An Investigation in Serial Dilution and Streak Plate Isolation

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Objective:

Serial Dilution allows for a given quantity of a solution to be sufficiently diluted by several orders of magnitude over a succession of dilutions (in series, or serially.) It allows for a considerable amount of a sample to be stored in a concentrated form, and then sufficiently diluted in order to be properly investigated. Streak plate isolation allows for a sample to be grown across a succession of streaks across a plate of growth medium, commonly a blood of nutrient agar, for a particular organism. It allows a microbial culture to be grown so that it may be further investigated. For this experiment, a concentrated solution of the pathogenic bacterium *Staphylococcus aureus* underwent serial dilution, and was then run across a streak plate, in order to determine the approximate number of colonies in the original, undiluted sample. Due to the pathogenic nature of *S. aureus*, care was used in maintaining proper aseptic techniques during its handling.

Results:

I. Streak Plate Isolation Questions:
   i. Our streak plate began displaying isolated colonies after the third streak, and with adequate spacing after the fourth.
   ii. The isolated colonies consisted of small white dots.
   iii. Diagram:

II. Serial Dilution Techniques
   i. Yes, thanks to step 2B, the series of 1:10 dilutions allowed the sample to be isolated during the streak plate isolation.
   ii. Results of the streak are recorded in Table1:

Tube Label	Description of Sample	Number of colonies obtained. (CFU/500 µL)	Comments
4D	Dilution #4	≈700	The colonies appear as large clumps.
5D	Dilution #5	≈120	Colonies appear to be the same size.
6D	Dilution #6	≈16	Colonies appear to be the same size.

Table 1: Streak Plate Results

iii. 4D: $\frac{7.0\cdot10^2\,CFU}{500\mu L}\cdot\frac{10^4}{1}=\frac{1.4\cdot10^6\,CFU}{100\mu L}$

5D: $\frac{1.2\cdot10^2\,CFU}{500\mu L}\cdot\frac{10^5}{1}=\frac{2.4\cdot10^6\,CFU}{100\mu L}$

6D: $\frac{1.6\cdot 10^{1}\,CFU}{500\mu L}\cdot\frac{10^{6}}{1}=\frac{3.2\cdot 10^{6}\,CFU}{100\mu L}$

Average: $\frac{(1.4+2.4+3.2)\cdot 10^{6}/3}{100\mu L}=\frac{2.4\cdot 10^{6}\,CFU}{100\mu L}$

iv. $\frac{2.4\cdot 10^{6}\,CFU}{100\mu L}\cdot\frac{1000\mu L}{1mL}\cdot\frac{1}{10^{3}}\cdot\frac{1\,Colony}{1\,CFU}=\frac{2.4\cdot 10^{4}\,Colonies}{1mL}$

v. $\frac{1\cdot 10^{6}\,CFU}{1mL}\cdot\frac{1mL}{1000\mu L}\cdot\frac{1}{2\cdot 10^{4}}\cdot\frac{1\,Colony}{1\,CFU}=\frac{50\,Colonies}{100\mu L}$