

**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**

28 November 2017

English only

2017 Meeting
Geneva, 4-8 December 2017
Item 6 of the provisional agenda
Issues of substance and process for the period
before the next Review Conference, with a view
to reaching consensus on an intersessional process

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

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

I. Introduction

1. This paper provides an indicative overview of the diverse range of programmes, projects and funding from UK public and private bodies that support the aims and objectives of Article X. The paper is designed to meet the requirement set out in the Seventh Review Conference Final Declaration (paragraph 61) on the submission of national reports, at least biannually, on the steps taken by States Parties to implement Article X. It follows a similar structure to previous UK Article X reports and provides an update on more recent UK initiatives.

II. Government departments, agencies and funded programmes

A. Tackling infectious diseases: the Ross Fund

2. In October 2016, the Department for International Development (DFID) published the outcome of its Research Review¹, which was used to formulate priorities for DFID research, responding to the UK AID Strategy². As a result, DFID has committed to increasing its research in technologies, building on its track record of funding the development and delivery of life saving drugs and vaccines, and ensuring that effective technologies can be accessed and used by those who need them most. The priority themes identified include a significant scale up to the Ross Fund Portfolio, which addresses the government's commitment to accelerate the development of vaccines and drugs to eliminate the world's deadliest infectious diseases. DFID will invest an additional £357

¹ <https://www.gov.uk/government/publications/dfid-research-review>

² "UK aid: tackling global challenges in the national interest". November 2015
<https://www.gov.uk/government/publications/uk-aid-tackling-global-challenges-in-the-national-interest>



million to the £1 billion fund set up in November 2015 to develop, test and deliver a range of new products, including vaccines, drugs and diagnostics. This amounts to an average of £390 million per year over the remaining 4 years.

3. The Portfolio targets neglected tropical diseases, diseases of emerging resistance and diseases of epidemic potential. Programmes funded from 2016/17 take an integrated and multi-disciplinary approach to help better understand what works most effectively to tackle infectious diseases, and aim to build the evidence based on effective interventions and delivery mechanisms to tackle infectious diseases in low and middle income countries. In partnership with other funders, they provide support to accelerate research and development with the goal of preventing epidemics, to inform more effective preparedness and response activities, and to avert/mitigate the impact of disease outbreaks. They also support the development of new products such as drugs, diagnostics and insecticides for targeted diseases.³ The Ross Fund also invests £265 million in the Fleming Fund to strengthen surveillance of drug resistance and laboratory capacity in developing countries.

B. The Newton Fund

4. The Newton Fund was launched in 2014 and is administered by the Department for Business, Energy and Industrial Strategy (BEIS). It aims to develop science and innovation partnerships that promote the economic development and social welfare of partner countries and does so through 15 UK Delivery Partners, including the Research Councils, the UK Academies, the British Council and Innovate UK. In 2015 it was agreed to extend and expand the initial commitment of £375 million over 5 years. Thus, the Newton Fund was extended from 2019 to 2021 and will expand to £150 million per year by 2021, resulting in a £735 million UK investment, with partner countries providing matched resources. It is expected that the UK funding will lead to extra funding from partner countries, private foundations, multilateral organisations and corporate partners. Some recent examples of relevant Newton Fund projects include:

- *UK-Colombia bioeconomy research programme.* In November 2016, a £20 million bioeconomy research programme was set up under the Newton Fund, in partnership with Colombia. This joint partnership funds research into how Colombia's vast biological resources can be used to develop new drugs and medicines, biofertilisers that can increase crop yields, and pollution-tackling products. The UK scientific community will work across Colombian regions to pass on knowledge for bioscience development and build project structuring teams across Colombia to design high impact science programmes in-country.
- *Zika virus research.* The UK has committed a total of £4 million to fund rapid research into tackling the Zika virus, including £2 million contributed by the Newton Fund. This was further aligned with additional support in Brazil provided by the São Paulo Research Foundation FAPESP. Twenty six projects have been funded and cover aspects such as genome sequencing and characterisation of viruses, transmission, surveillance, diagnostics, epidemiology and medical countermeasures.⁴ The successful projects were deemed able to provide novel, critical and timely insights into the nature of the virus and/or potential avenues for its management or prevention. Applicants were encouraged to work in partnership with affected countries and thus funding will go towards a wide range of projects across several countries including Brazil, Columbia, Ecuador, Cape Verde, Kenya and Uganda. Some results from the programme have recently been published. For example, a study led by the University of Glasgow in collaboration with international partners, including in Brazil, sequenced the full genome of a clinical sample from a patient in Brazil and analysed how a molecule derived from the genome inhibited part of the host antiviral response. The published data give

