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The Importance of China as a Biosecurity Actor

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Introduction

Any discussion of China and biosecurity cannot omit the well-known fact that the Chinese were victims of one of the worst biowarfare campaigns of the twentieth century. During the Second Sino-Japanese War (1937–1945), Unit 731 of the Japanese military dropped plague-infected fleas, aerosolised anthrax, and cholera and typhoid cultures across the country (Guillemin 2005). It is estimated that hundreds of thousands of civilians and military personnel were killed as a result. Although these attacks occurred more than a half century ago, Chinese collective memory of them remain strong and are kept alive through both political and cultural representations. Since becoming a signatory to the Biological and Toxins Weapons Convention (BWC) in 1984, Chinese statements to the Convention have repeatedly referred to its victimisation. On a more public level, the 1987 film *Men Behind the Sun*, served as a graphic depiction of the bioatrocities committed by Unit 731. The movie's explicit portrayal of Chinese suffering at the hands of the Japanese Imperial Army caused public outrage in Japan and led to death threats against the film's director. More recently, memories of biowarfare surfaced in 2003, when 29 people were hospitalised after a construction crew in north-east China inadvertently dug up Japanese-produced chemical shells that had been buried during the war.

In addition to these historical considerations, China is a crucial player in contemporary biosecurity negotiations for at least four reasons. Firstly, China has been the source of numerous emerging and re-emerging infectious diseases, SARS and H5N1 (avian influenza) being the best known. Farming practices and the live handling of fowl in southern China provide an ideal environment for viruses to jump species. Added to this,

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rapid urbanisation and heavy migration from the countryside to cities means that outbreaks could potentially spark epidemics as migrants introduce diseases into new populations. Beyond these risks, the fact that China is a source of disease outbreak also means that the number of laboratories in the country working with high risk disease pathogens will remain large, thus increasing the chances for accident or deliberate misuse.

Secondly, of equal importance to China's role as an international biosecurity actor is the burgeoning growth of its civilian and military life science and biotechnology industries – a growth perhaps best symbolised by the success of Chinese scientists in 2002 in decoding the rice genome. Massive government investment and incentive schemes have helped to lure back overseas trained scientists, resulting in a proliferation of labs. By 2000, Beijing-based genomic centres were estimated to have had more sequencing capacity than France and Germany combined (Schneider 2003). More recently, the OECD puts Chinese levels of investment in scientific research and development at US$115 billion, behind only the US and Japan, with a sustained annual growth rate of 18 per cent from 2000 to 2005 (OECD 2007). These trends will continue since Chinese leaders have sought to promote the life sciences as a key factor in the sustained growth of the national economy – and, crucially for biosecurity purposes, in its national defence. A parallel development to the trends cited above is military-related life science research. Data is hard to obtain as Beijing maintains strict control over information deemed to have security related implications. But as Cheung (2008) has shown, the civilian and defence economies are increasingly integrated to form a dual-use technological and industrial base. At the same time, the Chinese military have sought to reduce the role of the state and remove bureaucratic obstacles to help foster a more competitive and entrepreneurial culture. Their goal has been to facilitate the rapid diffusion and application of technology and knowledge for defence purposes.

A third critical element in Chinese biosecurity discussions are international concerns over the effectiveness of its regulatory environment. High profile arrests and anti-misconduct campaigns have not discouraged some from cutting safety measures in order to benefit financially. The most recent case of contaminated powdered milk is only one issue in a list of health scares from poor food production. There are similar worries in regards to the life sciences since government regulations are often open to local interpretation and uneven enforcement (Medeiros 2005). In the context of medical ethics, China has been characterised by some as the 'Wild East' – a place where procedures for recruiting volunteers and ensuring informed consent come second to potential scientific gain and personal profit (Wilsdon and Keeley 2007). For biosecurity purposes, the obvious concern here is that despite official regulations, gaps in successful implementation and loose systems of accountability could possibly result in security blunders. One challenge in overcoming this problem is that, in many cases, politics and party seem to rank higher than the law. This could be seen in the initial response to the SARS crisis when many local officials misrepresented the number of cases in their area out of fear of the political consequences and of causing damage to the Communist Party's reputation.

