

Working Group on the Strengthening of the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction

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Identifying, examining and developing specific and effective measures, including possible legally-binding measures, and making recommendations to strengthen and institutionalize the Convention in all its aspects within the mandate of the Working Group

Contemporary Challenges to the Objectives of the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (BTWC) Related to the Development of Synthetic Biology Technologies and Practical Approaches to Overcome them

Submitted by the Russian Federation

1. In recent years, a number of countries have been actively developing technologies for creating artificial microorganisms with targeted properties, endowing naturally-occurring bacteria, viruses and fungi with "unspecific" qualities or enhancing the existing features. Besides, the studies of mechanisms of selective impact on the genetic apparatus, immune system, microbiome and metabolism of a human being are getting broader.
2. Synthetic biology today allows not only to manipulate the existing genes and genomes but also to create absolutely new biological systems by changing nucleic acid sequences. In addition, synthetic biology technologies increase biological risks by creating tools to increase virulence and pathogenicity of microorganisms.
3. Cheaper, simpler and more available methods of synthetic biology and employed hardware result in a large-scale development of independent biotechnological laboratories of commonly portable and "garage" nature, which activities are left mostly unsupervised.
4. There is a need to carry out analysis and assess risks related to the proliferation of new technologies. Major risks include:
 - Accidental leak of synthetic microorganisms beyond a research laboratory or deterrence rooms, their uncontrolled propagation with drawing damage to the environment and healthcare;
 - Manifestation of harmful side effects of synthetic microorganisms created for a specific purpose after their release into the environment;
 - Use of synthetic biology by the States, terrorist organizations or individuals for hostile or illegal purposes;
 - Creation of infectious agents with targeted properties – high virulence, poly-antibiotic resistance, ability to epidemic spread – in laboratory conditions;



- Synthesis of viruses with potential to cause high lethality for humans, animals or plants or endowing viruses with new properties in order to study the fundamentals of pathogenicity or spread mechanisms.
5. Identification of bacteria and products of their vital activities created with new bio-engineering and bio-information methods will be extremely problematic while the existing ways of protection against them remain ineffective. Thereby, conditions are created for an unapparent use of modified biological agents, initiation of delayed pathological effects as well as influence on the human microbiome and immune system.
 6. The technology of "gene drive" is being developed for the purposes of the accelerated spread of modified genetic materials in large populations. It will allow exerting targeted influence on certain biological species up to their full extermination. Thus, studies are being conducted on the options of damaging the agro-industrial complexes of competitor States by bringing some covert modifications to the seed stocks of agricultural plants and sterilization of the breeder cattle.
 7. Appearance of desktop DNA printers allowing printing any prescribed DNA sequence is among frequently discussed problems of synthetic biology of late years. Large availability and uncontrolled use of DNA synthesis technologies carry a threat of emergence of toxins and pathogens fertile in inducing a new global pandemic.
 8. Even greater attention should be also given to engaging artificial intelligence (AI) to protein design. In the long run new AI models will permit the researchers to create a broader spectrum of molecules and proteins than ever, change properties of microorganisms, including to make them undetectable as well as to get new biological agents and toxins. At the same time research using AI compared to traditional studies, which can be time-consuming, allows generating encoding protein sequences in seconds.
 9. There are now qualitatively new technologies of the targeted genome change that allow much more easier modification of insects transmitting infectious diseases, pests and weed seeds damaging agricultural plants than traditional genetic engineering tools. Such technologies require close attention in the context of exports control as far as they create the whole spectrum of risks typical for the dual-use technological platforms.
 10. In general, the development of synthetic biology technologies is going on while effective mechanisms of international control are absent and scientific, production and laboratory equipment is quickly improved and more available for private consumers. This increases the possibility of emergence of new generation of biological destructive agents, which are no longer identifiable by traditional methods, conduct of uncontrollable dangerous biotechnological activities as well as the risk of sensitive technologies falling into the hands of terrorist organizations.
 11. There is a need for development and establishment at the international and national levels of an effective system of risk assessment and synthetic biology research control. Development of measures to strengthen the BWC should take into account possible perspectives of technological progress, including in the synthetic biology field. In general, this topic needs a thorough expert examination by the BWC States Parties.
 12. Implementation of an effective BWC verification mechanism becomes even more urgent in such circumstances. Commitment to the Convention should be measured by specific actions aimed at development and adoption of the verification mechanism. Since 2001 the United States has unjustifiably blocked the work on such instrument that would allow for the strict implementation of the BWC and prevent its violation.
 13. The Russian Federation regularly expresses at international fora its support for the renewal of negotiations on universal, legally-binding, non-discriminative Protocol with an effective verification mechanism of the BWC implementation. In particular, the Russian Federation stated this proposal at the Ninth Review Conference on 28 November 2022.