Bacteria on keyboards

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Abstract:

The purpose of this project is to test the bacteria on keyboards. The two groups for testing are personal laptop keyboards and Henry Madden library computer keyboards, and we will test 15 for each group. There is no E. coli on both of the groups, but laptop keyboards have more bacteria contamination than the ones from library based on the average. Besides, the results show that the keyboards from the third floor contain more bacteria than the other two floors based on the average.

Introduction:

Bacteria are growing in our body and the environment. Some of them are good for our body, but some of them will cause disease. We touch many things everyday, and computer keyboard is one of them. Are there many bacteria we leave on our keyboards everyday? Are they bad for our body? The answers are yes. Computer keyboards contain a lot of bugs that may cause food poisoning (3), and from the previous studies, we can know that they affect our health everyday.

The most common that cause our keyboards are good for bacteria growth is that we eat in front of our keyboards and leave food crumbs on the keyboards (1). Keyboards provide a comfortable environment which contains enough nutrients for bacteria to grow, and the risk of getting disease is increasing. A study shows that there is more than 50% of pathogenic microorganisms grow on keyboards, and a series of tests have done to test the Staphylococcus aureus, Pseudomonas aeruginosa and vancomycin-resistant Enterococcus on keyboards (5). According to the reasons above, cleaning the keyboards regularly is one of the personal cleaning we need to do everyday. Keep the keyboards clean needs people to wash

hands and prevent eating in front of computers.

There are three main bacteria on keyboards, which are vancomycin-resistant Enterococcus faecium (VRE), methicillin-resistant Staphylococcus aureus (MRSA), and Pseudomonas aeruginosa (PSAE). VRE and PSAE usually affect the health of the people whose immuse systems are injured before, while MRSA causes urinary tract infections (2).

A study was taken to evaluate the extent of microbial contamination of some computer keyboards. They collected 24 computer keyboards and spread on nutrient agar (for total bacterial count); MacConkey agar (for gram negative bacteria) and Sabouraud dextrose agar (for total mould count) to incubate. After the test, the scientists concluded that cleaning of keyboards and transparent plastic covers regularly will help reduce the rate of infection (4).

In our test, we will compare personal laptop keyboards and library computer keyboards in Fresno State. We plan to use APC and coliform Petri films to test and compare the results between the two.

Methods and Materials:

Materials

Swab (30)

APC Petri film (32)

Coliform Petri film (32)

Dilution bottles (16)

Pipettors

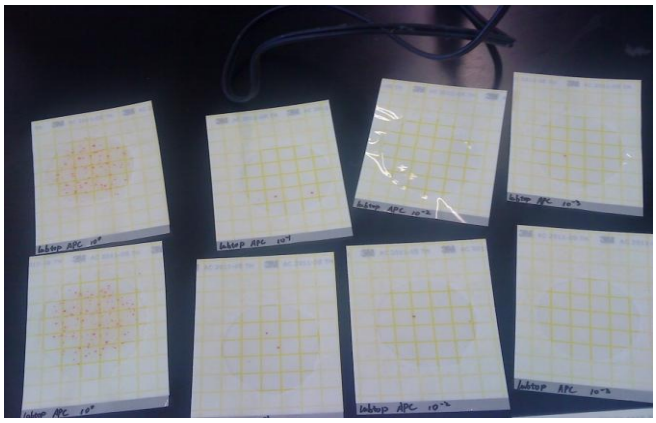
Methods

We plan to swab 15 personal laptop keyboards and 15 lib computer keyboards in a dollar bill size. For the library computer keyboards, we plan to swab 5 on each floor and mix the five of each floor to dilute, and the total number is also 15. For the personal laptop keyboards, we just mix all of them together for dilution. Dilution will be done three times and each dilution will have two APC Petri films and two coliform Petri films. Incubate the Petri films for 24 hours and count the number that growth on the Petri films.

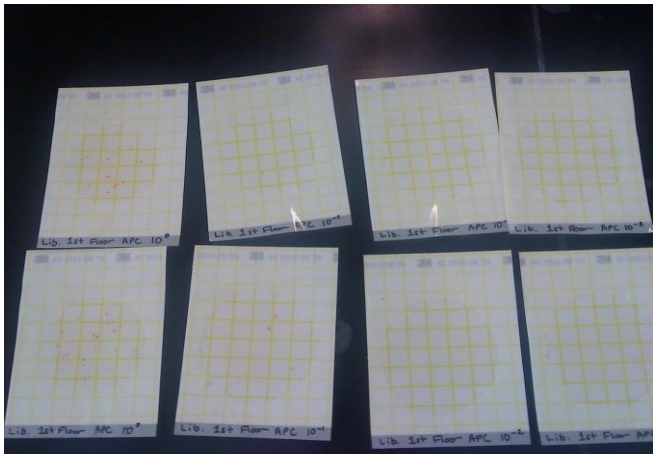
Procedure

1. Swab 15 personal laptop keyboards randomly and mix the solutions.
2. Dilute the mixture three times according to the ratio 1:9.
3. Transfer 1ml solution from the mixture and three dilution bottles to APC and coliform Petri films. Each one needs two APC Petri films and two coliform Petri films.
4. Swab 5 library computer keyboards from each floor and mix every floor's swab solutions separately.
5. Repeat the step 2 and 3 to finish dilution and transfer.
6. Incubate the Petri films at 37℃ for 48 hours.
7. Record and compare the results.