The fourth element worth citing is Beijing's growing use of soft power – its increasing ability to mobilise its economic, cultural and diplomatic influence to shape the international agenda. In Latin American and in Africa, Beijing has successfully usurped American influence by offering unconditional aid and development packages, as well as providing a political model to other leaders about how they can promote economic expansion without relinquishing political control. This slow but certain change in the international balance of power means that the solution to many international issues, such as North Korea's nuclear ambitions and the conflict in Darfur, have required the involvement of the Chinese. In relation to biosecurity, China has begun to play an active role in promoting non-proliferation but it remains to be seen if or how it will use its new found status to more assertively influence the actual agenda of the BWC.

These factors provide some context to biosecurity in China. In what follows, I draw on observations from interviews and discussions in Beijing, Shanghai, and Guangzhou with life scientists and policymakers in infectious disease hospitals, district level Centers for Disease Control (CDC), university research labs, the Chinese Academy of Sciences (CAS), and the Ministry of Health. The chapter aims to identify the views of Chinese scientists and government officials on biosecurity matters and attempts to highlight some of the key issues which need to be considered by those involved in promoting biosecurity awareness.[1]

Terms and definitions

One way of illustrating the difference between Chinese and general Western perceptions of biosecurity is to examine the language used to describe the phenomena. The term *shengwu anquan* is used to refer to biosafety – meaning laboratory procedures and policies aimed at reducing accidental exposures. Biosafety includes instructions on how to work with, store, and export pathogens and toxins properly in order to avoid accidents that could be harmful to people, animals, and plants. The term *shengwu anbao* signifies biosecurity – referring to the wider societal issue of the protection and control of pathogens and toxins to prevent their deliberate theft, misuse, or diversion for the purposes of biological warfare or terrorism. Biosecurity includes efforts to prevent and contain infectious disease outbreaks. It includes researchers' personal knowledge, choices and behaviour, as well as society's collective responsibility to safeguard a population from the dangers of pathogenic microbes.

As Wang Qian (2007) notes however, proper use of the terms tends to create some confusion amongst scientists and policymakers, in part since *shengwu anbao* is a newly created word. In practice, I found that many respondents were not familiar with the new term and offered widely varying opinions about what they thought it referred to. Often when *shengwu anbao* is used, it is meant to refer to issues of safety, not issues regarding dual-use or biosecurity *per se*. In addition, there seems to be a divergence in awareness depending on where one works. I found that scientists at large academic facilities tended to be slightly more aware of the new phrase and of the issues associated with it, than were scientists at smaller hospitals and district level CDCs. As we will see below, usage of these terms reflects the fact that whilst laboratory safety is on the increase in China, there remains little knowledge about the issues of dual-use or about the general security implications of biological research.[2]

Infectious disease as security concern

The difference in terminology points to another fundamental issue – that is, how Chinese microbiologists define a biorisk or a biosecurity concern. Whilst there is much fear (especially in the West) of a bioterrorist attack, the biosecurity worries in China are somewhat different. The present discourse in China is less about potential attacks than about dealing with the current and present danger of naturally occurring infectious disease outbreaks. One scientist, only half jokingly, told me that while America has many enemies, China did not – the implication being that concerns over bioterrorism were far down their list of priorities. This view was echoed by a senior director in the Ministry of Health, who had responsibility for emergency planning. His view was that infectious disease represents an 'every day' concern and that the primary challenge for his office was not the risk of attack but rather raising public awareness about disease risk and finding the resources to develop effective systems of disease prevention and outbreak response, especially in lesser developed regions.

That disease constitutes the main biological risk in China is not a surprising finding given the history of outbreaks in the country. Much has been written about the 2002/03 SARS epidemic, which infected over 8000 people worldwide and killed approximately 800. Since then, Chinese authorities have established a sophisticated disease surveillance system and a public health network that links national authorities to rural areas, where many of the vulnerabilities lie. This system allows authorities at the Centre for Disease Control and Prevention in Beijing to monitor sickness and disease patterns across the country so little intervention time is lost should an outbreak occur. As mentioned in the introduction of this chapter, the countryside is an important front in China's war on disease since the rural healthcare system has been weakened by 20 years of privatisation and fiscal decentralisation. This means that over a hundred million migrant labourers lack basic health coverage, and may be reluctant to seek treatment if unwell. This, in turn, increases the risk that a disease could be transmitted from rural to urban areas since outbreaks of many conditions tend to start in rural areas due to live animal markets and consumption patterns. SARS, for instance, is widely believed to have begun in civet cats, a delicacy in some parts of China. These twin facts – inequitable service delivery and a floating population – pose significant biosecurity-related risks, which the government has only recently begun to address through a greater investment in health insurance and rural development schemes (Kaufman 2008).

