import-permit-program/php/, <https://ehs.umich.edu/research-clinical/biological/importation-of-biological-materials/> [12,13].

The microorganism *Fusarium graminearum*: What is it?

Biology: *Fusarium graminearum*, belongs to the genus *Fusarium*, that is mostly soil fungi, pathogenic to plants causing stem and root, or fruits rot, and or, vascular wilt. Some species could be opportunistic in terms of pathogenicity in humans. Structurally, it grows as an hyphae, filamentous hyphae with colonies appearing in colors like red, or white or purple, i.e., ranging colors. Its primary form of reproduction is asexually via the production of spores. Spores are either typically multicellular (many cells), with elongated sickle-like shapes, termed, Macroconidia, or it may be smaller with one or two celled spores with oval shaped (Microconidia), or spores with thick wall, usually employed for survival in unfavorably weather or conditions, (Chlamydospore). Its ability to cause disease (the pathogenicity) is largely due to its ability to produce toxins (mycotoxin) and its ability sometimes to exist within host plants asymptomatic, without resulting in any apparent disease (endophytic nature).

Fusarium graminearum sometimes also refers to *Gibberella zeae*, is a fungus, that is pathogenic to plant primarily, like barley or wheat or other cereal crops, where it is said to cause “Fusarium head blight” disease or “scab” that can caused damages in crop production, and possibly massive economic lost. However, health impact to humans or livestock, is the effect of the toxins (mycotoxins - deoxynivalenol) that is produces, which could cause serious problems, hence many terms it as an agent that could be used for agroterrorism. Imagine if this fungus is genetically manipulated via gain-of-function, it could become a major national security issue.

Questions

The question many are asking now is how many of such biological products have since escaped custom officers, and how will this affect future transportation of useful research specimens or biological products?

Lesson learned

One of the most important lessons from the writer’s perspective is that no matter how many POE procedures or policies on the books, it takes the inner curiosity of the officers stationed at all POE, to think outside of the box, act and adapt.

Secondly, researchers must learn each country’s unique requirements for transportation of research specimens. Whether these scientists caught in the above cases had terrorism in their mind, or just wanted to conduct research, is difficult to ascertain, as this writer cannot read their intentions or mind. From, court charges, one of two of the Chinese researchers, lied or tried to conceal the truth about what was being transported into the United States. As doctoral students, they must be aware of the possible serious negative impact, their specimen, or biological products would have if it got into the agricultural system; the U.S. food base and thus the citizens health will be

adversely affected. The world is yet to recover fully from the impact of COVID-19 pandemic, with many indications, pointing to the widely once thought hypothesis, that, it was a product synthesized in the laboratory where it was released (intentionally or accidentally), into the world, starting from Wuhan, Chinese (House Report of covid origin) [14].

Criminals will always deliberately conceal their intentions. So, the security persons and citizens must be observant and curious or be alert. If you have genuine pure intentions, declare what you intend to use for scientific or pharmaceutical research on your transportation forms, or at the border to the officers. Be truthful in your declaration form.

Each government must recognize that it is very easy to bypass many procedures, thus increasing the assessment of vulnerability of each country's border security detection procedures and processes, is important. Frequent testing of all procedures and practices, for vulnerability, should be done. Staff or officers should obtain periodical training as to vulnerability assessment, updated emerging biological agents etc. Biological products, subject to the intent, could be a potential serious biological hazard to your citizens' health, potential harm to your food, water or educational systems.

With advancement in genetics or molecular biological technologies, like "Gain -of-Functions" practices, with the desire for maximal profits, or quest for domination or control, especially in the arena of "military" or pure terrorism, international or intra state POE security, must be taken seriously, by policy makers, and enforcers of procedures and practices at all POE, especially for carrier deliveries via mails or shipment.

Conclusion

In conclusion, threats are ubiquitous, so are the skills of perpetrators to avoid or circumvent known processes or procedures to achieve their mission. Microbiologists, bioengineers, etc., must employ all available technology to develop more reliable detection or deterrent equipment/procedures that can be deployed at our POE, to protect the homeland both parcel and human-borne biological agents' transportation/infiltration. Border security is national security.

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