
**Meeting of the States Parties to 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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**Standing agenda item: Cooperation and assistance,
with a particular focus on strengthening cooperation
and assistance under Article X**

**Report on Implementation of Article X of the Biological and
Toxin Weapons Convention**

**Submitted by the United Kingdom of Great Britain and Northern
Ireland**

Introduction

1. This paper outlines an *illustrative* range of the United Kingdom activities and programmes undertaken (or funded by) by government departments, industry, research councils and academia that give effect to our commitments under Article X; this paper is not comprehensive, but is designed to give a flavour of the range and diversity of relevant activities underway. The United Kingdom programmes include many with an emphasis on addressing concerns of priority to the developing world, such as low cost vaccines/malaria prevention and treatment. Many projects are multi-sectoral and collaborative and involve partnerships between government, academia, industry, international organisations and counterparts in those countries receiving assistance.

2. It bears repeating that these programmes and activities are being conducted for their intrinsic scientific, humanitarian and developmental value; they are not separately identified as BTWC Article X projects, or conceived exclusively to satisfy an Article X requirement. And that is how it should be. However, they undoubtedly give effect to the objectives of Article X that implementation of the Convention should avoid hampering the economic or technological development of States Parties or international cooperation in the field of peaceful biological activities.



Government departments, agencies and funded programmes

Antimicrobial resistance

3. In March 2015 the United Kingdom committed £195 million over five years to launch the Fleming Fund to work to counter antimicrobial resistance (AMR) and strengthen infectious disease surveillance world-wide. This fund will focus on enhancing laboratory capacity and surveillance networks in developing countries, particularly where there is no such existing or planned capacity. The United Kingdom government will work with the Wellcome Trust, the Bill and Melinda Gates Foundation, the Institute Pasteur International Network and other partners to this end. We are looking at how to use the Fleming Fund to work with countries in implementing the AMR global action plan and building sustainable surveillance capability in line with the International Health Regulations. In this context, the Commonwealth and Public Health England have joined forces to strengthen public health laboratories in low and middle-income Commonwealth countries through a twinning and partnership initiative to share expertise and knowledge. The initiative is focusing initially on the twinning of PHE with a small number of Commonwealth countries including Seychelles, Sierra Leone and Trinidad and Tobago (through the Caribbean Public Health Association, CARPHA, and linking to other countries in that region).

4. On 23 October 2015 the United Kingdom and China announced that they will establish the Global Antimicrobial Resistance (AMR) Research Innovation Fund and encourage further investment from other governments and the private sector, helping to address one of the greatest problems facing the world of medicine today. This new fund will invite bids from industry, academia and other bodies. It will aim to create international partnerships to build a global response and support new research to reduce the spread of antibiotic resistance. The Medical Research Council (MRC), the Biotechnology and Biological Sciences Research Council (BBSRC) and the Economic and Social Research Council (ESRC) are joining forces with the National Natural Science Foundation of China (NSFC) to establish a joint fund of £9M to support research on antimicrobial resistance (the United Kingdom contribution will be channelled through the Newton Fund – see paragraph 6 below). A workshop was planned for 24-26 November 2015 in Shanghai, China, to further explore the antibacterial resistance research landscape within the two countries and to establish core themes that will direct the funding.

5. Another example of the United Kingdom support in this area is a Newton Fund initiative in India which focuses on research into antimicrobial resistant Tuberculosis and minimising the indiscriminate use of antibiotics. Through this initiative, Innovate UK has launched a programme of industrial R&D support with their Indian counterpart which will support collaborative R&D projects on antimicrobial resistance. In addition, major research centres on Antimicrobial Resistant Tuberculosis, and Advanced Technology for Minimising the Indiscriminate use of Antibiotics are being established with the support of the United Kingdom Medical Research Council (MRC) and the Government of India Department of Biotechnology (DBT). Significant partnerships have been developed with Indian departments on PhD exchanges, Postdoctoral training schemes and professional development.

Biosafety, biosecurity and infectious disease surveillance, detection and diagnosis

6. During 2013/14 and 2014/15, the United Kingdom's International Biological Security Programme, managed by the Ministry of Defence, has funded projects which have:

(a) Achieved improvements in physical security and techniques at laboratories/institutes, particularly in FSU countries including Tajikistan, Georgia and Azerbaijan; improved the safety and security of work with dangerous pathogens, for example through the installation of critical safety equipment and the introduction of

laboratory techniques that reduce the need to work with live biological agent, as well as the provision of support to the development of biosafety associations e.g. the Biosafety Association of Central Asia and the Caucasus, and the Afghan Biorisk Association;

(b) Strengthened countries' ability to detect and identify disease outbreaks: this has included the introduction of, and training in, modern diagnostic techniques, as well as funding projects conducted by intergovernmental organisations as part of their established biosecurity and biosafety efforts;

