British Pugwash Group

2010 Science, Ethics and Politics Competition
Voice Your Vision: What advice would you give the next British Government on a key science or technology topic?

Essay Title

Preventing the development and use of Biological Weapons in the 21st Century: Ethics, Life Scientists and the Role of Next British Government

Authors

Masamichi MINEHATA[1] & James REVILL[2]

Executive Summary

Just as the information technology revolution profoundly affected the 20th Century, so biotechnology, with its growing capacity to enable humankind to understand and manipulate the fundamental life processes, looks set to have a significant impact on the 21st Century. It offers great benefits, giving a potential means of responding to societal challenges, such as those related to illness, hunger, poverty and energy. Yet at the same time, it is also generating a range of direct and indirect technological advances which in combination, could increase the strategic utility of biological weapons and hence increase the likelihood that such weapons will be incorporated into the military arsenals of states (and perhaps also of terrorist groups) in the 21st Century.

This essay outlines a number of practical steps that the next British Government could undertake to sustain the UK's leading role in responding to the global challenge of biological weapons in the 21st Century. It begins by highlighting salient changes in both science and security that have potentially enhanced the prospects for the incorporation of biological weapons. It then underlines the crucial importance of engaging with life scientists on their ethical responsibilities, at a time when the challenge of biological weapons cannot be dealt with by governments alone, but rather requires activity at a range of different levels from the 'individual to the international'. In this connection, it examines the role (and limits) of ethics, awareness raising and education. Finally, this essay concludes with a set of recommendations which could be undertaken by governments and individuals as part of an effort to prevent the exploitation of biotechnology in warfare in the 21st Century.

Changing Science, Changing Security

Just as the information technology revolution profoundly affected the 20th Century, so biotechnology, with its growing capacity to enable humankind to both understand and manipulate the fundamental life processes, looks set to have a significant impact on the 21st Century, and fundamentally change the nature and ownership of the life sciences. It is apparent that the life sciences are no longer the preserve of developed western states; but rather they are increasingly being acquired, for legitimate reasons, by a number of states across the globe, and are often located within the private sector. Because of the potential of what has been termed the 'new biology' to respond to societal challenges such as health, the environment, food production and even energy,[3] it is clear that the great majority of scientific research in this area cannot and should not be stopped. Indeed, the capacity of the life sciences to respond to many of the interlinked and interconnected challenges to security and stability – e.g. poverty, the spread of infectious diseases such as HIV/AIDS, Avian Influenza and climate change – means that we must avoid neo-Luddite agendas, but rather promote the globalisation of safe, secure and peacefully orientated biotechnology.

Yet these beneficial effects co-exist with a spectrum of technological advances which, taken together, give biology the potential to be applied as a weapon. Equally important are those seemingly indirect peripheral developments, which could potentially be malignly applied to create new biological weapons.[4] Three examples have frequently been cited of 'dual use' biological research – military/civil use (or more broadly peaceful/malicious use of science):[5] mouse-pox IL-4 Synthesis;[6] research into the 1918 Spanish Flu virus;[7] and the creation of a synthetic polio virus "in just two weeks".[8]

In parallel with the changing landscape of the life sciences, there has been a significant shift in the fundamental nature of conflict, and the emergence of a new international security scene. Over the course of the Cold War, national security threats faced by the British Government remained primarily defined by "a known adversary and the threat of nuclear war and other weapons of mass destruction (WMD)".[9] In contrast, in the current post-Cold War, post 9-11 environment, the security challenges are much more complex, with a broadening of the categories of actors that are perceived as posing a threat to security, from an ideological block to a broader range of actors, including individual states, organisations or even individuals.

This is further complicated by profound change in the way in which security and conflicts are now conceived. The concept of security has been broadened as a result of a wave of new challenges, including violent acts undertaken or threatened by international terrorists, ethnic conflicts, illicit trafficking networks, and failed and/or persistently failing states. These issues are further compounded by a number of less palpable yet interlinked challenges, such as poverty, the spread of infectious diseases such as HIV/AIDS, Avian Influenza, and climate change.

