

## TRACING THE ORIGIN OF AN EPIDEMIC

### I. OBJECTIVE

- To demonstrate how an epidemic can start and how it can be traced to its original source.

### II. INTRODUCTION

The word epidemic is applied to situations in which a large number of people are infected by a contagious disease in a certain geographical area. An epidemic could usually spread from a single source (individual, kitchen, water reservoir, etc.) but it is sometimes difficult to find its origin. In the United States, there is a governmental institution called Centers for Disease Control or CDC, (<http://www.cdc.gov>) headquartered in Atlanta, GA, which always watches for the start of the spread of a contagious disease before it can get out of control. Similar public health institutions exist throughout the world.

Many of the contagious diseases such as plague, tuberculosis, leprosy, AIDS, influenza, small pox, etc. can easily spread to epidemic proportions. In today's world, with faster modes of travel, an infected person could spread a highly contagious disease to different parts of the world before even knowing that he or she is a carrier of the disease. As soon as a contagious disease is discovered, the patients and the people they came in contact with should be quarantined, the disease organism isolated and identified (e.g. via diagnostic tests, serological tests, biotyping, restriction gel electrophoresis, etc.) and the patients treated accordingly (e.g. use of antibiotics). If left unchecked, the epidemic may have severe or even catastrophic repercussions not only on human life but economically, socially and politically as well.

To show how fast an epidemic can spread, a simulation experiment will be conducted today in our lab. Each student is given a peanut in a numbered petri dish. One peanut has been contaminated with *Serratia marcescens*, an organism that produces pink colonies if grown at or below 30°C but colorless colonies if grown at 37°C.

### III. LABORATORY SUPPLIES

BHI plates	2/student
Sterile water tubes	1/tableside
Numbered petri dishes containing a peanut	1/student
Gloves, single	2 /student
Swabs, sterile	2/student
Marker	1/tableside

### IV. PROCEDURE

**Note:** Each student works independently but the whole class is involved as a population.

1. Obtain a numbered petri dish containing a peanut. Record your petri dish number in your lab notebook.
2. Obtain 2 BHI plates and label their bottom perimeter with your initials, peanut # and round 1 or 2.
3. Wear a pair of disposable gloves and take out the peanut. Hold it between the palms of your hands and rub it gently into your gloved palms. Return the peanut to the petri dish. Although only one person in your class is contaminated, it is good practice to think that it may be you. So try not to touch your skin, clothes, bench top, etc.
4. Your instructor will write "1- " on the board. At this time, the student with peanut #1 will walk to any other student in the class and shakes hand with him/her. Suppose this second student has peanut #12. So the instructor will complete his/her writing as "1-12". Then the student with peanut #2 walks to another student (e.g. #9) and shakes hands. The instructor will write "2-9". This process will continue until everybody has shaken hands with everybody else. The following points should be taken into consideration:
  - Always use your right hand for handshaking.
  - Wait for the instructor to write the sequence of handshaking on the board and signal for the next handshaking.
  - When shaking hands, make sure you have a strong grip. Remember that the purpose of the experiment is to show transmission of the organism from one person to another.
  - Although you can choose anybody to shake hands with, the experiment will be more interesting if that person is far from you.
5. Swab your right palm with a moistened, sterile swab and streak the BHI plate labeled round 1. Rotate the plate 90° and reswab the surface of the agar completely. Discard the swab in the biohazard container. This completes the first round of handshaking.
6. A second round of handshaking starts again with student #1 and proceeds as before. Try to use a different handshaking partner this time around.
7. When all students have shaken hands and the instructor has completed the writing of sequence of handshaking, swab the BHI plate labeled round 2. Incubate both of your plates at room temperature for 2 days. Discard swabs, gloves and petri dish containing the peanut in the biohazard container. Wash your hands and disinfect your work area. Copy the data from the board in your notebook.
8. After the end of incubation period, examine your plates for red colonies of *S. marcescens*. If you find any red colonies, you have been infected in this epidemic.
9. Call out your observation so the T.A. can write all the results on the board. Copy the completed results onto your notebook. Figure out which student caused the epidemic. Also determine the number and percentage of individuals infected after the first and second rounds of handshaking.

*Use of any section of this Lab Manual without the written consent of Dr. Eby Bassiri, Dept. of Biology, University of Pennsylvania is strictly prohibited.*

### Results of Tracing the Origin of an Epidemic Lab Exercise

NAME \_\_\_\_\_ DATE \_\_\_\_\_

Peanut #: \_\_\_\_\_

Order of First Round of Handshaking	Order of Second Round of Handshaking

1-Place a star next to each of the petri dishes which had pink growth in it. Based on the results determine the following:

- The epidemic was started by the student with petri dish #
- % of individuals infected after the first round of handshaking =
- % of individuals infected after the second round of handshaking =

2-Draw a diagram showing the spread of the epidemic from its source.