20. Ethics as …

Brian Rappert

The contributions to *On the Dual Uses of Science and Ethics* have extended an invitation to dwell on a matter of much importance: the unity of knowledge. Each chapter has considered the potential for the skills, know-how, information and techniques associated with modern biology to serve contrasting ends. Each has spoken to steps that might be undertaken to prevent the deliberate spread of disease. A recurring message has been that, to date, the discussion about the 'dual-use' potential of the life sciences has been characterised by silences and absences. To be sure, while some researchers and policymakers have devoted attention to this topic for years, overall the regard is patchy and problematic.

But as the title of this volume advocates, as we attend to the multiple purposes served by the life sciences, parallel regard should be directed towards those served by ethics. Another theme of *On the Dual Uses of Science and Ethics* has been that, to date, the ethics discussion about the multiple potentials of the life sciences has been characterised by silences and absences. This book has sought to redress the state of analysis by bringing together individuals with varied backgrounds. Some have been trained as ethicists but had given little prior attention to the destructive applications of science, while others had long mulled over this topic but not directly informed by the discipline of ethics. As part of building the debate, the contributors have asked what role ethics (particularly bioethics) might serve in averting the deliberate spread of disease.

Part reflection on the preceding chapters, part analysis of the wider literature, and part programmatic agenda setting, this concluding chapter addresses how the history, methods and practices of bioethics could enrich current dual-use deliberations. This is conceived as a two-way exchange. The queries, uncertainties and anomalies raised by examining the unity of knowledge will also be approached for what they tell us about the preoccupations of bioethics. Through this the limits of bioethics, how it must adapt and what is at stake in suggesting 'change' is required will be considered.

In asking about 'uses', regard will also turn to possible 'abuses' of bioethics. Efforts to bring to bear the intellectual resources from this tradition come with their own dangers. The assumptions informing normative approaches, how they are positioned to justify courses of (in)action and the blind-spots of analysis are just some of the reasons for holding together worries about the direction of ethics and the life sciences. For instance, one of the common ways bioethics has positioned itself as a discipline is as an intellectual response to new innovations

in science and technology.[1] Ethicists then set out to offer needed analytical responses to the latest challenges cropping up. Yet, this 'techno-origin myth'[2] risks becoming blind to the organisation, funding priorities, agendas and purposes of ethics.

This chapter sets about to accomplish the above aims through a four-part analysis. The next section begins by scrutinising assumptions informing the contributions to *On the Dual Uses of Science and Ethics* as well as other commentaries. Undertaking this critical turning back is vital if we wish to set a productive program for the future. Section three asks how normative and empirical approaches can be reconciled in efforts to prevent the destructive application of the life sciences. The fourth section considers the potential dangers associated with promoting greater bioethical attention to dual use. Informed by the analysis that precedes it, the final section sets out a path for future intellectual and practical engagement. That path entails attending to the whys and hows associated with what is 'not': a) what is *not* recognised as posing a concern in the first place or, if recognised at some level, b) what is *not* treated as a problem, and c) if regarded as a problem then what is *not* acted upon.

Questioning beginnings

This section begins by undertaking a central task for robust ethical analysis: scrutinising presumptions.

1. Categorical condemnation

The contributors to this volume have begun with a normative position that has itself attracted little attention: the categorical unacceptability of biological weapons. This overall evaluation is codified in the 1972 Biological and Toxin Weapons Convention (BTWC) that forbids states from acquiring or developing bio-agents and toxins for hostile purposes.

Within international diplomacy, policy deliberation and academic study, the attribution of an 'abhorrent' or an 'inhumane' standing to these weapons is commonplace (as in van der Bruggen's chapter in this volume). While some have impugned the political expediency of the categorical prohibition of bioweapons vis-à-vis the laxer controls for nuclear weapons (which still enable

1 See Borry, P., Schotsmans, P. and Dierickx, K. 2005, 'The birth of the empirical turn in bioethics', *Bioethics*, vol. 19, no. 1; and Kushe, H. and Singer, P. (eds), *A Companion to Bioethics*, Blackwell, London.

2 de Vries, R. 2007, 'Who will guard the guardians of neuroscience? Firing the neuroethical imagination', *EMBO Reports*, vol. 8, S65–9.

retention by major military powers),[3] biological weapons are rarely portrayed as anything other than illegitimate today. That recent diplomatic accusations about the existence of offensive programs all refer to clandestine ones illustrates this exceptional status. With this now longstanding global rejection in place, little in the way of justification is treated as necessary for condemnation. When argument is given, it often amounts to a restatement of the cardinal assertion that inflicting death and injury to life through life is qualitatively different than other means of harming.[4]

Given this normative starting *ought*, it is hardly surprising that discussion about the possible contribution of the life sciences to the spread of disease is characterised by a binary language of 'use' and 'misuse'. This stark language would be out of place for many elsewhere. The systematic engineering of cross-fertilisation between civilian science and war-fighting capabilities has been a longstanding mission of many national innovation policies since World War II.[5] When Colwell commented that weaponising bio-agents 'violates the fundamental values of the life sciences that I and my colleagues hold dear: that science is a vital tool for improving life and health of our planet and enhancing our understanding of the natural world'[6] in a report for the US National Academy of Science, the reference to the life sciences would no doubt be widely shared in North America and much further afield. Generalising this sentiment against weaponisation to 'science' as a whole would, however, be far out of line with scientific practice.

In the past though, the moral standing of what would today be labelled as biological weapons was more contested. In a wide-ranging analysis, for instance, Zanders argued that the condemnation of biowarfare over the ages has never been uniform or absolute.[7] Within the twentieth century, scientists, medics and others have found ample justifications for their willingness to participate in large-scale programs. Patriotism, civilian spin-offs and even the belief that (at least some) bioweapons represented more humane alternatives were among the

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3 See Falk, R. 2001, 'The challenges of biological weaponry', in S. Wright (ed.), *Biological Warfare and Disarmament*, Rowman & Littlefield, London.

4 For an examination of the ethics of biological weapons, see, for example: Sims, N. 1991, 'Morality and biological warfare', *Arms Control*, vol. 8, pp. 5–23; and Krickus, R. 1965, 'On the morality of chemical/biological war', *Journal of Conflict Resolution*, vol. 9, no. 2, pp. 200–10. Even in attempts to differentiate the moral standing of types of biological weapons, the starting assumption is often that they all share dubious qualities, as in Appel, J. M. 2009, 'Is all fair in biological warfare? The controversy over genetically engineered biological weapons', *Journal of Medical Ethics*, vol. 35, pp. 429–32.

5 James, A. 2007, 'Science & technology policy and international security', in B. Rappert (ed.), *Technology and Security*, Palgrave, London.

6 Colwell, R. 2010, *Understanding Biosecurity: Protecting against the Misuse of Science in Today's World*, National Research Council, Washington, DC.

7 Zanders, J. P. 2003, 'International norms against chemical and biological warfare', *Journal of Conflict & Security Law*, vol. 8, no. 2, pp. 391–410.

reasons.[8] Prior to the ratification of the BTWC, in the 1960s scientific societies (such as the American Society for Microbiology)[9] found themselves embroiled in bitter dispute about the rights and wrongs of offensive programs.

Recognition of this historical contestation is not taken as an opportunity to reject the denunciation of bioweapons and the corresponding need to avert the life sciences from aiding their development. In this sense, this chapter begins where others in the volume have begun (and ended).

Noting this contestation though will be taken as an opportunity to reflect on the basis for today's commonsense moral appraisals and thus how ethical analysis can be made to matter. In relation to the topic of this volume, that means questioning how norms, stigmas and taboos can be bolstered (see below).

Noting this contestation also will be taken as an opportunity to reflect on how the boundary is set between what is and is not treated as a 'biological weapon'. As Whitby details in his chapter about plant inoculants, at times the distinction can be fine to non-existent. The contingency associated with categorisations is evident elsewhere. During ancient Greek and Roman times, debate about the morality of deliberate poisoning and the contamination of water supplies took place alongside debate about the morality of driving enemy troops into mosquito-infested areas.[10] Each of these represented a sort of weaponising of nature, even if the last would not fit today under the term 'biowarfare'. And as yet another aspect of boundary drawing, while the use of pathogens as weapons to inflict disease might be widely deplored, just when it is deemed appropriate for biology to serve war-fighting is of much less accord. Whitman's chapter indicated the range of bio-enabling capabilities that nanotechnology offers militaries. The moral status of such applications is likely to be a matter of disagreement in a way it would not be for other areas of nanotechnology given the link to biology.

What such examples suggest is that the descriptive matter of how things become *understood* needs to accompany the normative matter of how things ought to be *judged*.

Take the example of bio-defence. As a number of contributors in this volume have indicated, the acceptability of activities undertaken in the name of protection is not a matter of unanimity. In no small part this has been due to disagreement about what distinguishes the knowledge and techniques necessary for 'defence' from those of 'offence'. As I have argued elsewhere, at stake in past disputes about

8 Balmer, B. 2002, 'Killing "without the distressing preliminaries"', *Minerva*, vol. 40, pp. 57–75.

9 Cassell, G., Miller, L. and Rest, R. 1994, 'Biological warfare: role of scientific societies', in R. Zilinskas (ed.), *The Microbiologist and Biological Defense Research*, New York Academy of Science, New York.