(c) Re-established and strengthened, through a four year collaborative research project, basic surveillance capabilities to study key viral pathogens responsible for serious endemic diseases in the Republic of Tajikistan. This included a number of highly dangerous pathogens which appear on one or more 'select agent' lists, such as Crimean-Congo Haemorrhagic Fever (CCHF), often referred to as 'Asian Ebola'. This work underpins Tajik capacity to deal with its regular outbreaks of CCHF, and contributes to international understanding of CCHF virus aetiology and control. Through collaboration with Public Health England, modern molecular diagnostic techniques have been established in-country, reducing the requirement for handling highly infectious live virus in the diagnostic laboratory, thereby directly contributing to improved biosecurity and laboratory safety for this important research.

(d) Jointly funded with the US Biological Engagement and Canadian Global Partnership Programs the development of a regional biorisk management and molecular diagnostics training centre at the Jordan University of Science and Technology. The facility consists of a mock containment laboratory for training scientists, laboratory technicians and laboratory managers, and includes a functional heating, ventilation and air conditioning system, funded by the United Kingdom, for training these staff in the management and maintenance of such systems in containment facilities. This type of knowledge will contribute to laboratory safety by ensuring that these critical systems are properly maintained in trainees' parent laboratories.

(e) Overall, the training centre is intended to serve as a model institution, capable of providing training to scientists in the Middle East/North Africa and South Asia regions on a variety of topics related to biorisk management. There are no other dedicated training facilities in the Middle East/North Africa region capable of providing biosafety training courses which include both practical and classroom based activities. The safe and secure practices promoted will enhance regional laboratory safety and security on a sustainable basis. Jordan is able to provide a suitable environment for conducting such training activities, including for scientists from other countries in the region, such as Libya and Yemen, where access is more difficult for security reasons. This project therefore complements training courses that the United Kingdom has previously funded at the Jordan University of Science and Technology, which were focused on modern diagnostic techniques and were delivered to scientists from across the region.

(f) Provided funding for the joint OIE/FAO post-eradication programme to help reduce stocks and improve global security of the rinderpest virus, which is highly pathogenic, highly communicable and potentially devastating to livestock. Primarily affecting cattle, this disease poses a significant threat to food security. The sequestration and security of remaining stocks of this virus in a small number of designated holding facilities is therefore of high priority in order to minimise the risks of any further outbreaks, whether caused deliberately or otherwise. In May 2013, the OIE launched a United Kingdom funded international, multilingual media campaign highlighting the importance of the rinderpest sequestration and security programme. The OIE campaign has been successful in identifying 28 facilities which currently hold rinderpest virus; it is proposed that only five facilities should hold stocks in future, significantly reducing the associated risks. In addition, a United Kingdom funded efficacy trial is under way at the United

Kingdom's Pirbright Institute involving a vaccine for Peste des petits ruminants; if the trial is successful, the use of this vaccine could further reduce the need to hold stocks of rinderpest virus, and possibly allow their eventual elimination. The United Kingdom has encouraged a joint approach by the OIE and FAO to this programme, and has helped secure funding from other donors.

The Newton Fund: bioinformatics, neglected tropical diseases

7. The Department for Business, Innovation and Skills administers the Newton Fund whose objective is building science and innovation capacity in developing countries. It was launched in April 2014 and will provide £375 million of funding over the course of five years. As part of the Newton Fund, the Genome Analysis Centre (TGAC) was awarded over £50,000 in August 2015 by the British Council to develop advanced bioinformatics capabilities for next-generation rice genomics in Vietnam to aid precision breeding for improvement of this staple crop by exploring 48 local rice varieties. Developing the bioinformatics capacity in Vietnam will allow research Institutes to benefit from advancements in next generation genomics, applying their computational skills to rice breeding to help maintain productivity in the face of changing climates, and potentially develop new higher value rice varieties for the global market.

8. In collaboration with the Agriculture Genetics Institute (AGI) in Hanoi (Vietnam), TGAC is working to characterise the genetic diversity of traditional rice varieties from Vietnam, aiming to develop genomic markers associated with traits of interest such as disease resistance and salt tolerance. In order to make the data accessible, TGAC will set up a public database to host the variant data within the context of the latest genome assemblies and annotation. The programme involves the exchange of scientists from Vietnam to gain expertise in bioinformatics analysis, and from United Kingdom to learn about the field phenotyping activities in Vietnam. Scientists from TGAC, AGI and other participating Institutes will host '*Train the Trainer*' workshops in the United Kingdom to train Vietnamese researchers in bioinformatics and genomic analysis to equip them with the skills to sustain training for researchers in Vietnam for the future.