³ For further information on programmes and activities see:

<https://devtracker.dfid.gov.uk/search?query=Ross+fund&includeClosed=0>

⁴ <https://www.mrc.ac.uk/news/browse/research-funders-join-forces-to-tackle-zika-virus-with-3-2m/>

important insights into virus-host interactions that will help guide future research efforts in this field.⁵ An international research collaboration led by the Universities of Birmingham and Oxford, in partnership with colleagues in Brazil, developed a new protocol for real-time genomic sequencing directly from clinical samples and using a portable nanopore sequencer.⁶ This allowed the sequencing of samples from more than 1300 infected patients across the northeast of Brazil, and provided immediate results in the field which could be shared with partners. A system of continuous and structured virus sequencing in Brazil, integrated with surveillance data, could provide timely information to inform effective responses against Zika and other viruses.⁷ The protocol developed for cross-country fieldwork could prove very beneficial during other viral outbreaks in remote areas.

- *UK-Vietnam*. Previous information papers on the UK's implementation of Article X have reported examples of Newton Fund Vietnam projects that have addressed the agriculture priority area. A collaborative project between the UK Royal Veterinary College and partners in Vietnam on the persistence of highly pathogenic avian influenza is also relevant to this priority area. The study focusses on the role of free-grazing duck populations in the continued circulation of H5N1, which threatens public health, farmers' livelihoods and food security. However, free-grazing duck flocks provide a major source of income for many farmers in South-East Asia and thus careful consideration is required in development of control measures. The published findings of this study may help in development of risk assessment models and design of improved biosecurity practices, ultimately leading to better animal health, sustainable animal production and reliable income for farmers.⁸ A recent call for funding proposals relevant to the health and life sciences priority area will provide substantive support for collaborative working in infectious diseases research. The UK-Vietnam Partnership for Infectious Disease Research funded by the UK Medical Research Council (MRC) and the Vietnamese Ministry of Science and Technology (MOST) will provide three years of support to biomedical research in infectious diseases of importance to Vietnam, such as Neglected Tropical Diseases (NTDs), malaria and tuberculosis, and on antimicrobial resistance. This is the second of such partnerships between the MRC and MOST, with activities from basic research to increase the understanding of pathogens and disease mechanisms, to the development of vaccines, therapeutics and diagnostics, and to clinical studies and epidemiological research, which will lead to health benefits in Vietnam, particularly for the poorest and most vulnerable in society.

C. Antimicrobial Resistance

5. Previous papers on UK implementation of Article X provided information on UK commitments in support of the Global Action Plan on Antimicrobial Resistance. Further developments on these initiatives include:

- *The Fleming Fund* represents a £265 million government investment into improving laboratory capacity for diagnosis and surveillance of antimicrobial resistance (AMR) in low and middle income countries (LMIC). Following adoption of a political declaration on AMR by UN Member States in September 2016, the UK government

⁵ Donald C.L. et al. (2016) Full Genome Sequence and sfRNA Interferon Antagonist Activity of Zika Virus from Recife, Brazil. *PLoS Negl Trop Dis* 10(10): e0005048.
<http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0005048>

⁶ Quick, J. et al. (2017) Multiplex PCR method for MinION and Illumina sequencing of Zika and other virus genomes directly from clinical samples. *Nat. Protocols* 12, 1261–1276
<http://www.nature.com/articles/nprot.2017.066>

⁷ Faria, N. R. et al. (2017) Establishment and cryptic transmission of Zika virus in Brazil and the Americas. *Nature* <http://dx.doi.org/10.1038/nature22401>

⁸ Meyer A. et al. (2017) Movement and contact patterns of long-distance free-grazing ducks and avian influenza persistence in Vietnam. *PLoS ONE* 12(6): e0178241.
<https://doi.org/10.1371/journal.pone.0178241>

announced new delivery partners for the Fleming Fund and a range of early investment projects. The Fleming Fund will support country and regional grants in Sub-Saharan Africa, South and South-East Asia and will likely work in up to 25 countries over five years, taking into account lessons from early investment partner countries.