Site visits are a dramatic way to appreciate these new schemes to improve disease prevention and preparedness. In visiting the Beijing CDC, I learned that nearly one half of the 18 district labs (including both city and outlying areas) were in the process of constructing new facilities. Many of these upgrades include the installation of higher level biosafety labs, which will allow for more dangerous pathogens to be handled and stored. These higher level labs require more stringent training and safeguards for researchers and also carry the chance of greater consequences should something go awry. Such labs are not limited to Beijing. In Shanghai, the national government devoted one billion RMB to establish the new Shanghai Public Health Clinical Center of Fudan University. Formerly known as the Shanghai Infectious Disease Hospital, the Centre was expanded, re-named and re-located to 33 hectares of land, one hour outside the city (its move was, in part, because of urban residents' concerns about living next to such a facility). The Centre boasts a staff of more than 700 and houses Shanghai's first BSL-3 lab as well as a 500 capacity infectious disease hospital, with an extra 100 beds available in case of emergencies.

China's recent growth in advanced, well-regulated laboratories signifies the depth of the impact SARS has had on Chinese perceptions of biosecurity concerns. One microbiologist and biosecurity expert at the Chinese Academy of Medical Sciences explained to me that SARS was as important to China as the September 11th terrorist attacks were to the United States. He felt that the events were comparable in terms of their political, economic and psychological fall out. Although the Chinese economy continued its pattern of overall growth for 2002/03, the outbreak hit service industries such as retail and tourism particularly hard and temporarily damaged levels of investor confidence in the country (Rawski 2006). It is important to bear these points in mind when considering which issues the Chinese attach priority to, what they decide to invest in and, crucially how they assess and handle emerging national security risks. It is worth noting here that compared to their counterparts in the US and EU, Asian-based life scientists (including those in lesser developed areas of China) report that a lack of funds and equipment, as well as delayed shipments of key viral samples, due to export controls are serious problems (Sandia National Laboratories 2006). This fact stands in stark contrast to the US, which in the words of one observer, spends 'billions of dollars on the development of speculative technologies for hypothetical threats, when that money might otherwise go towards purchasing and distributing already-extant therapeutic or prophylactic technologies that would significantly impact the global burden of disease' (King 2005).

Of course none of this is to say that Western analysts and policymakers do not take infectious disease seriously as a national security issue. The linkages between disease and security have attracted much attention recently (Kelle 2007; Davies 2008; Selgelid and Enemark 2008; Cecchine and Moore 2007). Most notably, in 2004, the BWC itself highlighted the nexus between disease and security and called for infectious disease outbreaks to be contained through early detection, strengthened networks of surveillance, and immediate response systems at the national and international level. As the UN aptly framed the issue, 'the security of the most affluent state can be held hostage to the ability of the poorest State to contain an emerging disease' (UN 2004: 14).

The point worth making here is that in China, these concerns are not merely hypothetical. The issue is twofold. First, there are the bare facts regarding the sheer number of mortalities. The death toll from infectious disease in China alone far exceeds the number of global deaths from all acts of terrorism. In 2007 alone, the Chinese Ministry of Health estimated that nearly four out of every 1000 people were diagnosed with an infectious disease – 13,000 of which died. Arguably, as Western governments consider themselves on the 'front-line' of a war on terror, China considers itself on the 'front-line' of a war on disease. Second, there is also a security risk associated with the spread of disease in politically sensitive areas, which are already prone to public demonstrations and protests. Rates of HIV and Hepatitis B, for example, are particularly high in areas such as Xinjiang in north-west China (Gu and Renwick 2008). Some Chinese officials contend that Muslim insurgent groups in Xinjiang pose one of the biggest security threats to the country. Whatever one thinks about the authoritarian tendencies of the Chinese leadership, the point here is that from Beijing's perspective, there is a definite link between disease and security, as anything which promotes social unrest and instability is a threat to the legitimacy of the Communist Party rule.