9. The Newton partnerships between the United Kingdom and Brazil are continuing to tackle global challenges including infectious and neglected diseases, ensuring a lasting legacy of closer collaboration in science and innovation. In May 2015 the Medical Research Council (MRC), the Economic and Social Research Council (ESRC), a wide range of Brazilian State Funding Agencies and the Brazilian National Council for Scientific and Technological Development invited applications to the United Kingdom -Brazil Neglected Infectious Diseases Partnership Call as part of the Newton Fund. The launch of this call followed the success of the United Kingdom -Brazil Infectious Disease Workshop, which took place in October 2014. The workshop was convened by the funding agencies participating in this partnership and attended by eminent Brazilian and British researchers in the field of infectious diseases in order to scope the development of the call. This initiative will provide funding for collaborative research projects, focussed on neglected infectious diseases in Brazil. This includes but is not limited to Dengue fever and other vector-borne diseases (e.g. Chikungunya); Leishmaniasis; Chagas disease; Leprosy; Schistosomiasis; intestinal helminth infections; rotaviruses and emerging viruses. In total, up to £4.4m will be made available for this initiative: up to £2.2m on the United Kingdom side with equivalent effort matched by the Brazilian funders.

Academic and research councils

Combating zoonotic diseases, neglected tropical diseases and malaria

10. The Zoonoses and Emerging Livestock Systems (ZELS) initiative was launched in 2014 as a joint venture by the Biotechnology and Biological Sciences Research Council (BBSRC), the Defence Science and Technology Laboratory (Dstl), the Department for International Development (DFID), the Economic and Social Sciences Research Council (ESRC), the Medical Research Council (MRC) and the Natural Environment Research Council (NERC). It provides £20.5M over a 5-year period for new research and training to reduce the impact of zoonoses on poor people in developing countries and their livestock, and to enhance the scientific capabilities of developing countries for the longer term.

11. The initiative consists of 11 projects that will investigate emerging and endemic zoonotic diseases in developing countries. United Kingdom researchers will work in partnership with more than 30 overseas institutes and organisations in ten countries in Africa, south Asia and south-east Asia. The projects will generate scientific evidence to inform the selection of risk-based and cost effective prevention and control options that may contribute to decreasing the likelihood of occurrence, prevent the transmission, and reduce the impact of major zoonotic diseases such as brucellosis, Q fever and Rift Valley fever.

12. The Liberian Neglected Tropical Diseases Department (NTD) is working with the support of various partners including the African Programme for Onchocerciasis Control, the London School of Hygiene & Tropical Medicine (LSHTM), the Schistosomiasis Control Initiative (SCI), and DFID, to implement a number of training, mapping, and treatment programs in the country. DFID, the largest bilateral donor active in Liberia, is supporting an NTD control programme implemented by Liverpool's Centre for Neglected Tropical Diseases and SCI that targets Lassa Fever and schistosomiasis, and includes the delivery of drugs that treat intestinal worms.

13. African scientists working in collaboration with researchers from the London School of Hygiene & Tropical Medicine are recipients of major funding from the Wellcome Trust and DFID, to establish cutting-edge research and training programmes across the continent. The DELTAS Africa programmes establish world-class research environments at African universities with a strong focus on creating training opportunities for the next generation of researchers. In total, the scheme will award over £46 million (approximately \$70 million US dollars) over an initial period of five years. Many of the awards allow research to be carried out where the health challenges are greatest, for example genetic analysis of drug-resistant malaria across East and West Africa and locally relevant research into zoonotic infectious diseases.

14. A new compound that can kill the parasite that causes malaria is being developed by researchers as a potential treatment for the disease. If successful, it could lead to an affordable anti-malarial drug that requires only a single dose and that also reduces transmission of the disease. The discovery, published on 17 June 2015 in the journal *Nature*, came about through collaboration between the University of Dundee's Drug Discovery Unit and the Medicines for Malaria Venture (MMV), which was supported by the Wellcome Trust. The malaria parasite *Plasmodium falciparum* has developed resistance to many current drugs, meaning that new therapies are needed to overcome this problem. The compound identified (called DDD107498) works by blocking protein synthesis within the parasite and is effective against multiple life cycles. DDD107498 has been shown to be successful in mouse models of malaria and is now beginning preclinical development. The researchers estimate that a drug developed using the compound would cost around US\$1 per treatment, which would make it affordable for patients living in low-income countries that are most severely affected by malaria.

15. In 2013 the MRC Laboratory of Molecular Biology began collaborating with the Walter and Eliza Hall Institute of Medical Research (WEHI) in Australia to determine a preliminary structure of the *Plasmodium falciparum* cytosolic ribosome by single-particle cryo-electron microscopy. The purified ribosome samples were provided by WEHI. The ribosome is essential for protein synthesis and details of the parasite's specific ribosome structure may lead to the rational design of new treatments for malaria.

