



## Bug Identifying Activity Guide

### Equipment:

- Black boxes (modified with eyepieces)
- Light box
- Acetate-printed pathogens
- Carbolic soap
- Handtowels
- Old bowls for washing hands in
- Infection stickers
- Disease cards (optional)

### Set up

Cover the table with the large hessian cloth and place the light boxes on top. Place 2 of the acetate images on the large light box and 1 acetate image on the small light box. Cover with the other piece of hessian so the images can be seen through the cut out squares and turn on the light boxes. Then place the black boxes over the cut outs, with the rolled paper tubes in the circle to create a microscope. If using, position the disease cards behind each black box to show which disease is underneath (it is more fun to get them to guess first but this can help if you have lots of people or want a reminder yourself). At the other end of the table set up the rats, bowls, louse image and carbolic soap. You can either fill the bowls with water (it doesn't matter if it gets dirty as it would have been in the trenches) or if you have sinks nearby participants can use them. Alternatively just get attendees to smell the carbolic soap and discuss hand washing.



Example of set up (excluding rats and soap)

### Background:

Diseases were prevalent during World War One, with many of them caused by various bacteria. These days we can cure most bacterial infections with antibiotics, but this was not the case back in 1914. It wasn't until 1928 when Fleming discovered Penicillin – the world's first antibiotic.

Black boxes on light boxes are provided simulating small light microscopes with images of pathogens printed onto acetate to simulate slides. Attendees are to guess what they have been infected with. The clue is on their sticker. The three pathogens are: *Staphylococcus aureus* (causes skin and soft tissue infections and without treatment can go on to cause osteomyelitis and chronic infections); *Clostridium tetani* (produces a toxin-mediated disease and vaccination against the toxin is the key); and *Bartonella quintana* (body lice infected with this bacterium caused 'trench fever'; the most widely reported illness during World War One).

Let attendees know that although we have treatments now (antibiotics and vaccines), back then they only had carbolic soap and relied on good hygiene techniques to keep healthy. Ask attendees to wash their hands using carbolic soap in the bowls of water provided. Do they think this was an efficient way to keep bacterial (and viral) infections at bay? (**Safety note: make sure attendees are asked about any allergies/skin conditions prior to taking part**). Carbolic soap contains phenol (carbolic acid), which is a mild disinfectant. It is still given out by relief organisations to disaster victims to keep infections at bay.

Because of the unhygienic, cold and wet conditions in the trenches, there were many unwanted disease-carrying guests around. Soldiers caught leptospirosis (and in worst case scenario, Weil's Disease) from rats' urine containing *leptospira* bacteria. Symptoms included flu-like symptoms, headaches, chills and muscle pain. But Weil's disease symptoms include haemorrhaging from the mouth, organ damage i.e. liver and kidney failure, leading to jaundice. Body lice (*Pediculus humanus*) in the trenches infected with a bacterium (*Bartonella quintana*) would bite the soldiers (causing them to feel very itchy and uncomfortable) exposing scratches in the skin into which infected louse faeces could get in. Lice were present on soldiers' clothes and caused Trench fever. Soldiers would have high fever, headaches, skin sores and muscle aches. Fleas were also very common in the trenches, spreading the disease typhus (caused by the bacteria *Rickettsia*) not to be confused with typhoid. The symptoms of typhus included back pain, delirium, high fever, rashes and severe headaches and muscle pains. Attendees are invited to have a look at the rats and louse image and learn more about these pests. They can also have a 'mini body louse infestation' – by getting a body louse (or other creature) stamped on their hand!

### **Instructions:**

- Attendees are given a sticker with a graphic of a bug, which they have been infected with.
- Ask attendees to identify, through looking down the black boxes (which are representing microscopes) and referencing their sticker, to work out:
  - What they have been infected with
  - How they might have caught it
  - What do they think the cure might've been at the time?
- Pathologists will be on hand to help them identify the microscopic images and explain why their structures made them most likely to be transmitted in certain ways e.g. through water/dirt.

- The table below shows the bacteria which were common causes of infection during the war:

<b>Bacterium</b>	<b>Transmission</b>	<b>Disease/condition caused</b>
<i>Staphylococcus aureus</i>	Person to person through spots/pus	Infections e.g. wounds
<i>Clostridium tetani</i>	Battlefield from dirt/infected water	Tetanus
<i>Bartonella quintana</i>	Person to person via body lice	Trench fever

Any infection in the trenches was likely to be serious because of the poor conditions and lack of treatment options.

*Staphylococcus aureus* causes skin and soft tissue infections and without treatment can go on to cause osteomyelitis and chronic infections.

Infection with *Clostridium tetani* produces a toxin-mediated disease and vaccination against the toxin is the key.

Body lice infected with bacterium, *Bartonella quintana*, were the cause of 'trench fever'; the most widely reported illness during World War One.

- Ask attendees where they may have heard of these (MRSA, tetanus, lice)?
- Although we have treatments now (antibiotics and vaccines), back then they only had carbolic soap and relied on good hygiene techniques to keep healthy (which was not always available).
- Volunteers to ask attendees to wash their hands using carbolic soap in the bowls of water provided. Do they think this was an efficient way to keep bacterial (and viral) infections at bay? Would they be able to cure themselves of their infection? (**Safety note: make sure attendees are asked about any allergies/skin conditions prior to taking part**).
- During the hand washing activity pathologists will explain how during the war because of the lack of treatment options available, infection was one of the main causes of death.
- One source of *C. tetani* is horse manure. Body lice wouldn't be prevented by hand hygiene. Contact with infested individuals (very likely in the army) was the problem. The key to this would have been bathing, laundry of clothes with ironing and changing clothes regularly. The lice live on the clothes and only feed on the body. They lay the eggs on the clothes so if the clothes are washed and then ironed the eggs will die and the lice will not hatch onto the skin.