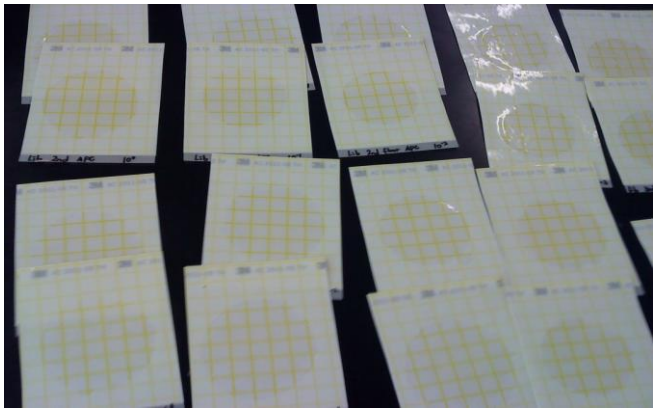
Results:



Laptop APC



Library 1st floor APC



Library 2nd floor APC

Library 3rd floor APC

Personal laptop keyboards (CFU/ml)

Dilution	APC 1	APC 2	CFU/cm²	E. coli 1	E. coli 2
10°	149	164	1.56 x 10²	Less than 1 CFU/ cm²	Less than 1 CFU/ cm²
10^{-1}	EST 3	EST 3	EST 3	Less than 10 CFU/ cm²	Less than 10 CFU/ cm²
10^{-2}	Less than 100 CFU/ cm²	EST 3		Less than 100 CFU/ cm²	Less than 100 CFU/ cm²
10^{-3}	EST 1	Less than 1000 CFU/ cm²		Less than 1000 CFU/ cm²	Less than 1000 CFU/ cm²

Library 1st floor:

Dilution	APC 1	APC 2	CFU/ cm²	E. coli 1	E. coli 2
10°	EST 18	31	EST 29	Less than 1 CFU/ cm²	Less than 1 CFU/ cm²
10^{-1}	EST 1	EST3	EST 2	Less than 10 CFU/ cm²	Less than 10 CFU/ cm²ml
10^{-2}	Less than 100 CFU/ cm²	Less than 100 CFU/ cm²		Less than 100 CFU/ cm²	Less than 100 CFU/ cm²

10^{-3}	Less than 1000 CFU/ cm^2	Less than 1000 CFU/ cm^2		Less than 1000 CFU/ cm^2	Less than 1000 CFU/ cm^2

Library 2nd floor:

Dilution	APC 1	APC 2	CFU/ cm^2	E. coli 1	E. coli 2
10°	82	79	8 x 10^1	Less than 1 CFU/ cm^2	Less than 1 CFU/ cm^2
10^{-1}	EST 17	EST 20		Less than 10 CFU/ cm^2	Less than 10 CFU/ cm^2
10^{-2}	Less than 100 CFU/ cm^2	EST 1		Less than 100 CFU/ cm^2	Less than 100 CFU/ cm^2
10^{-3}	EST 1	Less than 1000 CFU/ cm^2		Less than 1000 CFU/ cm^2	Less than 1000 CFU/ cm^2

Library 3rd floor:

Dilution	APC 1	APC 2	CFU/ cm^2	E. coli 1	E. coli 2
10°	149	132	1.4 x 10^2	Less than 1 CFU/ cm^2	Less than 1 CFU/ cm^2
10^{-1}	36	44	4 x 10^2	Less than 10 CFU/ cm^2	Less than 10 CFU/ cm^2

10^{-2}	Less than 100 CFU/ cm^2	EST 2		Less than 100 CFU/ cm^2	Less than 100 CFU/ cm^2
10^{-3}	Less than 1000 CFU/ cm^2	EST 1		Less than 1000 CFU/ cm^2	Less than 1000 CFU/ cm^2

Discussion:

On the APC Petri films, for the personal laptop keyboards, the CFU count on the 10° is 1.56×10^2 CFU/ cm^2, and others were not in the range of 25 - 250 CFU/ cm^2, which were counted as EST numbers. The APC Petri films counted results for the bacteria of the keyboards of the library computers from the first floor were all regarded as EST numbers. The result that got from the second floor was 8×10^1 CFU/ cm^2 for the 10° dilution, and others were still EST numbers. We got 1.4×10^2 CFU/ cm^2 for the 10° dilution and 4×10^2 CFU/ cm^2 for the 10^{-1} dilution on the third floor. For the coliform Petri film count, we didn't get the number to count, and there was nothing growing on the Petri films. This means good to us because there is no E. coli contamination from the keyboards of both personal laptops and library computers.

The third floor contains more bacteria than the other two floors according to the APC count average. Also, the APC results of personal laptop keyboards showed its bacteria was more than the library computer ones' based on the average. We didn't find E. coli on both personal laptop and library computer keyboards, but we still need to be careful and keep the

environment of keyboards clean. Due to the APC count results, people need to clean their laptop keyboards at least twice a week, and the library computer keyboards need to be clean every week. Besides, the mouse should also be clean because they are used as frequently as keyboards during our daily life.

Conclusion:

It’s a meaningful project which is related to people’s daily life. From this project, we practice a lot of lab skills that we may use in the future and learn more new knowledge that we didn’t notice before. If we have a chance to do the project again, I want to do more to concern what bacteria is most commonly see on the keyboards, and I am also interested in doing some research on the mouse.

References:

1. Goldsborough, Reid. 2008. Are Computer Keyboards Making You-or Your Students-Sick? Education Digest 74 (4): 53-54.

2. Hitti, Miranda. 2005. Bacteria Can Quietly Thrive on Computer Keyboards. FOX News 4 (41).

3. Goldsborough, Reid. 2008. Is Your Computer Keyboard Making You Sick? Teacher Librarian 36 (1): 60.

4. Eltablawy, S.Y. and Elhifnawi, H.N. 2009. Microbial Contamination of Some Computer Keyboards and Mice in National Center for Radiation Research and Technology (NCRRT). World Applied Sciences Journal 6 (2): 162-167.

5. Fleming, Jean. 2007. Computer Keyboards. Nursing & Patient Care. 36-37