16. The Liverpool School of Tropical Medicine (LSTM, Liverpool University)) has major field projects which evaluate, implement and monitor vector control activities in Africa and Asia. LSTM works closely with a range of partners to ensure that its research and educational programmes are responsive to the needs of disease endemic countries. The Liverpool-Guangdong Drug Discovery Consortium, in collaboration with University of Liverpool and Guangdong University of Technology (GDUT) in China, is focussed on the development of new drug therapies for the treatment of tuberculosis (TB), malaria, Neglected Tropical Diseases (NTDs) and other infectious diseases. The Consortium has established the Liverpool-Guangzhou drug discovery joint laboratory, located at GDUT and accommodating a drug discovery team made up of staff and students from GDUT and other parts of China.

Commercial, research and cross-sectoral

Vaccines and vectors of infectious disease

17. The United Kingdom's leading pharmaceutical companies, research centres, universities and disease experts will come together to focus on the most serious global health threats. The United Kingdom Vaccines Research and Development Network, an initiative led by the Department of Health, will bring together the best expertise across the country, with £20 million invested from the outset to focus on the most threatening diseases including Ebola, Lassa, Marburg and Crimean-Congo haemorrhagic fever, with additional investment from the private and research sector.

18. GAVI, the Vaccine Alliance, has a programme to trace children who missed out on immunisation in Sierra Leone as a result of the Ebola Virus Disease Outbreak. The objective is to ensure that they are reached through catch-up programmes. A measles vaccination campaign targeting more than 1.3 million children was undertaken in June 2015 with support from Gavi and the United Kingdom's Department for International Development (DFID).

19. The EbolaVac project is part of an international consortium comprising the Wellcome Trust, the UK government and the United Kingdom Medical Research Council which aims to accelerate collaborative multi-site trials of candidate Ebola vaccines. EbolaVac seeks to accelerate the clinical development of the GlaxoSmith Kline (GSK) Chimpanzee Adenovirus Type 3 Ebola virus Zaire (ChAd3-EBO Z) vaccine candidate to make the vaccine available to frontline health care workers at risk and to be used in the containment of EBOV outbreaks. This will be achieved by completing Phase I development of vaccine candidate conducted in Lausanne, Switzerland, and evaluating it in (placebo)-controlled, observer-blind Phase II testing at established clinical study centres in West Africa outside of Guinea, Sierra Leone, and Liberia. The EbolaVac consortium is composed of four European partners including The University of Oxford, United Kingdom, The Bernhard Nocht Institute for Tropical Medicine, Germany, The Hospices Cantonaux/University Hospital of Lausanne, Switzerland and the multinational company, GSK, who will ensure the full exploitation of the generated output and knowledge. The project will run until October 2017.

20. GlaxoSmith Kline (GSK) announced on 24 July 2015 that the Committee for Medicinal Products for Human Use (CHMP) of the European Medicines Agency (EMA) had adopted a positive scientific opinion for its malaria candidate vaccine Mosquirix™, also known as RTS,S, in children aged 6 weeks to 17 months. Following this decision, the World Health Organization (WHO) will now formulate a policy recommendation on use of the vaccine in national immunisation programmes once approved by national regulatory authorities. RTS,S, which was developed in partnership with the PATH Malaria Vaccine Initiative (MVI), is the first candidate vaccine for the prevention of malaria to reach this milestone. Once a WHO pre-qualification is granted, GSK intends to apply for marketing authorisation in countries in sub-Saharan Africa on a country-by-country basis.

21. GSK has committed itself to a not-for-profit price for RTS,S so that, if approved, the price of RTS,S would cover the cost of manufacturing the vaccine together with a small return of around five per cent that will be reinvested in research and development for second-generation malaria vaccines, or vaccines against other neglected tropical diseases.

22. Oxitec is a British biotechnology company pioneering an environmentally friendly way to control insect pests that spread disease and damage crops. It is currently pioneering a new solution to control harmful insect populations, including the mosquito species *Aedes aegypti* which spreads Dengue Fever and Chikungunya. Oxitec has used genetic modification to create 'sterile' male insects which seek out and mate with females. After an Oxitec mosquito has successfully mated with a wild female, any offspring that result will not survive to adulthood, so the mosquito population declines. This solution introduces a gene into the mosquitoes which stops their cells from functioning normally; this only affects the mosquito, unlike conventional insecticides or pesticides which kill insects indiscriminately. Oxitec and its collaborators have performed open field release tests of Oxitec's *Aedes aegypti* (under permit from the regulators) in several countries (including the Cayman Islands, Malaysia and Brazil) from 2009. In each trial aimed at suppressing the native *Aedes aegypti* population, Oxitec mosquitoes reduced the local population by over 90%, with no noted adverse events or effects.