10 Mayor, A. 2009, *Greek Fire, Poison Arrows and Scorpion Bombs*, Overlook Duckworth, London.

what is ethically and legally permissible have been thorny questions about how the purposes of activities can be discerned. Commentators have been divided on whether purpose can be discerned from the characteristics of the activities or whether their meaning has to be found in some wider 'context'. In practice, for many who subscribe to a contextual approach a sense of 'the context' is often mutually defined in relation to a sense of activities that are under scrutiny. For instance, expansion of American military funding during the 1980s was one occasion that featured heated dispute about the appropriateness of bio-defence. As part of this debate, attempts to evaluate aerosolisation-testing centres were subjected to contrasting assessments due to alternative characterisations about the overall purpose of bio-defence programs. But on top of this:

> [S]uch characterizations, in turn, [informed] determinations of intent. Many critics of the US 'biodefense' program treated the secrecy surrounding it and the wider political posturing of US administrations as indicators of the dubious intent of the undertaking. Seemingly acceptable individual projects were re-considered for how they might inform offensive weapons development. In turn, the number and character of such ambiguous activities provided justification for concerns about the ultimate aims served by the program as a whole.[11]

It is through such—what might well be deemed circular—reasoning that attempts to assess what is permitted often unfold. Herein, the trust held in a presidential administration informed the evaluation of particular projects and vice versa. In recognising such co-definition dynamics, it is possible to go beyond simply noting the recurring difficulties with making 'decisions about whether biodefense research can be ethically justified as truly "defensive" in nature'.[12] Instead it is possible to examine how boundaries and evaluations are established.

The previous paragraph indicated the need for empirically informed ethical analysis in relation to matters of dual use—a theme that will be taken up again in the next section.

2. Neglected dis-ease

As mentioned at the beginning of this chapter, a motivation for this volume—and a conclusion supported by its contributors—was a sense that dual-use issues had not hitherto been subjected to significant or sufficient ethical analysis.[13]

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11 Rappert, B. 2005, 'Prohibitions, weapons and controversy: managing the problem of ordering', *Social Studies of Science*, vol. 35, no. 2, p. 231.

12 King, N. 2005, 'The ethics of biodefense', *Bioethics*, vol. 19, no. 4, pp. 432–46.

13 As also voiced in Chadwick, R. 2011, 'Bio- and security ethics: only connect', *Bioethics*, vol. 25, no. 1, p. ii.

There are, however, past and present lively areas of deliberation related to the overall themes of *On the Dual Uses of Science and Ethics*. The rights of research subjects have long been an enduring topic of mainstream medical ethics. Human experimentation in weapons programs has more than its share of flagrant violations of rights.[14] Just how much research and healthcare priorities ought to pay to concerns about the deliberate spread of disease have animated much debate recently, too, with a feared 'biosecuritisation' of priorities.[15] Many have contended that the increasing funding directed at security post 9/11 has led to skewed research and healthcare agendas. Herein pathogens that might kill in warfare are given disproportionate resources compared with those that do kill on a daily basis. What suffer are human welfare, global justice and international security.[16] How many lives, it might be asked, have been lost because of the choice to spend scare resources on non-existent threats? In contrast, others have advocated for the increasing inclusion of security within public health and thereby reconceiving what is meant by both.[17] Herein, not only do healthcare systems need to do more to prepare for the intentional spread of disease, but also security agencies need to recognise the gravity of 'natural' disease for national protection.[18]

These points about 'biosecuritisation' suggest how the destructive use of the life sciences overlaps with healthcare preparations for the outbreak of disease. To the extent this is correct, turning the previous 'disconnect' between ethics and dual use into 'connect' should be entirely feasible.

Affinity was a recurring theme of the chapter by Bartolucci and Dando, who examined: 1) what neuroethics has to say about dual use; and 2) how neuroethics has positioned itself as similar/different to other areas of ethics. The first of these is relatively straightforward: neuroethics is notable for its lack of direct engagement with the dual-use aspects of the life sciences. At the same time, much of it could be pertinent. The second dimension is more complex. Debates about distinctiveness have long been at the centre of positioning about whether there is a need for 'neuroethics' as a field of study in its own right. With the increase of specialised publications and conferences, over recent years many

14 Harris, S. 1999, 'Factories of death', in T. Beauchamp and L. Walters (eds), *Contemporary Issues in Bioethics*, 5th edn, Wadsworth, London, pp. 470–8.

15 Fisher, J. and Monahan, T. 2001, 'The "biosecuritization" of healthcare delivery: examples of post-9/11 technological imperatives', *Social Science & Medicine*, vol. 72, pp. 545–52; and Brown, T. 2001, 'Vulnerability is universal', *Social Science & Medicine*, vol. 72, pp. 319–26.

16 Enemark, C. 2009, 'Is pandemic flu a security threat?', *Survival*, vol. 51, no. 1, pp. 191–214; and Choffnes, E. 2002, 'Bioweapons: new labs, more terror?' *Bulletin of the Atomic Scientists*, vol. 58, no. 5, pp. 28–32.

17 See Fidler, D. and Gostin, L. 2008, *Biosecurity in A Global Age*, Stanford University Press, Stanford, Calif.

18 See, for example, de Waal, A. 2010, 'Reframing governance, security and conflict in the light of HIV/AIDS: a synthesis of findings from the AIDS, security and conflict initiative', *Social Science & Medicine*, vol. 70, no. 1, pp. 114–20.

have adopted a language of intellectual uniqueness, at least at times. One of the dangers identified with this is that previous bioethical work becomes lost or reinvented as neuroethicists divorce themselves from mainstream ethics.

Stepping back from neuroethics as a specific example, there is good reason for contending that the likeness across topic areas will be tricky to pin down. Establishing the extent of resemblance is practical judgment that must be argued for, rather than simply being resolved once similarities (or differences) are identified. Determining the extent of overlap between topics of ethics requires identifying the key issues and defining how they should be understood. For emerging or disputed topics though—such as dual-use life sciences—these can be the very matters where accord breaks down.

I want to take the past two paragraphs as suggesting that the question of how much the ethical issues associated with dual-use concerns are similar to those elsewhere should be posed while also attending to implications of claims of 'similarity' or 'difference'. So in pondering to what extent a distinctive 'dual-use ethics' is required, the question of 'required for what?' should loom large. Attempts in relation to neuroscience and nanotechnology to stake out a distinctive sub-branch of ethics, for instance, are part and parcel of building professional identity and boundaries. While there was little in the way of calls in this volume to clear a distinct space for dual-use ethics, the complexion of the conversation might well change over time.

The implications of claims to similarity or difference figure in ongoing ethical debates elsewhere. Take the area of public health again. Leslie Francis and colleagues have argued that infectious disease has been largely absent from the historical development of bioethics as a field.[19] As a result, insufficient attention has been given to the way contagious individuals are both patients with illness and vectors for transmitting disease.[20] Consequently, traditional conceptualisations of the role for, composition of and need for informed consent are inadequate. These fail to recognise how choices about treatment or non-treatment made by some affect others. Once this is acknowledged, an individual patient's desire need not be the prime consideration.[21]

Turning to the topic of this volume, such observations are also relevant in the case of the deliberate spread of disease. A point to draw out is the way Francis and colleagues insist that current deficits in bioethics cannot be alleviated by

19 Francis, L. P., Battin, M. P., Jacobson, J. A., Smith, C. B. and Botkin, J. 2005,'How infectious diseases got left out—and what this omission might have meant for bioethics', *Bioethics*, vol. 19, no. 4, pp. 307–22.

20 See as well Tausig, M., Selgelid, M. J., Subedi, S. and Subedi, J. 2006, 'Taking sociology seriously: a new approach to the bioethical problems of infectious disease', *Sociology of Health & Illness*, vol. 28, no. 6, pp. 838–49; and Selgelid, M. 2005, 'Ethics and infectious disease', *Bioethics*, vol. 19, no. 3, pp. 272–89.

21 Likewise, Francis et al. argued past thinking about justice in health care in bioethics failed to acknowledge the global origins of disease in anything like a robust manner.

a minor refinement of bioethical principles (such as autonomy). Instead they argue that a fundamental rethink of the traditional liberal foundations of bioethics is necessary. The principle of autonomy, for instance, needs to break from a fixation on the preferences of competent and reasonable individuals. Instead acknowledgment must be given to how the vulnerability of individuals and communities derives from our embodied and relational existence. I take the points above as indicating that alongside claims about what is or is not missing from bioethics about dual use should be attention to how similarity and difference are being conceived.

Meeting in the middle

The previous section examined two of the starting points for *On the Dual Uses of Science and Ethics*: the normative condemnation of biological weapons and the lack of robust bioethical engagement with dual-use life sciences.

Still another starting point for this volume was the belief that working towards a bioethical engagement requires bringing together contributors from a variety of disciplines. The composition of the chapters reflects that thinking. No single field of study—be it ethics, social science, biology, and so on—could adequately label the previous chapters. Moreover, a mix of aims has been pursued: clarifying concepts and normative justifications, detailing how problems are recognised, charting the state of development in science and technology, and so on. To some extent, these varied activities have aligned with contrasting tasks: prescription, description and assessment.

Another way of making the points above is to say that *On the Dual Uses of Science and Ethics* has sought to clear a space for bioethical engagement within the fraught terrain of empirical ethics. In recent years the umbrella term 'empirical ethics' has signalled the need to bring closer together research questions and methodologies from multiple fields—such as ethics, sociology, bioethics, law, applied ethics, epidemiology and anthropology. The aim has been to couple normative analysis and empirical evidence. That has entailed finding some way of combining contrasting preoccupations. While much of bioethics strives to produce useful guides for making decisions in problematic-choice situations, much of the empirical research in sociology and anthropology attends to how notions of right and wrong are socially formed, policed and reproduced.

