

Ethical and Philosophical Consideration of the Dual-Use Dilemma in the Biological Sciences

Seumas Miller • Michael J. Selgelid

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Seumas Miller
Centre for Applied Philosophy and Public
Ethics
Charles Sturt University
The Australian National University
Canberra ACT
Australia

Michael J. Selgelid
Centre for Applied Philosophy and Public
Ethics
Menzies Centre for Health Policy, and
National Centre for Biosecurity
The Australian National University
Canberra ACT
Australia

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Contents

Acknowledgements	v
Executive Summary	1
1 Introduction	9
2 Experiments of Concern	17
3 The Ethics of Dual-Use Research	31
4 Dissemination of Dual-Use Research Results	39
5 Options for the Regulation of Dual-Use Experiments and Information	49
Bibliography	65
Index	73

Executive Summary

What Is the Dual-Use Dilemma?

The so-called “dual-use dilemma” arises in the context of research in the biological and other sciences as a consequence of the fact that one and the same piece of scientific research sometimes has the potential to be used for harm as well as for good.

A dual-use dilemma is an *ethical* dilemma, and an ethical dilemma for the *researcher* (and for those who have the power or authority to assist or impede the researcher’s work, e.g., governments). It is an *ethical* dilemma since it is about promoting good in the context of the potential for also causing harm, e.g., the promotion of health in the context of providing the wherewithal for the killing of innocents. It is an ethical dilemma *for the researcher* not because he or she is aiming at anything other than a good outcome; typically, the researcher intends no harm, but only good. Rather, the dilemma arises for the researcher because of the potential actions of *others*. Malevolent non-researchers might steal dangerous biological agents produced by the researcher; alternatively, *other* researchers—or at least their governments or leadership—might use the results of the original researcher’s work for malevolent purposes. The malevolent purposes in question include bioterrorism, biowarfare and blackmail for financial gain.

In the aftermath of the 11th September 2001 attacks and the subsequent anthrax letters episode in the US, bioterrorism is widely considered to be a real threat, especially to populations in western countries. Moreover, it is seen as a more likely threat from non-state terrorist groups than, say, nuclear weapons of mass destruction, given the availability of the technical knowledge necessary to produce the relevant biological agents and the feasibility of weaponisation. (In this report we assume terrorist acts could be performed by state actors as well as non-state actors. This is consistent with the definition given in the Commonwealth of Australia Criminal Code 1995.)

Aims and Scope of This Report

In general terms, the aims and scope of this report are to provide a reasonably comprehensive array of (possibly competing) answers to the following questions:

(A) Morally Impermissible Research:

- What, if any, research in the biological sciences that does *not* give rise to a dual-use dilemma is morally impermissible, e.g., research undertaken for purely offensive military purposes?
- What is the dual-use dilemma in the biological sciences, and in what categories of research does it arise, e.g., experimental research undertaken to assist in the combating of mice plagues that might in fact result in the development of a more virulent form of smallpox?
- What are the moral and other considerations in play in these various categories of research that give rise to dual-use dilemmas, e.g., potential to save human life versus potential to destroy human life?
- In light of these considerations what, if any, research in the biological sciences that gives rise to dual-use dilemmas is morally impermissible?
- Who is to decide what research, if any, in the biological sciences is morally impermissible, e.g., biosecurity committees?

(B) Physical and Regulatory Conditions under which (Permissible) Experiments of Concern Ought to be Undertaken:

- In relation to the various categories of *prima facie* permissible research that, nevertheless, give rise to dual-use dilemmas, what are the safety and security—and associated regulatory—conditions under which this research ought to be undertaken, e.g., background checks and security clearance for research personnel?

(C) Dissemination:

- What are the moral and other considerations in play in relation to the ownership rights (intellectual property) of permissible, safe and secure research in the biological sciences that, nevertheless, gives rise to dual-use dilemmas?
- What are the moral and other considerations in play in relation to the dissemination of findings from permissible, safe and secure research in the biological sciences that, nevertheless, gives rise to dual-use dilemmas?
- In relation to permissible, safe and secure research in the biological sciences that, nevertheless, gives rise to dual-use dilemmas what, if any, restrictions ought to be placed on dissemination of research findings?
- In relation to permissible, safe and secure research in the biological sciences that, nevertheless, gives rise to dual-use dilemmas who ought to decide what, if any, research findings ought not to be disseminated or ought to have restrictions placed on their dissemination?

Experiments of Concern

In relation to the dual-use dilemma in the biological sciences, the approach of the US National Research Council (NRC) in its influential 2004 report, *Biotechnology Research in an Age of Terrorism*, is to map the range of dual-use

dilemmas by identifying and taxonomising a set of salient “experiments of concern”. We accept this approach in the context of our attempt to isolate the morally permissible from the morally impermissible in relation to dual-use research in the biological sciences.

According to the NRC report “experiments of concern” are those that would:

1. Demonstrate how to render a vaccine ineffective
2. Confer resistance to therapeutically useful antibiotics or antiviral agents
3. Enhance the virulence of a pathogen or render a non-pathogen virulent
4. Increase the transmissibility of a pathogen
5. Alter the host range of a pathogen
6. Enable the evasion of diagnosis and/or detection by established methods or
7. Enable the weaponization of a biological agent or toxin [102].

Other possible categories are:

8. Genetic sequencing of pathogens
9. Synthesis of pathogenic micro-organisms
10. Any experiment with *variola* virus (smallpox) or
11. Attempts to recover/revive past pathogens.

Ethical Analysis of Dual-Use Research

Fine-grained ethical analyses of dual-use research in the biological sciences would seek to *quantify* actual and potential benefits and burdens, and actual and potential recipients/bearers of these benefits and burdens. These analyses would also identify a range of salient policy options. Each option would embody a set of trade-offs between present and future benefits and burdens, and recipients and bearers thereof. The construction of these options and the process of selection between them would consist in large part in the application of various ethical principles, including human rights principles—e.g., right to life, freedom of inquiry, and free speech—and principles of utility and justice.

We are not in a position to provide such fine-grained ethical analysis but will rather focus (somewhat simplistically) on a single ethical consideration—namely, human health (including human life)—that gives rise to the dilemma, and we will do so without exploring questions of which human populations or how many individual humans have benefited/been burdened or are likely to benefit/be burdened, and so on. Viewed from this perspective the dual-use dilemma concerns human health (as a simple, unquantified human good), and the dilemma consists in the fact that research undertaken to promote human health might instead be used to destroy human health. As such, the dilemma gives rise to questions of security. What are reasonable and ethically justified forms and degrees of security in this context?

The above mode of analysis of the dual-use dilemma consisting of the quantification of harms and benefits, the identification of salient options, and the selection