Although, as I have indicated, China considers disease to be its main biological risk and has thus invested heavily in its capabilities to study and contain pandemics, the sudden growth in this sector has also opened potentially serious gaps in biosecurity. In the remainder of the chapter, I shall examine China's role in the BWC and the merits and challenges associated with national legislative efforts to promote biosecurity.

Building biosecurity awareness

After initially criticising the BWC as a 'fraud' and an example of 'sham disarmament' for not prohibiting the actual use of biological or chemical weapons, China eventually joined the BWC in 1984 with the stipulation that it would cease to be binding in regard to any enemy states whose armed forces or allies do not observe the Convention's provisions. Unfortunately, since that time there have been some doubts as to the veracity of Chinese claims regarding its own research facilities. Although Beijing has consistently claimed that it never researched, produced, or possessed biological weapons, US intelligence believes that China maintained an offensive biological weapons programme based on technology developed prior to its accession to the BWC. These reports have never been confirmed, though they were echoed by Ken Alibek, the former director of a Soviet germ-warfare programme. He claims that China suffered a serious accident at a biological weapons plant in the late 1980s, resulting in two epidemics of hemorrhagic fever. According to Alibek, whose claim remains unsubstantiated, Soviet analysts had concluded that Chinese scientists had been attempting to weaponise viral diseases when their experiments went awry (Broad and Miller 1999).

Dispute also arose in 2002 when the US imposed sanctions on three Chinese firms accused of supplying Iran with materials used in the manufacture of chemical and biological weapons. In the same year, China's main legislative body, the State Council, passed two sets of regulations on dual-use (State Council of China 2002a, 2002b). Moves to formulate these regulations preceded US sanctions but in passing them, Chinese leaders recognised their significance in fulfilling 'China's international non-proliferation obligations' and in promoting 'normal trade and economic co-operation' (People's Daily 2002). The regulations contained measures to strengthen export controls to prevent the diversion of dual-use biological agents, related equipment, and technologies which could be used in weapons production. It also included an export licensing system and provisions for the criminal prosecution of domestically-based violators. Significantly, the export control list covered within the regulations provided an extensive list of pathogens and toxins, thus putting China in accord with control lists of the Australia Group (to which it still does not formally belong). The dual-use legislation is a good example of how China has adapted to international norms, which is befitting of its increased stature and of its emergent role in international organisations. In political science terms, it is evidence perhaps that China seeks to be a *status quo* actor. However, despite these new laws, there are of course many obstacles and challenges for the promotion of biosecurity and biosafety in China.

A good example is that in 2004, a batch of the SARS virus at the National Institute of Virology in Beijing, mistakenly thought to have been inactivated, was moved from a BSL-3 storage container to a non-regulated lab where medical students were working on diarrhoeal diseases. The breach of security subsequently resulted in eight infections and one death, as well as the temporary closure of the Institute and quarantine of over 700 individuals suspected of coming into contact with the virus. The problem was not a failure of equipment, technology, or insufficient regulations – instead, it was the result of human negligence.

One microbiologist at Fudan with an interest in security issues, refers to this problem as a laboratory without 'software'. Her meaning is that much attention has been paid to the so-called 'hardware' – the building of hi-tech labs, autoclaves, cabinets, locks, doors, and so on – while the human element has been neglected. That is, the behaviour, management skills, expert knowledge, and duties of care needed to safely operate high level laboratories have not kept pace with the introduction of new facilities.

A key point, however, is that the element of human 'software' includes much more than laboratory safety. Yet statements by the Chinese Delegation to the BWC Meeting of Experts (2008b) show that their focus is almost entirely on safety, not the wider issue of dual-use. According to their declaration, biosecurity 'education and awareness raising' refer solely to 'laboratory safety management and technical training, biosafety licensing, preparedness for health emergency and response and veterinary biosafety'. These efforts are obviously important and are to be supported. However, like other countries with growing biotechnology sectors, China has yet to fully embrace educational measures and codes of conduct aimed at addressing a broader agenda of oversight of the life sciences and how biological research might be exploited for illegitimate purposes.