The need for coupling the normative and the empirical has been evident in this volume in a number of respects.

- *Identification*: In no small part, the very attention to dual use stems from claims about the pace of development of biotechnology today and its

potential relevance for intentional destructive purposes tomorrow;[22] however, as with other issues, the path from potential concern to publicly recognised social problem is not one of necessity. Social, institutional and cultural considerations are the reasons certain topics become treated as serious problems. In the case of the topic of this book, the year 2001 remains of paramount importance.

- *Specification*: Moving from a general recognition of a problem to specifying what is pressing and why are often informed by detailed argumentation. The chapter by Kelle, for instance, delineates the multiple strands of synthetic biology in order to map variations in kind and severity of potentials. As he also argued, much of the policy attention to the governance of synthetic biology has been limited to particular strands of it—most notably, DNA synthesis. The reasons for and the implications of such narrow framings are part of what empirical research needs to establish.
- *Appreciation*: Part of ensuring that sensible and appropriate measures are devised is understanding how practitioners—such as laboratory researchers and managers—assess the possibilities of their work. As Connell so vividly and honestly shares with readers, even those with longstanding experience in preventing the deliberate spread of disease can lose sight of the implications of their own work. Understanding the organisational and social reasons for such blindness is vital in knowing how to respond. As Chambliss has warned, everyday routines in organisations often delimit ethical scrutiny.[23]
- *Contextualisation*: Benzuidenhout's chapter explored how recognition and responses to dual-use issues are likely to vary systematically due to research environments. Without regarding information about the day-to-day experiences of those in labs, proposals for what needs to be done can be compelling in the abstract but practically irrelevant.[24]
- *Evaluation*: Assessing the measures undertaken to prevent the hostile use of the life sciences requires empirical data.[25] Without this, action can be misplaced. For instance, the review of civilian research experiments, science journal manuscripts and public grant proposals for their security risks has excited much controversy.[26] As the most prominent instance of this, in 2003,

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22 See Rappert, B. 2007, *Biotechnology, Security and the Search for Limits: An Inquiry into Research and Methods*, Palgrave, London, ch. 1.

23 Chambliss, D. F. 1996, *Beyond Caring: Hospitals, Nurses, and the Social Organization of Ethics*, University of Chicago Press, London.

24 'Context' should not, however, simply be thought about as a static backdrop directing action. Financial and organisational resource constraints motivate the search for different forms of research collaboration that, in turn, structure possibilities for perception.

25 Douglas, T. and Savulescu, J. 2010, 'Synthetic biology and the ethics of knowledge', *Journal of Medical Ethics*, vol. 36, pp. 687–93.

26 King, op. cit., pp. 432–46; Frisina, M. 2006, 'The application of medical ethics in biomedical research', *Cambridge Quarterly of Healthcare Ethics*, vol. 15, pp. 439–41; and Tyshenko, M. 2007, 'Management of natural and bioterrorism induced pandemics', *Bioethics*, vol. 21, no. 7, pp. 364–9.

32 prominent (Western) journal editors committed themselves to enact peer-review procedures to assess the risks and benefits of individual manuscripts. These were meant to determine whether articles needed to be modified or withdrawn because 'the potential harm of publication outweighs the potential societal benefits'.[27] One concern frequently expressed has been that such measures would jeopardise the free flow of information that is vital to civilian science. Such fears though are arguably misplaced for two reasons

1. experience from at least 2004 has indicated that the risk–benefit logic of the formal review processes means that few manuscripts, grant applications or experiment proposals are identified as posing dual-use concerns (let alone are censored; there are no cases of civilian work being categorically withheld)[28]
2. evidence from social studies of science has illustrated how the exchange of resources and information in research is frequently subject to negotiation in practice.[29]

Such observations raise concerns about the ultimate purposes and prospects of formal oversight procedures. They might either miss important developments or impose needless layers of bureaucracy.

- *Operationalisation*: Policy initiatives can also be misjudged if they misconstrue the unit at which ethical decisions are taken and moral standards enforced. As Miller argues in Chapter 12, reducing ethical concerns to individual decision-making would be fundamentally flawed. Science must be treated as a group and community enterprise.

The need for ethical analysis informed by empirical research is readily acknowledged today in bioethics—indeed, many contend it has always been so.[30] The rub is not with *whether* 'empirical' and 'ethics' can be placed side by side, but rather *how*. The central difficulty is that of bringing together 'what is' and 'what ought to be'. The 'facts' of some issue—for instance, how those in a lab regard their professional responsibilities—do not resolve what should be the case.[31] Clearly, it is not possible to justify standards for morality on empirical data alone, even if in practice 'what is' often shapes notions of 'what ought to be'.

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27 Journal Editors and Authors Group 2003, *Proceedings of the National Academy of Sciences*, vol. 100, no. 4, p. 1464.

28 See Nightingale, S. 2011, 'Scientific publication and global security', *JAMA*, vol. 306, no. 5, pp. 545–6; and Rappert, B. 2008, 'The benefits, risks, and threats of biotechnology', *Science & Public Policy*, vol. 35, no. 1, pp. 37–44.

29 Rappert, 2007, op. cit., ch. 2.

30 Herrera, C. 2008, 'Is it time for bioethics to go empirical?' *Bioethics*, vol. 22, no. 3, pp. 137–46; and Hurst, S. 2010, 'What "empirical turn in bioethics"?' *Bioethics*, vol. 24, no. 8, pp. 439–44.

31 See Bosk, C. 2000, 'The sociological imagination and bioethics', in C. Bird, P. Conrad and A. Fremont (eds), *Handbook of Medical Sociology*, Prentice Hall, Upper Saddle River, NJ, p. 403.

Recognising this though is just the start of unpacking how empirical study can contribute to the normative. As de Vries and Gordijn argue, 'the conclusion of an empirical-ethical inquiry is not necessarily a moral judgment or principle. Nor are the conclusions of these studies necessarily based solely on empirical results.'[32] In other words, the tasks undertaken as part of empirical ethics are many and varied. Seeking some way to move from description to prescription is just one possibility. Others include detailing conduct, understanding conditions and processes of meaning making, acknowledging alternative ethical reasoning, testing the feasibility of moral precepts, and refining ethical theory.

Ethics for … and for …

One succinct gloss of the previous sections would be this: ethics is contested space and a contested label. Whether some concern is treated as 'ethical' and how, for instance, are part and parcel of the way issues become identified as problems that demand action. With this recognition, the vocabulary of 'use' and 'abuse' requires scrutiny. The previous sections included consideration of how framing the potential of the life sciences in terms of destructive and peaceful purposes is indebted to particular ways of thinking.

This section takes the 'use and abuse' in a different direction. Instead of focusing on the *life sciences*, it turns to the contrasting potentials of *bioethics*. So rather than just treating research and innovation as the sources of problems to which bioethics offers some sort of antidote, this section asks how pursuing ethical analysis is associated with dangers. If dosage can be the only thing that distinguishes a medicine from a poison then the same applies to ethical prescriptions. Each of the possible positive utilities for bioethics given below is questioned as to how it contains the seeds for dubious outcomes. In this sense, seeking to 'input' bioethics into current dual-use debates is treated as dilemmatic.[33]

Advising

Bioethicists are often called upon to provide advice in controversies. The 2010 *New Directions: The Ethics of Synthetic Biology and Emerging Technologies*[34] report of a US presidential commission is one such instance. It recommended various

32 de Vries, R. and Gordijn, B. 2009, 'Empirical ethics and its alleged meta-ethical fallacies', *Bioethics*, vol. 23, no. 4, pp. 193–201.

33 Billig, M. 1996, *Arguing and Thinking*, Cambridge University Press, Cambridge; and Billig, M., Condo, S., Edwards, D., Gane, M., Middleton, D. and Radley, A. 1989, *Ideological Dilemmas*, Sage, London.

34 Presidential Commission for the Study of Bioethical Issues 2010, *New Directions: The Ethics of Synthetic Biology and Emerging Technologies*, US Department of Health and Human Services, Washington, DC.

reforms to oversight and reporting procedures for research that were said to be congruent with widely shared ethical principles. Through such advice giving, ethics has a chair at the table of high-level public policy.

The need for considered ethical advice has been made before. Green called for a portion of the multi-billion-dollar per year funding for bio-defence in the United States to be set aside to examine its ethical, legal and social implications (ELSI).[35] This recommendation was based on the precedent of the Human Genome Project. And yet, despite seeking to build on this example, Green also acknowledged various problems with the Human Genome Project ELSI program: its policy consequences, coordination and focus.

At a more theoretical level, attempts to advise can be misguided if they are based on a faulty understanding of how analysis—be it ethical or empirical—is made to matter. In an idealised model of policy, analysis acts as an input into rational decision-making processes through establishing facts and selecting between options. Medical ethics and bioethics are arguably particularly aligned with this 'inputting' model given the centrality placed on decision-making. In contrast, students of policymaking have forwarded a complex path between knowledge and action, one characterised by iterative movements without clearly demarcated beginnings or endings. Indeed, some have gone so far as to question whether it would even be desirable for policymaking to be solely or largely based on analysis.[36] Instead of portraying it as some sort of authoritative input, the role of analysis has been defined in more limited terms—such as helping to identify concerns not widely recognised.