Contemporaneously, there has been a fundamental shift in the nature of conflicts: tank warfare or naval battles are now rare. By contrast, what Kaldor describes as 'new wars' have become prevalent. In new wars, "battles are rare and […] most violence is directed against civilians as a consequence of counter-insurgency tactics or ethnic cleansing [...]. They are wars where the distinctions between combatant and non-combatant, legitimate violence

and criminality are all breaking down."[10] The failure of conflicting parties in these 'new wars' to make these distinctions has the potential to generate several challenges to prohibitions on the use of biological and toxin weapons.[11]

The experience of 'new wars' in the 21st Century is pushing state actors towards new technological measures to enhance their war-fighting or riot control capabilities. Already states have begun investing extensive resources in re-equipping their military forces for conflicts that are "radically different from those envisaged in the cold-war era".[12] In the long term, frustration with existing warfare technology could shift the balance between the incentives and disincentives when considering novel biochemical means of waging warfare (including so called 'non-lethal' forms of warfare) to respond to short term challenges,[13] irrespective of their longer-term consequences for arms control and the longstanding, cross-cultural moral taboo on biological weapons.

Given this analysis of the evolving scientific and security contexts, it is argued that the life sciences increasingly present a security/insecurity paradox. On the one hand, the life sciences are increasingly important in responding to the underlying causes of instability and insecurity around the world; yet on the other hand, advances in the life sciences, taken together, have the potential to create more effective tools of warfare and terrorism in the new wars that characterise the 21st Century.

Ethical Role of Scientists in the Prevention of a Biological Weapons Future

Whatever else[14] may be required to deal with the challenge of biological weapons, it is certain that greater engagement from life scientists will be required, and this will have to include a fundamental shift from the idea that science is 'value neutral' to the idea that scientists have to assume responsibility for their work. As the late Joseph Rotblat boldly stated in 1999, "This amoral attitude is in my opinion actually immoral, because it eschews personal responsibility for the likely consequences of one's actions".

Dealing with the challenge of biological weapons thus requires action at the level of the scientific community, as well as the maintenance of collective political will at the level of states. One critical expression of such collective will from the international community can be found in the solemn declaration of the Biological and Toxin Weapons Convention (BTWC), in which States Parties agreed firstly to "never in any circumstances to develop, produce, stockpile or otherwise acquire or retain [or use]… Microbial or other biological agents, or toxins whatever their origin or method of production"; and secondly, to begin the process of actively engaging and informing members of the life science community of their responsibilities.

The Awareness Deficit

Achieving effective and meaningful engagement requires scientists to be cognisant of the concerns of the security community and vice versa. Unfortunately, despite growing interest internationally in the concept of education on the 'dual use' problem, there has not been commensurate activity undertaken by states to deal with this challenge. Rather, there remains a deficit in life scientists' awareness of the concerns of the security community, the prohibitions embodied in the BTWC and indeed, about how research can be malignly

applied. This deficit has been alluded to by a number of States Parties to the BTWC (particularly by Australia,[15] the UK and the Netherlands[16]) and in the work of academic and policy organisations. Indeed, surveys on biosecurity education in universities in Europe,[17] Japan[18] and Israel[19] have demonstrated the lack of education on dual use issues for life scientists, and have suggested that there are a number of obstacles to the introduction of such education, including:

- A shortage of space in the existing curricula;
- A lack of time and resources to develop new curricula;
- An absence of expertise and available literature on biosecurity education; and
- The existence of doubts over biosecurity education.

This view has been reinforced by recent research conducted in the UK, which has suggested that many (but not all) life science lecturers and course coordinators feel that topics, such as biosecurity, dual use and biological weapons, are either irrelevant or of limited relevance in a life science degree.[20]

The Role (and Limits) of Ethics

Notwithstanding the current weaknesses in biosecurity and dual use education in the scientific community, teaching on bioethics is relatively widespread, and this could play an important role in informing and shaping the perspectives of the community of life scientists. Unfortunately, in their current form, some though not all, of the bio- or medical ethical frameworks employed in teaching on the issue of biological and toxin weapons run counter to the legal and normative principles enshrined in the BTWC and the Geneva Protocol. Michael Gross for example, speaks of 'biodeterrence'[21] whereas Larry May[22] *et al* have quoted the language of Grotius who has suggested that the prohibition on biological weapons "originated with kings, whose lives were better defended by arms than those of other men, but are less safe from poison".

