Microbial diseases of travel

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The November 2016 special issue of the *Microbiology Australia* is the first joint one with the Microbiology Society of the UK. Deciding on an appropriate theme for this issue, the 'Microbial Diseases of Travel' was a relatively straightforward task and a direct 'fallout' from the geographical distance that separates our two societies; In the recorded history of mankind, travel has been one of the most effective means of disseminating infectious diseases throughout and among different populations. Explorers carried with them, many infectious agents such as influenza, measles, small pox, typhus and yellow fewer resulting in devastating consequences for the indigenous populations that they encountered on their travels. Nowadays, with the current explosive rates and speed of travel the consequences of carrying infectious agents continue to be significantly detrimental to human, animal and crop populations even with our understanding of effective public health measures. Exposure to disease causing agents carried on wild animals can also be a potent force in the emergence of disease on travellers' return to their home country. In addition, migratory animals and birds can bring disease into far away countries as illustrated by the avian influenza.

Climate and environmental changes can also lead to the emergence of microbial diseases, which may not have been seen at a particular geographical location previously. Moreover, diseases such as brucellosis, HIV/AIDS, leishmaniosis and TB are known to have prolonged and variable incubation periods. As a result their clinical manifestations may appear long after the return from travel. As a direct consequence, it does not take a lot of imagination to see that tracking the source of infection can be difficult in some cases.

Due to the 'abrupt and dramatic changes in environmental conditions' such as changes in the altitude, temperature and humidity, travellers might also become more prone to diseases. The most commonly encountered microbial-mediated disease affecting travellers is called 'travellers' diarrhoea' and can be caused by many different foodborne and waterborne infectious agents. Prolonged shedding of infectious agents via the faecal-oral route can also happen, resulting in dissemination of the infectious agents along the travel path. Understanding the modes of transmission and corresponding general precautions can reduce the risks of infections. WHO lists these factors as:

- Foodborne and waterborne diseases
- Vector-borne diseases
- Zoonoses (diseases transmitted by animals)
- Sexually transmitted diseases
- Blood-borne diseases
- Airborne diseases
- Diseases transmitted via soil

At the destination or along the travel path, the risk of becoming infected depends on the sanitary and preventative measures taken, including vaccination. However, there are still some infectious diseases including some deadly ones, spread via travel, that have not generated effective vaccination programmes. A list with some of the diseases and causative agents associated with travel, where no vaccine are currently available is highlighted in Table 1.

The WHO uses the following criteria for classifying specific infectious diseases that involve potential health risks for travellers

- diseases that have a sufficiently high global or regional prevalence to constitute a significant risk for travellers;
- diseases that are severe and life-threatening, even though the risk of exposure may be low for most travellers;
- diseases for which the perceived risk may be much greater than the real risk, and which may therefore cause anxiety to travellers;
- diseases that involve a public health risk due to transmission of infection to others by the infected traveller.

The mode of travel can also be another factor in the increase or downgrade of infection risk. Most modern aircraft are fitted with high-efficiency particulate air (HEPA) filters and ventilation rates are controlled to recycle cabin air so that its quality is ensured. Well maintained HEPA filters trap dust particles and are adept at trapping bacteria and fungi. Transmission of infectious agents may occur between closely sitting passengers, as a result of personal

Table 1. Diseases and causative agents commonly encountered by travellers.

Disease	Causative agents
Amoebiasis	Parasitic amoeba
Angiostrongyliasis	Parasite
Anthrax	Bacterium
Brucellosis	Bacterium
Chikungunya	Virus
Dengue fever	Virus
Giardiasis	Parasite
Haemorrhagic fevers	Virus
Hepatitis C	Virus
Hepatitis E	Virus
Histoplasmosis	Fungus
HIV/AIDS	Virus
Legionellosis	Bacterium
Leishmaniosis	Parasite
Leptospirosis	Bacterium
Listeriosis	Bacterium
Lyme borreliosis (lyme disease)	Bacterium
Lymphatic filariasis	Parasite
Malaria	Parasite
Onchocereciasis	Parasite
The Plague	Bacterium
SARS (severe acute respiratory syndrome)	Virus
Schistosomiasis (Bilharziasis)	Parasite
Trypanosomiasis	Parasite
Typhus fever	Bacterium
Zoonotic influenza	Virus

hygiene decisions and shared fomites. If infectious diseases are to be avoided then the best advice is to strictly adhere to safety precautions and committed personal hygiene practices. An example is the transmission of Tuberculosis in air travel and the preventative measures are highlighted in the WHO Guidelines for Prevention and Control.

It is not just air travel that can spread disease: sea travel is also an effective 'transmission' environment with gastrointestinal disease outbreaks from contaminated food or water, norovirus infections, legionellosis, varicella and rubella all being reported.

Another concerning risk might derive from poorly stored seafood under unchilled conditions (e.g. mackerel, tuna, bonito, sardines, marlin and butterfly kingfish), which might result in 'scombroid (histamine) poisoning'. Bacterially converted histidine to histamine might lead to severe reactions and even death and once the fish is contaminated with this toxin freezing or cooking will not be effective in removing the toxin. Paralytic shellfish poisoning (PSP) and saxitoxin (STX) poisoning as a result of dinoflagellate algae contamination of the shellfish can also be another risk to be aware of for travellers.

In this joint issue our articles will cover some of the diseases of travel such as syphilis, avian influenza, dengue and mosquito-transmitted viruses, Zika as well as antibiotic resistant bacterial infections and food borne diseases involving human beings. Related to plants and animals articles will cover Chytridiomycosis, blue tongue, decline in bees, crop diseases. Disease surveillance and biosecurity aspects are also included. Australia and the UK have historic links and extensive travel history and we are overjoyed to put a joint issue together and thank all the contributors, Editorial Boards of the both journals and Editor-in-Chief of *Microbiology Australia* Ian Macreadie and the Digital Communications Manager, Microbiology Society, UK, Ruth Paget for their support during the production.

Reference websites referred to in the above article are:

- http://www.who.int/ith/diseases/en/
- https://wwwnc.cdc.gov/travel/diseases/
- http://www.who.int/tb/publications/2006/who_htm_tb_2006_363.pdf

Biographies

Dr Kurtböke has been working in the field of biodiscovery and has been a member of the international actinomycete research community since 1982. She currently conducts research and teaches in the field of applied microbiology and biotechnology and is senior lecturer at the University of the Sunshine Coast (USC), Queensland. She has also been an active member of the World Federation of Culture Collections (WFCC) including serving as the Vice-President of the Federation (2010–2013).

Laura Bowater is a Professor of Microbiology Education and Engagement at the Norwich Medical School in the University of East Anglia with a special interest in antibiotics and antibiotic resistance. Laura is currently completing her tenure as Editor in Chief of *Microbiology Today* and this joint venture with the Australian Society for Microbiology will be her final issue in this role.