Therefore, a danger with greater bioethical scrutiny about dual use would be that it invests a greater significance in the former than it can bear. In practice, the arguments of ethics might well give a false air of justification to decisions taken for altogether different reasons.[37] Another potential problem is that of misconstruing the nature of the choices faced. Hoffmaster and Hooker have argued ethical dilemmas are often radically open-ended and indeterminate. Herein,

> not only is the solution unknown, but the problem itself is initially not well defined, and the values that ought to drive its investigation and the

35 Green, S. 2005, 'E3LSI research: an essential element of biodefense', *Biosecurity and Bioterrorism*, vol. 3, no. 2, pp. 128–37.

36 Lindblom, C. and Cohen, D. 1979, *Usable Knowledge*, Yale University Press, New Haven, Conn.; Palumbo, D. and Hallet, M. 1993, 'Conflict versus consensus models in policy evaluation and implementation', *Evaluation and Programme Planning*, vol. 16, pp. 11–23.

37 For a consideration of this point, see Winner, L. 1992, 'Citizen virtues in a technological order', *Inquiry*, vol. 35, nos 3–4, pp. 341–61.

> valid methods to do so are unknown, unclear, or in dispute, as are the set of applicable theoretical models, the solution set, and the criteria for successful resolution.[38]

The danger of trying to 'apply' bioethics to determine the proper course of action in such situations is that the conventional concepts of bioethics can provide a sterile and static understanding of the issues at stake. Any recommendations that follow then are likely to have a stunted potential.

Guiding

If bioethics might not be thought of as wielding the decisive hand in policymaking, a more modest goal would be to suggest that it provides guides for assessing the morality of acts. Along this line, some have sought to derive general guidance for scientists and research organisations from ethical principles.[39] Kuhlau and colleagues, for instance, outlined various criteria for identifying 'harm' within the moral responsibility of scientists.[40] In line with the ethical principle of non-maleficence, for instance, they argued that '[r]esearchers should be responsible not only for not engaging in harmfully intended activities but also for research with harmful implications that they can reasonably foresee'.[41]

The ability of ethics to derive moral obligations has been a topic of debate since its inception as a field of study. Much of that discussion has turned on the prospects for high-level principles to inform situated action. A frequent refrain against principlism is that it is flawed because what it means to adhere to a principle (such as autonomy or justice) is always indeterminate at some level. As instances of ethical concern are never identical, the future application of normative standards cannot be set out once and for all. Individuals must manage the relevance of principles, what it means to follow or deviate from them, and what consequences are likely to follow from violations. For instance, while the obligation to 'prevent harm' often figures as an ethical bar to bioweapons development, this prescription does not have the same import for conventional (read: commonly accepted) forms of weaponry.[42] Enabling harm is a goal in many areas of research. As such, dual-use discussions are often coloured by a normative starting orientation about which principles matter and why, rather than deriving a sense of the right course of action from the principles themselves.

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38 Hoffmaster, B. and Hooker, C. 2009, 'How experience confronts ethics', *Bioethics*, vol. 23, no. 4, pp. 214–25.

39 See Ehni, H. J. 2008, 'Dual use and the ethical responsibility of scientists', *Archivum Immunologiae Et Therapiae Experimentalis*, vol. 56, pp. 147–52; and Green, S., Taub, S., Morin, K. and Higginson, D. 2006, 'Guidelines to prevent malevolent use of biomedical research', *Cambridge Quarterly of Healthcare Ethics*, vol. 15, pp. 432–9.

40 Kuhlau, F., Erikson, S., Evers, K. and Höglund, A. 2008, 'Taking due care: moral obligations in dual use research', *Bioethics*, vol. 22, pp. 477–87.

41 Ibid., p. 481.

42 Rappert, B. 2012, *How to Look Good in War*, Pluto Press, London, ch. 6.

A concern with principlism then is that it has failed to acknowledge this indeterminacy in favour of adopting a sense of certainty and inevitability. In response, leading proponents have acknowledged the need for the specification and interpretation of principles in relation to specific situations.[43] Yet, whatever the sophistication and subtlety within academic texts about how to do these tasks, some have voiced concern about the blunt way in which principles figure within day-to-day institutional practice.[44]

Deliberating

A different way of thinking about the utility of ethics is to focus on process. If general ethical analysis has a limited ability to definitely determine the proper course of action then it can help structure democratic deliberation.[45] Herein, as individuals schooled in conceptual analysis and argumentative logic, ethicists can ensure the quality of discussions (even if they do not occupy elevated moral positions). This procedural expertise might be exercised through clarifying reasoning, ensuring consideration of neglected topics, making hidden values explicit, providing comparative examples, and so on.

Each of these notionally 'procedural' contributions though could be questioned regarding how they import in (unrecognised) value commitments. The prescriptive and procedural dimensions of bioethics are exemplified in current disputes about the merits of 'the precautionary principle'.[46] Any discussion of this notion needs to begin with the recognition that it comes in a multitude of versions. While in general terms precaution is aligned with not requiring conclusive demonstration of harm to prompt concern or even action, many formulations of it exist.[47] It is possible, for instance, to distinguish between

43 Beauchamp, T. 1995, 'Principalism and its alleged competitors', *Kennedy Institute of Ethics Journal*, vol. 5, no. 3, pp. 181–98.

44 Marshall, P. 2001, 'A contextual approach to clinical ethics consultation', in B. Hoffmaster (ed.), *Bioethics in Social Context*, Temple University Press, Philadelphia.

45 Boniolo, G. and di Fiore, P. P. 2010, 'Deliberative ethics in a biomedical institution: an example of integration between science and ethics', *Journal of Medical Ethics*, vol. 36, pp. 409–14.

46 In relation to how the prescriptive and the procedural meld, a concern for some is that attention to procedure is a means of decision-making, at least by default. A criticism made of precautionary approaches—but one that could be made of any attempt to promote and conduct deliberation—is that it ends up significantly delaying decisions, and that such a delay thereby favours some over others. It is notable in this regard that precaution has become a byword for inaction and hesitancy in many areas of science policy. See Ledford, H. 2011, 'Hidden toll of embryo ethics war', *Nature*, vol. 471, p. 279.

47 Stirling, A. 2008, 'Science, precaution, and the politics of technological risk converging: implications in evolutionary and social scientific perspectives', *Annals of the New York Academy of Sciences*, vol. 1128, pp. 95–110.

argumentative, process-orientated kinds that establish guidelines for what sorts of arguments are legitimate, and those prescriptive decision-orientated kinds that resolve what action should be taken.[48]

As a *decision rule* for making political deliberations, this principle has its detractors. While claiming the need to safeguard against harms in the face of uncertainty and ignorance is reasonable, specific enactments of precaution are seen as going too far. Clarke's chapter, for instance, offers a sustained critique of the so-called 'strong version' of the principle that exclusively considers potential costs of a particular action (such as the 1994 *Final Declaration* of the First European 'Seas at Risk' Conference). Within this way of thinking, any doubt about severe consequences is treated as providing adequate grounds for stopping an activity from going ahead—the result being a paralysing conservatism that can create larger risks than those forgone.[49]

Whatever the merits of formulations of the precautionary principle for making decisions, as *process* guides they can structure how troublesome questions are approached. For instance, with whom the burden of proof rests to substantiate claims of harm or benefit, to whom and with what level of certainty are important issues for any topic of controversy. Box 20.1 details some of the procedural proposals for how evidence and onus could figure in responses to the destructive potential of the life sciences. The relative merits of these alternatives could be further informed by ethical analysis regarding their procedural dimensions.

Box 20.1 Handling Risks and Uncertainty in the Review of Research

The National Science Advisory Board for Biosecurity (NSABB) was in large part formed following the recommendations of the US National Academies report *Biotechnology Research in An Age of Terrorism*. A central task of NSABB is the development of recommendations on 'guidelines for the oversight of dual-use research, including guidelines for the risk/benefit analysis of dual-use biological research and research results'[a] for the US Federal Government. The guidelines for risk/benefit analysis and oversight represent attempts to define, evaluate and handle concerns about the dual-use potential of research through the creation of formal bureaucratic procedures.

The split NSABB has offered between research that might have some sort of dual-use potential and that which is 'of concern' has been of paramount importance. For the board, the term 'dual-use research' is used 'to refer in general to legitimate life sciences research that has the potential to yield information that could be misused to threaten public health and safety and other aspects of national security such as agriculture, plants, animals, the environment, and materiel'.[b] In contrast, 'dual use research of concern' refers to the 'subset of life sciences research with the highest potential for yielding knowledge, products, or technology that could be misapplied to threaten public health or other aspects of national security'.[c]

48 Sandin, P., Peterson, M., Hansson, S., Rudén, C. and Juthe, A. 2002, 'Five charges against the precautionary principle', *Journal of Risk Research*, vol. 5, no. 4, pp. 287–99.

49 See as well Harris, J. 2001, 'Introduction: the scope and importance of bioethics', in J. Harris (ed.), *Bioethics*, Oxford University Press, Oxford; and Douglas and Savulescu, op. cit.