Ethics is not the same as law, and in contrast to empirical scientific research, ethics does not provide concrete answers. Rather, it remains a process that involves evaluating competing interests and factors without necessarily producing quantitative or incontrovertible answers. As Dr Vivienne Nathanson has said, "one of the many joys of bioethics is that it does not give final answers to questions but posits arguments and analysis for others to support or oppose".[23] In this regard, medical and bioethics could offer a pragmatic and practical space for building awareness at the level of life science students, yet at the same time requires a critical mass of literature and stronger analytical frameworks that are consistent with the broader legal and moral prohibitions on biological warfare.

Dealing with Dual Use: Recommendations to the Next British Government

Successive British governments have sustained a longstanding record of global leadership in dealing with the challenges of (chemical and) biological weapons which dates back to at least the aftermath of the First World War.[24] Given the challenges faced above, the next British Government needs to sustain this leading role in the early 21st Century, not least because the UK remains one of the global leaders in the life sciences. This could be achieved by pursuing the following actions, which are discussed in more detail below.

1. Reaffirm an unequivocal renunciation of all biological and toxin weapons;

2. Engender greater clarity on the role of biochemical incapacitants and other peripheral technologies;
3. Engender transparency (as far as possible), and also accountability, in biodefence activity, and encourage other states to do the same;
4. Engender a consensus on the feasibility of the compliance confirmation envisaged in the BTWC;
5. Encourage scientists to assume greater responsibility for their activities;
6. Encourage complementary bioethical and biosecurity education in higher education at a range of intervention points;
7. Promote safe, secure and peaceful life science research around the world.

These steps would maintain the British government's role as a global leader in dealing with the challenge of biological weapons at the level of states. It would also demonstrate leading by example, and exercise a top-down influence to stimulate a bottom-up effort to prevent the misuse of the life sciences, and build a 'culture of responsibility' amongst the life science community, both domestically and abroad.

1. Reaffirm an unequivocal renunciation of all biological and toxin weapons

Successive British governments, regardless of political affiliation and context, have reaffirmed the prohibitions agreed under the BTWC and the Geneva Protocol. It will be important for the next British government to follow suit, and unequivocally and explicitly reaffirm its commitment under the relevant international treaties. Ambiguity on the part of any future British Government over this commitment would be highly damaging, and would send the wrong signals (regardless of intention) to other states.

2. Engender greater clarity on the role of biochemical incapacitants and other peripheral technologies

Related to the above recommendation, it would be useful to engender clarity on, and seek consensus with other states parties to the BTWC, around the seemingly peripheral issues of so-called non-lethal incapacitating weapons (specifically peptides and bioregulators) and anti-materiel weapons, which can be considered as falling within the scope of the BTWC and the Chemical Weapons Convention. To date consensus on the position relating to these growing spheres of research has been based on assumptions, which may or may not be shared, and it remains questionable whether assumptions are a sufficient basis upon which to operate in the future.

3. Engender transparency (as far as possible), and also accountability, in biodefence activity, and encourage other states to do the same

Biodefence is a legitimate undertaking under the BTWC, nonetheless, certain aspects of biodefence research appear to have pushed the boundaries of permitted research and begun to tinker with the 'dark art' of offensive weapons development. Because the rationale, necessity and context for offensively orientated research have been shrouded in secrecy, the lack of information has tended to send damaging signals to others states. Interpretation of such signals has historically been significant. As Guillemin has pointed out, "One frequent justification for developing strategic biological weapons was the suspicion that an aggressive enemy had already armed itself with similar weapons."[25] So it will be important to avoid pushing states into undertaking reciprocally ambiguous research, which

could delve "even more deeply in shadows?"[26], and in the longer-term spawn a biological arms race for humanity to lose.

