



Biosecurity Aspects in Life Science Programmes at German Universities

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Since the anthrax letter attacks in autumn 2001, awareness of the misuse potential of the life sciences has dramatically increased. Like any other technology, biotechnology can be used not only for peaceful purposes, but also for the creation of weapons. It is not primarily state biological weapons programmes that are currently viewed as a threat – development and production of biological weapons are prohibited by the multilateral Biological Weapons Convention of 1972. Instead, the focus has shifted towards the use of pathogens by terrorists. Concerns that terrorists could acquire and use biological weapons are further amplified by the rapid developments in the life sciences, in particular the advancements in synthetic biology and the automation and miniaturization in biotechnology.

Often, scientists will be the first to realize a misuse potential or actual misuse of their research results. It is therefore extremely important that they are knowledgeable about the “dual use” potential of their work, and that the topic is part of university curricula. Surveys from a number of countries indicate that life scientists, generally, have little or no knowledge about the security aspects of their work, which is at least partly due to the absence of the topic in scientists’ education.¹

¹ See, for instance, Simon J, Hersh M (2005) An educational imperative: The role of ethical codes and normative prohibitions in CBW-applicable research, *Minerva* 40(1): 37-55, DOI: 10.1023/A:1015001429180; Revill J, Dando MR (2006) A Hippocratic Oath for life scientists: A Hippocratic-style oath in the life sciences could help to educate researchers about the dangers of dual-use research, *EMBO Reports* (July 2006) 7(SI): S55–S60, DOI: 10.1038/sj.embor.7400708; and National Science Advisory Board for Biosecurity (2008) Strategic plan for outreach and education on dual use research issues, 10 December 2008, <http://oba.od.nih.gov/biosecurity/PDF/FinalNSABBReportonOutreachandEducationDec102008.pdf>.

In order to find out whether and to what degree issues such as dual use, biosecurity, bioterrorism and bioweapons are addressed in life scientists' education in Germany, the Hamburg Research Group conducted a survey of German public universities in autumn 2010.

Methodology

The survey included all public universities in Germany offering life science degree programmes. Teacher training programmes in the life sciences and medical programmes were excluded, because those very rarely lead to employment in the research areas relevant for our survey. 58 universities were identified and interviewed.

We addressed the programme coordinators of the respective life science departments, assuming that they have the best knowledge about the content of their programmes. Contact was established via email. The coordinators were informed about the goal of the survey and directed to an online questionnaire. After one month, the universities that had not responded were contacted again to increase the response rate.

The questionnaire took two to four minutes to complete. It contained, in addition to the opening question whether the university offers courses addressing issues such as dual use, biosecurity, bioterrorism and bioweapons, questions about the scope and target group of those courses.

Findings

19 of the 58 universities contacted replied, identifying themselves by name; another three replied choosing not to give their names. The response rate was a comparatively high 38 per cent.

Question: Does your university offer a course to students of the life sciences (biology, biochemistry, biotechnology, etc.), that is entirely dedicated to the possibility of misuse of the life sciences for weapons purposes (keywords would be biological weapons, bioterrorism, dual use, biosecurity)? "Biosecurity" is understood as the prevention of the misuse of life science research and equipment for bioweapons or bioterrorism purposes, in contrast to "biosafety".

Number of universities replying	Answer: Yes	Answer: No
22	1	21

The University of Hamburg is the only university that offers a course focusing specifically on the topic in question. The seminar is entitled "About the military misuse of the life sciences", covers two semester periods per week (SPPW), is offered once a year, and is open to undergraduate, graduate and PhD students of the life sciences.

Question: Does your university address the possibility of misuse of the life sciences for weapons purposes (keywords would be biological weapons, bioterrorism, dual use, biosecurity), but not in a course that is entirely dedicated to this topic?

Number of universities replying	Answer: Yes	Answer: No	Answer: Don't know
21	4	3	14

Three universities stated the topic in question is covered in courses about bioethics. Another university addresses the topic in question in a lecture called “Diversity of microorganisms”. Three universities replied that they do not take up the issue at all. A surprisingly high number of universities (67 per cent) did not know whether the subject is taught or not.

University	Course	SPPW	Percentage of course dedicated to bioweapons issues
Karlsruhe Institute of Technology	Lecture „Ethics in biology“	2	<10%
Philipps University Marburg	Lecture „Diversity of microorganisms“	4	10-25%
Saarland University	Seminar „Bioethics“	2	<10%
Münster University	Module B.Sc. „Bioethics“	2	<i>Not stated</i>

Conclusion

The survey shows that issues such as dual use, biosecurity, bioterrorism and bioweapons are seldom addressed in life science programmes at German universities. Only one university offers a course that focuses exclusively on those issues. Additional four universities cover the topic in other courses, mostly in courses on bioethics. A surprisingly high number of programme coordinators did not know whether the topic in question is taught or not. It seems that many of them are not aware of the misuse potential of the life sciences. This assumption is supported by the comment of one programme coordinator: “I do think the topic is important [...] though consequently you'd have to point out the dual use problem of firearms, knives, cigarette lighters, fuel and cars also” (translation by the author). The naive comparison of the misuse potential of technologies that could be used for the creation of weapons of mass destruction with that of everyday objects – combined with the low priority of the bioweapons topic in teaching – underlines the urgent need for awareness raising.

At the international level, there have been a number of activities and initiatives to raise the awareness of life scientists of the potential for misuse of their work. One example is the *Statement on Biosecurity*, that 68 national and international academies of sciences – the Union of the German Academies of Sciences and Humanities being one of them – developed and signed in 2005.² Another example are the relevant online courses, that some universities and non-governmental organisations have developed.³ In Germany, it is for instance the German Research Foundation (DFG) that has published a statements on the dual use problem in the life sciences.⁴

But all such activities will only be successful in preventing the misuse of the life sciences for weapons purposes, if the life science community is well informed and attentive. Education and awareness raising have to take place at many levels, but most certainly at universities also. Germany should do much better in including biosecurity aspects in academic life science education.

Contact

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2 Interacademy Panel (2005) IAP Statement on Biosecurity, 1 December 2005, available at http://sites.nationalacademies.org/xpeditio/groups/pgasite/documents/webpage/pga_054651.pdf.

3 See, for instance, Biosecurity Education Portal of the Federation of American Scientists (FAS), available at <http://www.fas.org/programs/bio/educationportal.html>, or the Applied Dual-Use Biosecurity Education Online Distance Learning Module of the University of Bradford, available at <http://www.brad.ac.uk/peace/courses/PostgraduateCourses/AppliedDual-UseBiosecurityEducation/>.

4 Deutsche Forschungsgemeinschaft (2008) Verhaltenscodex: Arbeit mit hochpathogenen Mikroorganismen und Toxinen, 25 April 2008, available at http://www.dfg.de/download/pdf/dfg_im_profil/reden_stellungnahmen/2008/codex_dualuse_0804.pdf.