Because it is imagined that few experiments will need to be given security review, the emphasis has been with devising a non-demanding 'tick-box' first stage that should exclude the majority of research from further formal consideration.[d] In this regard, NSABB has proposed that the initial review of whether or not research is 'of concern' be undertaken by the principal investigator (that is, the senior project leader). Herein, this person would ask of their work, 'based on current understanding, can [it] be reasonably anticipated to provide knowledge, products, or technologies that could be directly misapplied by others to pose a threat to public health and safety, agricultural crops and other plants, animals, the environment, or materiel'.[e]

To state that assessors must be able to *reasonably anticipate* a direct threat based on current understanding sets a high threshold for proof. At this initial stage of the review process, the determination of the status of research is not intended to impose significant demands on principal investigators. Should research be found to match the criterion then it would be subjected to institutional risk review.[f]

Such an approach can be contrasted with an alternative oversight model proposed by the Center for International and Security Studies at Maryland (CISSM). This is envisioned as an international legally binding system requiring the licensing of personnel and research facilities. The Maryland system also involves independent peer review. An oversight body needs to approve work going ahead, rather than the investigators making the initial determination. This was justified on the basis that '[i]n addition to having a self-interest in seeing their research proceed, such individuals are also unlikely to have the security and other expertise necessary to recognize the possible dual use risks of their work'.[g]

The criteria proposed as part of the risk–benefit analysis in the Maryland system also go further than the NSABB proposal. As part of assessing research, for instance, individuals are required to consider whether the same experimental outcome could be pursued through alternative means, whether the research is being done in response to a validated (credible) threat, and whether it will yield results definitive enough to inform policy decisions. Such questions place additional demands on those taking part in the assessment process to those as part of NSABB recommendations. They also require forms of knowledge that the average principal investigator is unlikely to posses. As another contrast to the NSABB proposals, the Maryland one provides a metric for evaluating research based on the responses given to the criteria mentioned.

At the heart of such alternative policy options is the matter of expertise and how this should be exercised. While NSABB devolves much of the decision-making down to senior individual scientists who are aided by others, the CISSM proposal places much more emphasis on a diverse range of expertise structured through mandatory requirements.

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[a] *Charter—National Science Advisory Board for Biosecurity*, 16 March 2006, p. 1.

[b] National Science Advisory Board for Biosecurity (NSABB) 2007, *Proposed Framework for the Oversight of Dual Use Life Sciences Research: Strategies for Minimizing the Potential Misuse of Research Information*, National Science Advisory Board for Biosecurity, Bethesda, Md, p. 4.

[c] Ibid., p. 16.

[d] As in comments made during National Science Advisory Board for Biosecurity, 20 March 2006.

[e] NSABB, 2007, op. cit., p. 17.

[f] Ibid., Appendix 4.

[g] Harris, E. 2007, 'Dual use biotechnology research: the case for protective oversight', in B. Rappert and C. McLeish (eds), *A Web of Prevention: Biological Weapons, Life Sciences and the Governance of Research*, Earthscan, London, p. 120.

Legitimating

If legitimacy is a function of being in accordance with rules and procedures justified by shared societal beliefs[50] then one of the roles often sought of ethics is to legitimate policies and practices. Whether through contributing expert moral reasoning or facilitating deliberation, bioethicists (and others) are often called up to ensure support for core social institutions. An often-voiced reservation with such a purpose is that the basis for accord might be less than warranted or genuine. In other words, rather than legitimacy being positively secured, it is skilfully manufactured through a language supplied by ethics.

Chambliss, for instance, offers a highly critical evaluation of how medical ethics and bioethics training figure within hospital practice. One of the starting points for this is the view that organisational hierarchies are often the source of the dilemmas experienced by professionals.[51] Nurses—with relatively little formal power in relation to doctors or administrators—often struggle with the tension between doing what they think is right and doing what conforms to official policy. As a result, it is not enough for them to receive high-minded instruction about moral principles in order for them to do what is right. For Chambliss, ethical training in the form of abstract, principle-based talk cannot only be irrelevant to lived experience, but it can also serve to give a false impression that dilemmas and challenges are being acknowledged and addressed while, in practice, ethics instruction reinforces relations of hierarchy. Winner too cautions against the way moral categories and ethical arguments are often forwarded without attention to the roles and institutions needed to enable notions of the good to translate into deeds.[52] In the absence of such opportunities, ethical analysis all too easily validates the status quo.

More subtly than this, ethics can also act to reinforce the perception of shared beliefs and values. Take the case of the previously mentioned dual-use review procedures initiated by civilian journals, funders and research organisations since 2004. While they differ in specifics, each proposes a risk–benefit calculation. Expected societal gains from research are to be measured against possible security threats, the balance between the two indicating what should be done. As such, the review procedures are forwarded as embodying core characteristics of rational decision-making. Ethicists have adopted and endorsed this rationalistic framework of balancing risks and benefits.[53]

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50 To paraphrase Green, P. and Ward, T. 2004, *State Crime*, Pluto, London, p. 3.

51 Chambliss, op. cit.

52 Winner, op. cit.

53 See, for instance, Krohmal, B. and Sobolski, G. 2006, 'Physicians and the risk of malevolent use of research', *Cambridge Quarterly of Healthcare Ethics*, vol. 15, pp. 441–4; and Kuhlau et al., op. cit.

What has not been elaborated is how risk could be calculated (see by way of contrast the aforementioned CISSM system for an alternative framework). Certainly no form of detailed calculus has been set out. Even putting to the side a demand for exactitude, it is not at all clear, for instance, how reviewers could specify the risks from the destructive use of fundamental scientific knowledge. The users, situations, time frame, specific contribution of that knowledge, and so on, are not well defined. The absence of significant past experience of the deliberate spread of disease that might at least provide data points for assessing risks and benefits also frustrates undertaking reviews. In the exceptionally few instances of experiments where some science bodies have judged risks in excess of benefits—as in the initial (but subsequently revised) NSABB recommendations for publication redactions with research on the transmission of a modified H5N1 virus in a ferret model—detailed cost–benefit calculations have not been forwarded. Instead, general appeals to notions such as precaution have been given.[54]

Perhaps most fundamentally, what positive values or negative implications might be relevant for weighing are not clear. From one defensive standpoint, it might be vital to identify and publish research that raises concerns (so as to confirm such fears and to devise countermeasures). This would seem to be the rationale that informed the Defense Advanced Research Projects Agency decision to fund the synthesis of poliovirus.[55] In Nancy Connell's chapter, similarly, demonstrating hyper virulence in a mouse model was seen as providing the grounds for future follow-on funding. Thus, what should count as a 'problem' is not simply poorly defined, but also open for radically opposed interpretations in the first place.

Legitimation dangers do not just include giving undue credence to certain outcomes. Another danger is perpetuating faith in the presumptions, beliefs and competencies that underpin the proposal for what should be done. Rockel, for instance, has offered a trenchant critique of the doctrine of double effect as applied to modern warfare.[56] As contended, its underpinning distinctions related to foreseeable effects and intentions have provided the material for papering over systematic deficiencies in military action. In relation to the themes of this volume, it should also be noted that within the discussion of risks and benefits, the non-destructive applications are often assumed to fall wholly on the plus side. This thinking is in line with many public portrayals of science; however, the extent to which biomedical research is linked to improvements in human

54 Cohen, J. and Malakoff, D. 2012, 'NSABB members react to request for second look at H5N1 flu studies', *Science*, 2 March; and Imperiale, M. 2012, Presentation to 'Dual-Use Research and Biosecurity: Implications for Science, Governance and the Law', The Hague, 12 March.

55 Selgelid, M. and Weir, L. 2010, 'The mousepox experience', *EMBO Reports*, vol. 11, pp. 18–24, <http://www.nature.com/embor/journal/v11/n1/full/embor2009270.html> (viewed 23 April 2003).

56 Rockel, S. 2009, 'Collateral damage: a comparative history', in S. Rockell and R. Halpern (eds), *Inventing Collateral Damage: Civilian Casualties, War, and Empire*, Between the Lines Press, Toronto, pp. 1–96.

health can be questioned. It can even be counterproductive when it 'obscures socioeconomic reasons for health problems [and] creates boundar[ies] to other types of action that are more effective, efficient, and equitable'.[57]

In considering the legitimating role of ethical analysis, it should be borne in mind that the designation of a matter belonging to the domain of 'ethical' (or not) is part of what needs to be examined. As a case in point, Houtepen examined how controversy about euthanasia in the Netherlands shifted over time.[58] Prior to the late 1960s physicians debated what should be done largely among themselves. It was only in the late 1960s that others found a recognised voice. Part and parcel of this was the explicit redefinition of euthanasia as a matter of 'ethics', and, as such, a matter where varied perspectives from the public at large had to be brought in. Later, with the introduction of formalised clinical routines and policies informed by ethicists, the overt 'ethical' framing of practice waned. Beyond this specific case, what is deemed 'technical' versus 'ethical' is a product of social negotiation that can readily work to exclude some voices from being recognised. To what extent the dual-use review of research activities is deemed a matter of 'ethics' (which it largely has not been to date) is tied to who needs to conduct such reviews. Whitman makes a related point in this volume in recounting the consequences associated with how presenting issues as 'dilemmas' refracts our understanding of what is at stake.

Stigmatising

As contended previously, the categorical condemnation of bioweapons is historically contingent and collectively produced. It is because of—not in spite of—this thoroughgoing social basis that resistance would be offered to attempts to sanction the employment of life-sciences knowledge and techniques for destructive ends.[59] Looking towards the future, given the numerous possibilities for the malign applications outlined within the pages of this volume as well as the difficulties of trying to enforce the prohibition through national security and policing measures, stigmatisation is likely to be essential.