- The Liverpool School of Tropical Medicine (LSTM) has recently completed three Fleming Fund scoping studies utilising their established networks and expertise across sub-Saharan Africa and Asia.⁹ The studies were commissioned to help funding partners identify how best to strengthen surveillance capacity for the burgeoning threat posed by AMR.¹⁰ The first study was an analysis of approaches to laboratory capacity strengthening in LMICs to provide evidence for the design of future interventions. Building on this analysis the second study assessed AMR surveillance models and supporting laboratory capacity in Ghana, Nigeria and Nepal in order to provide representative case studies on AMR surveillance systems in LMICs. The third study looked at regional networks and educational resources for AMR in LMICs and identified available resources that could support the effective implementation of such networks. LSTM will continue to work alongside in-country partners across sub-Saharan Africa and Asia to address the big issues affecting health in the region, including combating AMR.
- *UK-China Global Antimicrobial Resistance Research Innovation Fund.* Research Councils UK (RCUK) and the National Natural Science Foundation of China (NSFC) have together provided £9 million funding for six research partnerships which bring together leading researchers from both countries, and from multiple scientific disciplines, in order to better understand the emergence and spread of bacteria, develop new interventions, and improve health and agricultural systems. The UK investment was provided through the Newton Fund. The projects funded involve research to: understand the emergence and spread of resistant bacteria in China; accelerate AMR discovery, investigate AMR in livestock; identify pathways to optimise antibiotic use; investigate repurposing of old antibiotics for treatment of multi-drug resistant pathogens; and determine the clinical and environmental impact of extensively drug resistant pathogens in China. A further call for proposals to enhance existing partnerships and develop new partnerships between the UK and China in the area of AMR will be launched early in 2018.

D. Neglected Tropical Diseases

6. In April 2017, DFID announced a doubling of support to fight NTDs, such as trachoma, Guinea worm and river blindness with an investment of £360 million over the next 5 years. This will mean a billion treatments for people at risk in the developing world as part of the international push to eradicate these diseases. The UK's total support package will aim to wipe out Guinea worm, eliminate visceral leishmaniasis in Asia, prevent up to 400,000 cases of blindness caused by trachoma, and prevent tens of thousands of cases of disability caused by lymphatic filariasis. The UK will also build on the work done by our universities, pharma companies and NGOs tackling NTDs by investing in pioneering research to drive the development of drugs that will control or eliminate them. The UK has also committed allocations from the Ross Fund of £48 million to the Drugs for Neglected Diseases Initiative, £30 million to the Foundation for Innovative New Diagnostics and £10 million to the Coalition for Operational Research on Neglected Tropical Diseases.

⁹ <https://lstmed.ac.uk/research/centres-and-units/capacity-research-unit-cru/our-projects/antimicrobial-resistance>

E. Biosafety, Biosecurity and Infectious Disease Surveillance, Detection and Diagnosis

7. The UK's International Biological Security Programme, managed by the Ministry of Defence, has recently funded projects that have:

- continued to improve and strengthen the detection and identification of disease outbreaks and disease surveillance systems in partner countries, and to improve the safety and security of work with dangerous pathogens, as well as funding further projects conducted by intergovernmental organisations as part of their established biosecurity and biosafety efforts.
- developed capabilities in both arbovirus and arthropod vector identification in Tajikistan. Previous UK funded work assisted Tajikistan in identifying the presence of a number of pathogenic viruses including Crimean-Congo haemorrhagic fever virus, West Nile virus, Issyk-Kul virus and tick-borne encephalitis virus. The current two year project aims to strengthen the surveillance skills and to instil the safe and secure working practices developed in previous UK funded projects. It addresses the requirement for sustainable national surveillance and diagnostic capabilities for vector-borne viral diseases within Tajikistan and has led to further collaborations being established with Tajik partners by UK experts at Public Health England and the Natural History Museum's Department of Life Sciences.
- improved disease surveillance in Tajikistan. Reported cases of rabies have increased in Tajikistan in the past ten years. Control of the disease requires dedicated surveillance, accurate laboratory diagnosis and an understanding of disease epidemiology. The UK Animal and Plant Health Agency (APHA) is a key technical partner in a project to develop wider national disease surveillance capabilities, which extends beyond its main focus on the surveillance and control of rabies. This project includes the training of scientists in safe and effective surveillance and diagnostic approaches using internationally recognised diagnostic procedures. Improving biosafety and biosecurity in collaborating institutes has also been an underpinning component. Initiatives to raise public and official awareness of this preventable disease are being addressed within the project and expected impact includes policy relevant information on the spread of rabies in the region.
- improved capabilities to detect and characterise *Brucella* in the veterinary and public health sectors in Tajikistan. Brucellosis remains a significant human and animal health disease worldwide, including in Tajikistan. A previous UK funded project achieved notable improvements in biosafety, biosecurity and diagnostic capabilities. This follow-on project, which commenced in 2016, seeks to embed and enhance these skills and to further develop molecular diagnostic capabilities. The focus is on building the capability to work safely and securely with *Brucella* and other pathogens, developing links with international scientific institutes and reference laboratories, and embedding internationally accepted diagnostic approaches and reporting transparency.
- continued to provide support to the multinational Technical Advisory Committee at the regional biorisk management and molecular diagnostics training centre at the Jordan University of Science and Technology (JUST), jointly funded with the US Biological Engagement Program and the Canadian Global Partnership Program. This facility continues to provide high-quality training in biorisk management and modern diagnostics to Jordanian scientists and others in the Middle East and North Africa regions.
- supported a veterinary education twinning project between the Jordan University of Science and Technology's Faculty of Veterinary Science and the UK Royal Veterinary College. This partnership has served to share best practice in veterinary public health between Europe and the Middle East, and build capacity in terms of undergraduate and postgraduate education in veterinary medicine, scientific research and disease control. Crucially, it seeks to promote concepts of bio-threat awareness and reduction, and to spread a culture of ethical science by building improved

capacity for biosecurity, modern diagnostics, and disease surveillance. It will also enhance capability for research on endemic and emerging diseases, develop innovative academic practice, and provide advice and support to JUST's aspiration to gain European accreditation for its veterinary science courses.

- in support of the joint OIE/FAO rinderpest post-eradication programme, conducted an efficacy trial at the UK's Pirbright Institute to determine if a vaccine for peste des petits ruminants (PPR), which confers some protection against rinderpest in small ruminants, would similarly protect cattle from rinderpest. This information was of critical importance to the future direction of the rinderpest post-eradication programme, which includes establishing vaccine banks and strengthening national emergency plans. If PPR vaccine could be considered as an alternative to rinderpest vaccine, it could thereby allow for the destruction of rinderpest stocks retained for vaccine production. However, the results of this study, published in 2016, clearly showed that PPR vaccine did not protect cattle against rinderpest and cannot therefore be used as an alternative to rinderpest vaccine.¹¹ This project produced a highly significant result, provided a major contribution to the international biological threat reduction effort, and will inform the OIE/FAO rinderpest post-eradication programme's future strategic plans.
- provided training in the maintenance of microbiology biosafety cabinets to support the wider adoption of improved biosafety practices. The UK and other donors to Tajikistan have provided biosafety cabinets as essential items of equipment to improve laboratory safety. Regular maintenance and certification is required to ensure that these cabinets remain functional and safe. Building upon previous training, this project has evaluated and supported the development of scientists from Tajikistan and from Kyrgyz Republic. Further training has been provided to allow them to monitor and approve the performance of cabinets within their institutes and also to offer their skills to other in-country institutes.