A small number of top universities and scientific associations, including CAS have sought to establish an internal code of ethics which aims to promote scientific ethics, as well as the integrity and moral character of staff. CAS has also set up a special commission for scientific integrity to promote transparency, autonomy and accountability of scientific research. These types of codes are to be encouraged and broadened to specifically promote dual-use awareness. Yet it must be noted that CAS is essentially the scientific arm of the government, supported by the State Council itself, and considered to be the most prestigious scientific institution in the country. Whilst bodies like CAS may set a useful example, the real challenge lies in reaching provincial and district level laboratories, especially outside of the main urban settings, where it is harder to monitor activities. It is useful to note, for example, that a 141-page biosafety and biosecurity booklet distributed to Beijing area hospital laboratories shortly before the Olympics is dedicated entirely to *shengwu anquan* (biosafety) and disease control (Beijing CDC 2007). No mention is made of biosecurity (*shengwu anbao*) or the possibility of dual-use of facilities or research findings. Based on this evidence at least, raising biosecurity/bioterrorism awareness at the level of hospital laboratories has, unsurprisingly, some distance to go yet.

This point can be re-emphasised by again examining statements made by the Chinese Delegation at the BWC meeting (2008a). Their declarations defined 'training in biosecurity' as 'knowledge of relevant laws and regulations, licensing systems, and protective skills'. This is important of course, but knowledge of relevant laws is not enough. A further 'software' problem is the challenge of legal enforcement. This is not a new problem, nor is it unique to China. But there are no less than 53 government sponsored regulations and laws pertaining to biosecurity and biosafety in China, the vast majority of which were passed after the SARS outbreak.

With seven different government ministries publishing regulations and laws related to infectious disease, there is clearly a need for officials in Beijing to decide how best to streamline the system. As Julie Fisher aptly argues, the implementation of the new biosafety and biosecurity regulatory framework at the local level in China may well pose problems of successful implementation, 'particularly if the framework is applied, as it should be, to the full range of laboratories that work with highly contagious infectious diseases. Without a well-designed plan and resources to ensure effective implementation of regulations and oversight of practices at all levels in China', advances in biosecurity and biosafety 'will, quite frankly, serve no purpose'. (Fisher 2007: 136)

Conclusion

The objective of codes of conduct and protective oversight systems are to provide reassurance that scientists pay attention not only to biosafety in their labs, but also to the broader public health and security implications of their research. In the course of presenting biosecurity lectures to staff and students in China, it was clear that they had given very little thought to their own responsibilities in the dissemination of their work or to the wider agenda beyond disease control. In this way, my findings support Dando and Rappert's (2005) study which found that academic life scientists in the UK and elsewhere are generally ill-informed about the potential destructive use of their research findings and techniques, and tend to believe that the advancement of science is inevitable. Moreover, many of the Chinese life scientists I interviewed were not particularly concerned about the dual-use implications of their work and did not regard 'bioterrorism' or biological weapons as substantial threats. The reasons for this varied but as in the West, many scientists in China tend to view scientific progress as inevitable and generally think that pressures to publish and present findings mean that research will, one way or another, be conducted and find its way into the public domain. These findings are also in line with a recent survey of over 300 Asian life scientists that found that there was better awareness of laboratory biosafety issues compared to biosecurity and that overall, awareness levels and perceived threats about biological terrorism remained very low (Sandia National Laboratories 2006).

This chapter has highlighted the importance of China as an international biosecurity actor and drawn attention to the fact that Chinese biosecurity concerns, whilst mindful of terrorism and deliberate misuse, are nonetheless focused more on current and present dangers of disease control and prevention. However, I have also argued that good biosecurity practice also entails a need to promote responsibility for the outcomes of research and the development and effective implementation of codes of conduct, which address issues far wider than mere lab procedures. It is not difficult to imagine research findings falling – or being sold – into the wrong hands or a lab accident causing a disease outbreak or published results giving unintended assistance to those who seek to use the life sciences as weapon. Thus, developing security awareness amongst the Chinese life science community is a crucial part of strengthening the biosecurity web of prevention and ensuring that regulations are enforced in all labs and areas of biological research.

Notes

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2 My own use of the terms biosafety and biosecurity in this chapter are thus: I use biosafety to refer to issues of lab procedures and accidental exposures. I use biosecurity a bit more loosely, to refer to the collective responsibility to safeguard populations against dangerous pathogens, whether they derive from naturally occurring disease or from intentional acts of bioviolence.

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