Taking this to be the case—and agreeing with the need to work against the deliberate spread of disease—implies a certain agenda for bioethics: it should work to find ways of strengthening and renewing stigmatisation. This needs to take place in a manner sensitive to different possible belligerents: states, sub-state groups and lone individuals. How to prevent current efforts to develop

57 Sarewitz, D. 1996, *Frontiers of Illusion*, Temple University Press, Philadelphia, p. 150.

58 Houtepen, R. 1998, 'The social construction of euthanasia and medical ethics in the Netherlands', in R. de Vries and J. Subedi (eds), *Bioethics and Society*, Prentice Hall, Upper Saddle River, NJ, pp. 117–44.

59 In other words, the categorical nature of the prohibition in the BTWC and the 1925 Geneva Convention is laudable not because it reflects an objective and 'essential' truth, but rather because of the choices that buttress it.

next-generation 'incapacitants' (as discussed in the chapter by Crowley) from leading to a wider normalisation of drugs as weapons, for instance, should be a high priority.

While norms, stigmas and taboos have been subject to significant consideration within the field of international relations in recent decades, much of that has been of a classical, scholarly variety. Herein the relevance of positive normative positions on the part of that writing is downplayed. By and large, international relations scholars have sought to explain the formation of norms rather than elaborating the practical skills necessary for bringing about reform. Therefore, bioethics in its more applied forms could offer significant contributions to the future of the prohibition against bioweapons.

Seeking such positive engagements for bioethics does not amount to promoting blind faith in existing moral standards. This chapter has not sought such a blind faith, even if it is always in danger of taking for granted certain normative positions; however, doing so does require challenging the conventional way stigma is regarded. In fields such as public health, stigma is routinely associated with acts of prejudice and discrimination.[60] HIV/AIDS would be a classic example of where stigma leads to negative consequences. As a result, attempts to make some scope for it as a tool in public health have been subjected to heated criticism.[61] Of course, one of the things that distinguishes talk of stigmatisation in public health from international relations is the typical object of study: those with illness versus state functionaries. Adopting the latter as the bearers of negative distinction might well not animate fears about the victimisation.

Seeking to employ stigma within the international community in relation to preventing the use of biological weapons comes with its own dangers though. One is that the prohibition of these weapons is not neutral vis-a-vis the power relations between nations. Insisting on the outright objectionable status of one type of weapon while patchy controls exist for many other weapons—and doing so in a world with starkly unequal distributions of power—serves some more than others. Moreover, the shunning and integrating dynamics associated with the stigma raise concerns about the importance attached to renunciation. Undoubtedly, Libya's abandonment of its 'weapons of mass destruction' programs in 2003 helped secure a large measure of re-entry into the international community. In the hindsight of 2013, the justifications for what was bought from this act of disarmament seem questionable.

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60 Meyer, I. and Stuber, J. 2008, 'Stigma, prejudice, discrimination and health', *Social Science & Medicine*, vol. 67, pp. 351–7.

61 See Bayer, R. 2008, 'Stigma and the ethics of public health: not can we but should we', *Social Science & Medicine*, vol. 67, pp. 463–72; as well as follow-on commentaries such as Burris, S. 2008, 'Stigma, ethics and policy: a commentary on Bayer's "Stigma and the ethics of public health: not can we but should we"', *Social Science & Medicine*, vol. 67, pp. 473–5.

Educating

Who needs to be educated, about what, how and by whom are longstanding matters of commentary in ethics. The charge that those involved in medicine and the life sciences are somehow lacking with regard to an appreciation of the implications of their work is hardly unique to the topic of this volume.[62] Yet moving from such an appraisal to proposals for what needs to be done often proves contentious. Approaches to ethics tuition differ—notably, between prescriptive, procedural and virtue-based varieties. Each of these is aligned with distinct ways of thinking about individuals as moral agents, what count as appropriate learning techniques and how value disagreement ought be handled.

Elsewhere I have considered the dilemmas, tensions and pitfalls of education about the destructive use of life science.[63] In this subsection I want to extend that work by placing the issue of education within a wider political framework. Cribb offers a valuable inroad into this by distinguishing types of health education.[64] For him, a *medical* model treats education as a way of achieving health outcomes through providing information that affects patient behaviour. A danger with this is that healthcare workers assume a highly paternalistic role. Against the medical model another would be to conceive of education as enabling people to make *informed choices* based on their own values and preferences. A danger with this model is that it treats individuals' values and preferences as deriving only from them as autonomous agents. An *empowerment* model, by contrast, starts with asking about the factors that constrain individuals from realising their preferences and then envisions education as part of overcoming those barriers. In other words, the emphasis is with change rather than edification for its own sake. A *social-action* model goes one step further by asking what sort of structural changes in society (for instance, with regard to poverty and social welfare) are necessary to achieve sought-for health gains. As with the empowerment model, this one necessarily involves posing wider questions about what needs reform. Individuals and groups require skills for participation to affect change. In endorsing the social-action model, as with Chambliss, Cribb counsels against divorcing education and training from institutional and organisational conditions.

Such a typology offers a way of classifying the work that has taken place to date with regard to dual-use education. The overwhelming orientation has been in

62 As, for instance, in the case of Sales, C. and Schlaff, A. 2010, 'Reforming medical education: a review and synthesis of five critiques of medical practice', *Social Science & Medicine*, vol. 70, pp. 1665–8.

63 See Rappert, B. 2007, 'Education for the life sciences', in Rappert and McLeish, op. cit.; and Rappert, B. 2010, 'Introduction: education as …', in B. Rappert (ed.), *Education and Ethics in the Life Sciences: Strengthening the Prohibition of Biological Weapons*, ANU E Press, Canberra.

64 Cribb, A. 2005, *Health and the Good Society: Setting Healthcare Ethics in Social Context*, Oxford University Press, Oxford.

line with the medical model. Herein, researchers or the public are expected to take on board messages about the potential of the life sciences. The intention is to help achieve certain thinking or behaviour—such as the competency to identify research of concern. Situated within the international community of states, the danger of paternalism typically associated with this model is compounded by that of neo-colonialism. With much of the recent attention to dual use emanating from North America and Europe, an obvious concern is that the agenda as well as the ethical approaches employed to understand it (for example, individualist and principle based) are indebted to strains of Western thinking.[65] With the effort dedicated to 'education as instruction', much less attention has been given to 'empowerment' or 'social-action' models. Exceptions include the *Kampala Compact: The Global Bargain for Biosecurity and Bioscience* and related *DNA for Peace* report.[66] Both proposed holding together biosecurity measures with social/international development agendas. Brian Martin, too, spoke of the importance of individuals and group empowerment in whistleblowing and dual use.[67] In the absence of such practical skills training, a danger of education is that it does not enable positive reform. Such an outcome can lead to feelings of irrelevance, indifference or frustration on the part of educators and the educated.

A 'non-' research agenda

The previous sections have counselled the need for caution regarding the commitments of our analysis: its starting points, the use of evidence and argument, and the purposes to which it is put. In more or less direct ways, in those sections I have suggested that among the prime challenges for ethics include identifying moral issues and formulating them as problems in need of redress.[68] Both are inextricably tied to processes of categorising, labelling and boundary-setting that help define but are also defined by social routines, institutions and structures.

This section considers how these goals of identification and formulation can be taken forward in a way that enriches bioethical engagement with dual-use life science. The starting move in this is a shift, in a sense, backwards. Rather than suggesting detailed engagement with this or that topic of controversy, the proposal is to attend to the why and the how of what is 'not': what is *not*

65 For a more general discussion of this danger, see Widdows, H. 2007, 'Is global ethics moral neo-colonialism? An investigation of the issue in the context of bioethics', *Bioethics*, vol. 21, no. 6, pp. 305–15.
66 Available at: <http://www.utoronto.ca/jcb/home/documents/DNA_Peace.pdf> (viewed 4 April 2010).
67 Martin, B. 2007, 'Whistleblowers: risks and skills', in Rappert and McLeish, op. cit.
68 In line with Clouser, K. D. 1978, 'Medical ethics: some uses, abuses, and limitations', *New England Journal of Medicine*, vol. 293, pp. 384–7; and Hoffmaster, op. cit.

recognised in the first place or, if recognised at some level, what is *not* treated as a serious problem; if regarded as a problem then what is *not* acted upon. In short, the subject for scrutiny is the one of what isn't happening.

A rereading of the Australian IL-4 mousepox experiment illustrates the varied relevancies of the 'non-': the potential for IL-4 to enhance virulence was recognised prior to the mousepox publication by some experts, yet seemingly it was not subject to much professional (let alone public) debate. In this respect, what distinguishes the 2001 mousepox controversy from the majority of other work with a dual-use potential is that the researchers actively voiced their concerns beyond a closely knit expert coterie. Although counterfactual, it seems doubtful that this work would have garnered anything like the same attention in the absence of Ramshaw's communication with *New Scientist*. The fraught path to media agenda item is suggested by what happened subsequently. Despite the profile of the researchers from the mousepox experiment, 9/11, the anthrax attacks and much else besides, the publication of results of a follow-on study indicating IL-4 modified mousepox resisted treatment with an antiviral agent for smallpox garnered little notice. As another instance of the 'non-', only years after the initial controversy did Ramshaw regard his research as entailing a sort of weaponisation of sterilisation for rodents.

As well, on a different level, the way that mousepox has been one of only a handful of so-called 'experiments of concern' that are repeatedly put forward speaks to the narrow, individual case-based approach that has come to dominate framing how the life sciences might aid destructive purposes.[69] Herein what are held as mattering are the choices taken at critical 'ethical moments' (for example, should these results be published? Should experiments be approved? And so on).