8. The UK continues to work closely with other international partners and is providing a significant package of technical implementation and training support to Canada's Global Partnership Program in Jordan. This includes training in biosafety, biosecurity, modern diagnostics and laboratory management for Jordanian laboratory directors and technicians.

F. Support to Disaster Response

9. In discussion of Article VII issues in 2015, the UK reported plans to establish a more robust national rapid response workforce for public health emergencies that would be ready to deploy to help countries respond to disease outbreaks.¹² In August 2017 following the Sierra Leone mudslide, the new UK Public Health Rapid Support Team deployed to Freetown at the request of the Sierra Leonean government to help them prevent major outbreak of diseases, such as cholera, measles, malaria and typhoid. The team, run jointly by Public Health England and the London School of Hygiene & Tropical Medicine, was made up of top experts, including two epidemiologists, two microbiologists and a logistician.

10. The UK is playing a major role in the push to stem the current cholera outbreak in Yemen, including by working with UNICEF and the International Organisation for Migration (IOM) to tackle the disease, which has so far claimed thousands of lives. In April 2017, the overall UK aid funding to Yemen was increased to £139 million for 2017/2018, and £8 million of this will be prioritised this year for the cholera response. The UK's support will provide medical supplies, such as chlorine tablets and hygiene kits, for half a million people and rehabilitate medical facilities to help 250,000 people. These efforts will

¹¹ Holzer B, Hodgson S, Logan N, Willett B, Baron MD. 2016. Protection of cattle against rinderpest by vaccination with wild-type but not attenuated strains of peste des petits ruminants virus. *J Virol* 90:5152–5162. <http://jvi.asm.org/content/90/10/5152.full>

¹² BWC/MSP/2015/MX/WP.2 Making Article VII effective: relevant lessons and follow-up action from the Ebola virus disease outbreak in West Africa. Submitted by the United Kingdom of Great Britain and Northern Ireland.

mean that those in the most affected areas of Yemen will benefit from access to safe, chlorinated water, helping to prevent the further spread of the disease, and from seven health centres and thirty-five oral-rehydration points providing treatment.

III. Academic and Research Councils

11. The funds and programmes detailed above rely on partnerships with, and involvement of, research councils and academic institutions. Some additional examples of relevant projects in this sector are described in the following paragraphs.

12. *The Global Challenges Research Fund (GCRF)* is a five year £1.5 billion fund announced in 2015 to ensure that UK research takes a leading role in addressing the problems faced by developing countries. This initiative operates across several delivery partners, including the UK Research Councils and Academies. Some examples of recent programmes of relevance to Article X include:

- *Networks in vector borne disease (VBD) research fund.* With increasing resistance of vectors to chemical insecticides, new methods of vector control are urgently required. This fund addresses five key research priorities: development of new control strategies for VBD such as genetic control; fundamental vector biology and ecology; factors driving the emergence and expansion of VBDs; vector-pathogen interactions; and improved diagnostics, surveillance and forecasting.
- *Networks for vaccine research and development (R&D).* This programme will build capacity and capability by establishing networks on a range of themes, and further develop existing strengths and collaborations. The Networks aim to bring together groups working in basic immunology and pathogen biology with those active in vaccines R&D, to support discovery-led research to drive development of the next generation of human and animal vaccines.
- *The bioinformatics and biological resources fund.* This fund aims to enable the provision of bioinformatic resources to manage, analyse and share large and complex datasets to enable in-depth analysis and facilitate greater understanding of biological systems.

13. The Biotechnology and Biological Sciences Research Council (BBSRC) has initiated partnering awards to establish links between UK and overseas laboratories in several countries, including for example Brazil, India and China. The aim of the BBSRC partnering awards is to promote the exchange of scientists, particularly early career scientists and promote access to facilities.