4. Engender consideration on and consensus around the feasibility of compliance confirmation envisaged in the BTWC

The issue of verification remains a divisive issue within the BTWC forum and the resurrection of the decade of work done under VEREX and the Ad Hoc Group on a Verification protocol would be difficult for both political and practical reasons. Yet, in 2006 States Parties managed to move past the "verification impasse"[27] and during the second inter-sessional process which is currently underway in the BTWC, conditions may be more conducive to begin an incremental process of constructing a mechanism through which compliance could, to some extent, be assessed. Any new process must seek to exploit both new scientific advances in detection technology but also the growing concerns of states around the world over the threat of biological weapons.

5. Encourage scientists to assume greater responsibility for their activities

Beyond the assumption of a leading role at the international level, it will be important for the next British government to lead by example in terms of domestic policy at the level of individual scientists. Scientists have long presented the case that science, but particularly biology, is 'value neutral'. Although historically this may have been defensible, the acceleration of capacity to convert pure research into applied technology suggests that this is no longer an adequate response, and that scientists can no longer "eschew personal responsibility for the likely consequences" of their research.

6. Encourage complementary bioethical and biosecurity education in higher education at a range of intervention points

One practical step that could contribute to building a sustainable culture of awareness and the assumption of greater responsibility amongst the next generation of life scientists would be through the promotion of complementary biosecurity and bioethics teaching within the academic life science curricula. This does not require a significant change in existing educational structures or syllabi, but rather the modest extension of university course content to include laws and regulations of direct relevance to scientists, as well as the dual-use nature of elements of life science research. Any activity must be developed through a process of engagement with life science academics and be complemented by activity at a range of different intervention points, particularly the life science literature and the criteria for funding of scientific research. Cumulatively activity at each of these intervention points over time is likely to build both best practice and resistance to engaging in offensive weapons activities.

7. Promote safe, secure and peaceful life science research around the world

The achievements of biotechnology suggest that it would be wrong to deny states the right to exploit new technology to respond safely and securely to local challenges. In any case, there are serious limitations in the capacity of a state to control intangible exports, as is indicated by the impossibility of wholesale policing of the internet. Under these circumstances the best approach is to engage proactively in the peaceful exchange of scientific knowledge and technology, in order to promote safety and security standards and build relationships between scientific communities. This practice has had a remarkably

fruitful history in terms of resolving ambiguities.[28] As the adage goes, "if you cannot beat them join them". Accordingly, the final recommendation is for the next British government to encourage a shift away from regarding the proliferation of 'dual use' expertise and technology by states as the mark of a pariah or a so-called 'rogue state'; towards emergence of a paradigm in which safe, secure and peaceful international scientific cooperation and bilateral scientific engagement becomes the mark of a paragon.

Conclusions

There have been profound changes in both security and the life sciences, so the next British government will need to wrestle with the complex scientific, ethical and political issues related to biotechnology and biological weapons. Preventing the growth of biotechnology is not an option; it would be both technically difficult and ethically irresponsible to deny states the means to respond to societal challenges. Accordingly, the next British government will need to consider how biotechnology can be subject to controls so as to ensure that it is safe and secure, and that it is only applied for peaceful purposes. This requires leadership at both the international and the national level. Internationally, the next British government could assume a leading role in dealing with biological weapons through building a consensus on the scope of the BTWC, the limits of biodefence and how compliance could be assessed. In addition, the next British government should also lead by example at the national level. This could be achieved through engaging and encouraging scientists to assume greater responsibility for their research activities, and promoting awareness-raising and educational strategies which will to build an ethical culture of awareness among the next generation of life scientists both in the UK and abroad.

References

[1] Masamichi Minehata is a post-doctoral research fellow with the Department of Peace Studies of the University of Bradford, UK. From December 2010, he will be a Sasakawa Peace Foundation (SPF) Research Fellow with the Pacific Forum-Center for Strategic and International Studies (CSIS), USA. Contact m.minehata@bradford.ac.uk

[2] James Revill is a research fellow with the Harvard Sussex Program (HSP), Science and Technology Policy Research (SPRU) at the University of Sussex, UK and a consultant to the Landau Network-Centro Volta, Como, Italy. Contact j.revill@sussex.ac.uk

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