This framing has characterised recent debate regarding the justifications for the proposed redaction of research undertaken by Dutch and American-based researchers who mutated the H5N1 virus in a ferret model in such as way as to enable it to transmit between mammals. While this case was a matter of much controversy in early 2012, as with other 'experiments of concern', what is perhaps most notable is its *exceptionality*. With this regard to a very limited number of cutting-edge experiments, much less attention has been cast on what the mundane commercialisation of science means for new biowarfare capacities.

69 As in World Health Organisation (WHO) 2011, *Responsible Life Sciences Research for Global Health Security*, WHO/HSE/GAR/BDP/2010.2, World Health Organisation, Geneva, Part 2.

The 'non-' as a non-issue?

Asking about what is 'not' speaks to many of the themes raised previously in this chapter: moral blindness, taken for granted meaning, the social construction of moral reasoning, the lack of ethical scrutiny to the conditions that produce ethical issues, and the need to move beyond a preoccupation with specific decision points.

Noting such affinities prompts the wider question: to what extent has the 'non-' been addressed within bioethics? On the one hand, the case-based scenario reasoning prevalent in bioethics is typically directed towards manifested dilemmas and choices. Given the widespread technique of posing hypothetical and real-life cases to ask 'what should be done', what is not taking place can be sidelined. Attention rests with possibilities for action and agency in specific scenarios. Certainly some approaches in bioethics, such as the case-based casuistry ethics,[70] are ill suited for directing themselves towards what is not happening.

On the other hand, absences are also prevalent. Bioethical analysis generally seeks to question the basis for what is treated as natural, inevitable, just so, and so on. In some ways, the history of bioethics can be read as a history of seeking to doubt prevalent moral conventions and priorities.

Within bioethics, 'non-action' is often at the centre of dispute about what is justifiable. In a review of ethical analysis of euthanasia, Holland mapped out some of the contrasting orientations given to the distinction between undertaking and refraining from action.[71] As he argued, one common means of differentiating between what is morally permissible and what is not is through the language of 'killing' versus 'letting die'—or so-called active versus passive euthanasia.[72] Often the latter is treated as more justifiable than the former because active euthanasia requires directed intervention. While passive euthanasia can itself entail some sort of action (such as turning off life-support equipment), that this is not the direct cause of death is held by some as justification for a moral distinction between it and (the more problematic) active forms. Tooley has countered such attempts to distinguish between killing and letting die. For him, passive euthanasia should be regarded as morally equivalent. As such, it is the lack of willingness on the part of doctors to intervene to *hasten* death that should be seen as the prime problem. As Holland recounts, this analytical

70 Arras, J. 1991, 'Getting down to cases: the revival of casuistry in bioethics', *Journal of Medicine and Philosophy*, vol. 16, pp. 29–51.

71 Holland, S. 2003, *Bioethics*, Polity, London.

72 See Rachels, J. 1975, 'Active and passive euthanasia', *New England Journal of Medicine*, vol. 292, pp. 78–90; and McLachlan H. V. 2008, 'The ethics of killing and letting die: active and passive euthanasia', *Journal of Medical Ethics*, vol. 34, pp. 636–8.

argument about moral equivalence has itself been disputed through the contention that the widespread belief that a moral difference should be made between killing and letting die itself provides an adequate basis for judging which one is preferable.

In contrast, other ethicists have sought to move away from direct reference to action/non-action as the basis for evaluating morality. One way that has been done is by distinguishing between positive and negative duties. Herein transgressing negative duties (such as refraining from killing) are treated as more serious than positive ones (such as not intervening to prevent death). Yet this is problematic because some actions (such as preventing someone from being saved) cut across the starting distinction between killing and letting die. Still other ethicists have advocated replacing the focus on action in debates about euthanasia with that on agency and responsibility.[73]

The manner in which action/non-action is varyingly configured as relevant speaks to the importance of how issues are identified and how they are formulated. Action and inaction have been the locus for moral argument while also being deemed somewhat beside the point. Thus when attending to dual use vis-a-vis what is missing, in addition to considering the many ways (in)action is said to matter, how the debate is framed must be considered: what is taken as counting as (in)action, what evidence supports such claims, what implications are said to follow.

This complicated picture of the coverage and place of the 'non-' in ethics is mirrored in the empirical social sciences. Again while fields such as sociology and political science are generally preoccupied with what is taking place, what is not happening has also figured as a subject of study. A recurring undercurrent of the commentary by sociologists on bioethics is that it does not attend to the structural and institutional conditions that delimit the possibilities available to individuals. As such, sociological analysis often purports to attend to what bioethics systematically ignores.

Another facet of the study of the 'non-' in social research is the examination of how social concerns about science are nullified. Much of this work starts with Gieryn's observations about how the boundaries between objectivity/subjectivity, natural/social realms and expert/lay knowledge are routinely managed within the practice and portrayals of scientists.[74] Such 'boundary work' is part and parcel of how control is maintained over the goals and standards of science. Along these lines, Cunningham-Burley and Kerr examined how adept boundary work enabled geneticists to secure the cognitive authority necessary to secure funding, while placing themselves as authority figures for speaking

73 Coggon, J. 2008, 'On acts, omissions and responsibility', *Journal of Medical Ethics*, vol. 34, no. 8.
74 Gieryn, T. 1999, *Cultural Boundaries of Science*, University of Chicago Press, Chicago.

about the social consequences of genetics, while also distancing themselves from the responsibility for negative consequences.[75] Specifically in relation to the 'non-', Firth et al. have sought to chart how boundary work was part of the creation of a 'settled morality'[76] in infertility clinics.[77] Boundaries management was central to securing agreement over many issues that were contentious outside the lab. Ethical concerns were not identified with day-to-day practices within clinics as part of what was referred to as the 'no ethics repertoire'. The result of both aspects of settled morality is that those in the clinics rendered their practice immune from outside interference.

Non-groundings

As suggested in the previous subsection then, within both ethics and social science, uneven regard is given to what is not taking place. As a result, attempts in relation to the dual-use life sciences to combine normative justification with empirical analysis face two types of problems: how the 'non-' is treated within fields of study and how these fields can be brought together. In relation to what is absent, what really needs attention is the status quo and therefore what is likely to foil efforts to move on from it. As part of this, the normative and the empirical must seek to identify each other's underlying assumptions. The 'non-' as a topic of study in this respect proves advantageous. This is so because attending to what is absent requires not just clarifying thinking, but instead also inquiring about the conditions under which quandaries arise and are structured.

If the 'non-' has advantages as a topic for study in fostering this dialogue between the empirical and the normative, it also has drawbacks. A prominent one is its open-endedness. In de-anchoring analysis from something definite to something that could be happening, the range of relevant considerations multiplies manifold. Appeals to research-community interactions, time and organisational constraints, awareness, professional socialisation,[78] widespread cultural myths and narratives,[79] and so on, are among the reasons that could be cited to explain the lack of professional attention to dual-use issues. And since those considerations relate to what is not happening, proving their counterfactual relevance is not straightforward. This in turn makes choosing

75 Cunningham-Burely, S. and Kerr, A. 1999, 'Defining the "social"', *Sociology of Health & Illness*, vol. 21, no. 5, pp. 647–68.

76 From Hoffmaster, B. 1990, 'Morality and the social sciences', in G. Weisz (ed.), *Social Science Perspectives on Medical Ethics*, Kluwer Academic, Boston.

77 Frith, L., Jacoby, A. and Gabbay, M. 2011, 'Ethical boundary-work in the infertility clinic', *Sociology of Health & Illness*, pp. 1–16.

78 As suggested in Sture, J. 2009, 'Educating scientists about biosecurity: lessons from medicine and business', in Rappert, 2009, op. cit.

79 Gordon, D. and Paci, E. 1997, 'Disclosure practices and cultural narratives', *Social Science and Medicine*, vol. 44, no. 10, pp. 1433–52.

between explanations a demanding task. While empirical and normative argument can be marshaled to make a case that is persuasive for many, this is a case that will need to be made. The 'non-' in relation to dual use faces a similar demand. Barring recourse to an objective sense of social problems that could be read back to determine exactly how much of a concern is really posed by the destructive use of science,[80] normative and empirical questions can be raised about claims regarding what should be recognised as a problem but is not.

Methodology

From the previous argument of this chapter it is possible to draw some important conclusions for the study of what is not going on in relation to concerns about the destructive use of the life sciences. First, while some of the existing literature in bioethics and social sciences speaks to how issues are not recognised or what actions are not taken, more systematic thought is needed. Second, with the somewhat inevitable reliance on the counterfactual and the speculative, arguments about the 'non-' require careful justification. Although it might be possible to make a case for why something is not happening that is persuasive to many, it is likely to be disputed too. Third, a dialogue must be established between the normative and the empirical. Locating a discussion of the 'non-' of dual use within the emerging literature about 'empirical ethics' could provide additional (normative) analytical resources for probing compared with those typically called upon by social scientists.

In thinking in more specific methodological terms about how to study non-issues and non-actions, in this subsection I want to advance two considerations: 1) comparative examination, and 2) interventionist inquiry.

Comparative examination

One of the strategies used in researching the exercise of power has been to match up situations that shared pertinent similarities in order to account for their variations. For instance, the responses of communities affected by air pollution have been juxtaposed to inquire about the reasons for those differences. In a related vein, using time as the variable, periods of major social disturbance have been examined for the opportunities created (and closed) for unconventional ideas and practices.