14. In October 2017 the BBSRC, in partnership with the São Paulo Research Foundation FAPESP, announced a research call for proposals focussing on antimicrobial resistance and insect pest resistance in livestock and agriculture.¹³ Projects will focus on priority areas such as host/pathogen interactions, epidemiology and disease management and control, in particular related to pathogens and pests of relevance to Brazilian arable crops and farmed animals.

15. The BBSRC's Zoonoses and Emerging Livestock Systems initiative (ZELS), in collaboration with DFID, has funded engagement of the UK Animal and Plant Health Agency (APHA) in collaborative research on bovine tuberculosis (bTB) in Ethiopia. This has addressed issues relevant locally as well as to the international community. Research teams comprising scientists from the UK and Ethiopia have worked together to boost knowledge of the efficacy of the Bacille-Calmette-Guerin (BCG) vaccine against bTB in cattle.¹⁴ This mutually beneficial research will inform the development of sustainable

¹³ The UK contribution comes from the Newton Fund, with matched contribution from FAPESP providing the Brazilian component.

¹⁴ Ameni G, Tafess K, Zewde A, et al. Vaccination of calves with *Mycobacterium bovis* Bacillus Calmette-Guerin reduces the frequency and severity of lesions of bovine tuberculosis under a natural

control strategies for bTB in Ethiopia as well as allowing UK researchers to explore the efficacy of BCG during natural transmissions cycles.

16. The Liverpool School of Tropical Medicine (LSTM) has been engaged in a UK-Turkey research collaboration on Crimean Congo haemorrhagic fever (CCHF). This initially focussed on understanding the pathogenesis of the disease and is now extending to the development of a monoclonal antibody therapy. The work is funded by the Wellcome Trust and the Ministry of Defence, in collaboration with the Turkish Ondukoz Mayıs University and the Public Health Agency of Canada. Phase I clinical trials were scheduled to take place with healthy volunteers in 2017, followed by phase II trials in people suffering from CCHF in Turkey.

17. The Zoonotic and Emerging Diseases research group (ZED group), based jointly between the Institute of Infection and Global Health, University of Liverpool, and the International Livestock Research Institute (ILRI), in Kenya conducts research on a range of epidemiological issues revolving around domestic livestock, peri-domestic wildlife and humans, in particular the epidemiology of zoonotic and emerging/re-emerging diseases. Some examples of current projects cover:

- (a) Research to enable Kenya to develop an effective national surveillance programme for zoonotic diseases;
- (b) Examination of bats and rodents in western Kenya for known and emerging zoonotic pathogens;
- (c) The role of urbanisation in the emergence of zoonotic pathogens;
- (d) A cross-disciplinary approach on the ecology of antimicrobial drug resistance in Kenya including in-depth research on antibacterial resistance in clinical and community settings.

IV. Industry

18. In December 2015 GlaxoSmithKline (GSK) launched a five year partnership with Comic Relief to fight malaria and strengthen healthcare systems in five countries worst affected by the disease: Ghana, Mozambique, Sierra Leone, Tanzania and the Greater Mekong region. The £22 million partnership, comprising a £17 million donation from GSK and £5 million from Comic Relief provides grants to frontline organisations in these five malaria endemic countries. Through these collaborations GSK aims to support the WHO target to reduce malaria cases and deaths by at least 90% by 2030 and support the Global Goals for Sustainable Development. In 2016, the partnership announced its first grants to organisations fighting malaria and improving healthcare in Tanzania and Mozambique.

19. Oxitec, a UK based company pioneering in controlling insects that spread disease and damage crops, developed an environmentally-friendly, genetic engineered version of the *Aedes aegypti* mosquito, the vector known to transmit Zika virus, dengue fever, yellow fever and chikungunya. This genetically modified mosquito does not bite and when it mates with wild females produces offspring that do not survive, therefore suppressing the local population. Oxitec's work has been supported by Innovate UK, including an award made through the Newton Fund to bring together UK and Indian scientific research. In September 2017, Innovate UK announced that a £7.3 million investment by the US biotech company Intrexon Corporation will fund a state-of the art production unit. The facility, to be built by Oxitec, will be able to produce one billion mosquito eggs a week in the global fight against deadly mosquito-borne diseases.