80 For a consideration of objectivist and constructivist orientations to dual use as a social problem, see Rappert, 2007, op. cit., ch. 1.

With respect to dual-use issues, it is possible to take inspiration from this comparative strategy. For instance, a given line of experimentation—such as the insertion of IL-4 on pox viruses—could be examined regarding why some *failed* to raise dual-use concerns while others did.

To take comparison in a different direction, another tack would be to put side-by-side efforts to *dissociate* science from bioweapons concerns actively. For instance, in recent years an international do-it-yourself (DIY) community has emerged, encouraging the formation of small-scale open-access biological labs. While much of the DIY bio community emphasises the democratisation of science in order to address problems ignored by corporations and universities, the proliferation of capabilities beyond accredited labs has been repeatedly associated with fears about bioterrorism.[81] Leaders in the DIY bio community are seeking actively to distance their work from such fears, in part by establishing codes of conduct.[82] Likewise, through innovations in art, the Critical Art Ensemble has sought to debunk the link between biology and bio-threats.[83]

Such attempts to move from 'is' → 'is not' could be compared with attempts to move from 'is not' → 'is'. Along these lines, civilian researchers who have raised dual-use threats could be studied with a view to the reactions they experienced from colleagues, funders and others. The pushback and resistance faced by organisational whistleblowers would likely prove a salient comparison.[84] In the military area, the aim of US Defense Advanced Research Projects Agency funding to link basic research to the protection against bioterrorism (as through the synthesis of poliovirus that brought its own dual-use fears) would be one such effort to move from 'is not' to 'is'.

Another comparative tact would be to juxtapose the evaluations made by different communities. For instance, security experts could be enlisted to identify lines of research they believe pose security risks but which have *not* been the subject of much scrutiny to date. Then those working in the identified areas could be approached to determine whether practitioners agreed with the assessments of security experts, the extent to which researchers have identified dual-use concerns with their work, and the reasons those concerns have (and have not) been communicated. Much the same could be done for ethicists and how their ranking of what ought to be a matter of concern compares with those in the life sciences.

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81 Ledford, H. 2010, 'Garage biotech: life hackers. Amateur hobbyists are creating home-brew molecular-biology labs, but can they ferment a revolution?' *Nature*, vol. 467, pp. 650–2; and Nature 2010, 'Garage biology: amateur scientists who experiment at home should be welcomed by the professionals', *Nature*, vol. 467, p. 634.

82 As in the DIYbio Continental Congress held on 8 May 2011 attended by the author.

83 Critical Art Ensemble n.d.,*Bodies of Fear in A World of Threat*, <http://www.critical-art.net/mp.html> (viewed 4 April 2010).

84 Martin, B. 2007, 'Whistleblowers: risks and skills', in Rappert and McLeish, op. cit.

Interventionist inquiry

That non-issues are *non*-issues and non-actions are *non*-actions speak to the way in which a spirit of intervention needs to infuse their study.

To expand, the process of questioning practitioners about matters of dual use is likely to be an act of questioning assumptions, priorities and world views. For instance, since 2004 Malcolm Dando and I have conducted seminars for university faculties and other public research centres in order to inform participants about current life-science security developments as well as to generate debate about how research findings should be communicated, whether experiments should be subject to institutional oversight and what research should be funded. More than 130 seminars have been undertaken in 15 countries (ranging from the United Kingdom to Uganda and Japan to Argentina), with more than 3000 participants. While it has been possible to generate lively (but bounded)[85] discussion about dual-use issues at these events, as interactions they required careful management because they asked participants to think about their work anew. As a result, what was said, how, to whom and when were all subject to lengthy methodological consideration. The decision to run seminar discussions akin to focus groups in which attendees were encouraged to deliberate with each other was itself the result of the limitations experienced in a one-to-one interview format.[86]

The manner in which probing about non-issues de facto amounts to a form of intervention suggests the need to consciously attend to how this intervention is conducted. Overall, what is required is a systematic process of planning and execution that allows for learning and experimentation. As part of this, inquiry should be thought of as a practical, intellectual, action-orientated and consequentialist form of action.[87] Kurt Lewin's often quoted suggestion that 'if you want to truly understand something, try to change it' indicates the potential for deliberate intervention to yield insights not readily obtainable through unobtrusive means.

In fields of social science such as 'action research', such practical inquiry is linked to the aim of transforming social relations.[88] As with the 'empowerment' and 'social-action' models noted in the previous section, the factors that frustrate change require attention. This practical step entails incorporating

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85 See, for instance, Rappert, 2007, op. cit., ch. 5.

86 Ibid., ch. 2.

87 Dewey, J. 1929, *The Quest for Certainty*, George Allen & Unwin, London.

88 See, for example, Ospina, S., Dodge, J., Godsoe, B., Minieri, J., Reza, S. and Schall, E. 2004, 'From consent to mutual inquiry', *Action Research*, vol. 2, no. 1, pp. 47–69; and Winter, R. 1996, 'Some principles and procedures for the conduct of action research', in O. Zuber-Skerritt (ed.), *New Directions in Action Research*, Taylor & Francis, London; and Winter, R. 1998, 'Managers, spectators and citizens', *Educational Action Research*, vol. 6, no. 3, pp. 361–76.

positive normative goals into the design of inquiry. Central to a robust process of transformative intervention is to ensure that a conversation takes place between the methods of inquiry and its normative aims. The latter should promote scrutiny regarding the fallibility and commitments of the methods employed. Also, the methods should enable the refinement and revision of what is held as necessary and desirable. Doing so not only requires a certain kind of intellectual understanding, but also practical skills.

What seems essential in studying what is absent is to find means of questioning taken-for-granted assumptions about what counts as an ethical or a social 'problem' in the first place. Rather than going out and probing straightforwardly overt, recognised issues widely labelled as 'ethical' or 'contentious', research techniques and strategies must help to cultivate thinking afresh in order to avoid confirmation bias, to encourage alternative hypotheses and to embrace negative evidence.

Inquiry about non-issues and non-actions then cannot be conceived simply as an attempt to reveal holes in understanding. Instead, it must be a project of questioning the historical, political and situational bases for how understandings are formed and thereby what is counted as 'missing' in the first place. As such, ensuring inquiry interrogates its own starting points is vital. One interesting direction to take the 'non-' is to consider the hows and whys regarding ethicists' lack of engagement with dual-use life science. Some preliminary reflections have already been given on this matter;[89] however, undertaking systematic empirical research might inform an understanding of not only the priorities and presumptions of ethicists, but also therefore the likely limits of existing academic disciplinary resources. Moreover, such a line of empirical investigation provides an opportunity for bringing to the fore questions about how the normative and the empirical can be combined.

At stake is the question of how facts, figures, concepts and arguments should be made sense of in order to assess whether ethicists themselves have been remiss for their past level of regard. The contention that some issues are being neglected compared with others is commonplace in bioethics, with its attentiveness to distributive justice. At times this extends to commentary on bioethics' own agenda.[90] For both, the justifications for claims are open to disagreement in relation to their underlying ethical assumptions. Appeals to consequences versus duties versus rights, for instance, can result in far different assessments about what is lacking from the agenda of bioethics. Each appeal is also reliant on

89 Selgelid, M. 2010, 'Ethics engagement of the dual-use dilemma: progress and potential', in Rappert, 2010, op. cit.

90 For examples of this, see Selgelid, M. 2008, 'Ethics, tuberculosis and globalization', *Public Health Ethics*, vol. 1, no. 1, pp. 10–20; and Selgelid, 2005, op. cit.

different types of 'evidencing' to substantiate neglect. While many or even most bioethicists might agree that a particular topic is being relatively 'neglected', the basis for this might well vary.

Complicating the situation further, varying appraisals of what counts as a neglected 'non-' will likely be part and parcel of meaningfully alternative ways a given topic is framed. That then raises important questions about whether commentators are orientating to neglect in 'realist' or 'non-realist' terms—that is, whether they are assuming some definitive sense of what 'topic X' is and how it should be understood. There may well be meaningfully different topics X_1, X_2, X_3 and so on at play.[91]

In short, an empirical examination of how ethicists contend about whether and how the dual-use aspects of the life scientists are being 'neglected' could be a way into examining the in-practice reasoning and bounds of bioethics.

If inquiry is linked to the aim of transforming social relations then another reflexive dimension of the relationship between the normative and the empirical opens up, one that again calls into question conceiving of the study of non-issues as the cataloguing of knowledge gaps. To make this point I want to return to where this chapter began, with the categorical condemnation of biological weapons. As contended earlier, assents to this denunciation are typically accompanied by little explicit justification. As with many stigmas, the one against biological weapons is often portrayed as self-evident.

To engage in explicit empirical-normative inquiry about what should count as a problem might well cast doubt on this orientation. That could happen through questioning arguments that biological weapons are really more 'inhumane' or 'indiscriminate' than other weapons. If empirical-normative analysis were to undermine the often visceral, intuitive reactions against biological weapons, some would no doubt regard this as a deplorable outcome. As a result, *not* undertaking analysis might well be judged as a wiser course of action. Whether or not this appraisal holds depends on the goals sought from analysis. As ever, then, the uses of science and ethics are topics for considered inquiry.

91 Further, then, whether some definitive sense of the topic needs to be established (and what that should be) is a choice that needs to be addressed.