

Park View STEM activities

To grow or not to grow?

Defining the problem (Creative thinkers)

1. Use the pictures to summarise what we are going to learn about Today?



Learning Objectives:

- Explain how bacteria can be grown using agar.
- Describe the effect of UV radiation on bacteria.
- Conduct an investigation to describe why some planets may never harbor life.

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1. Write at least 5 key words you think best summarise what we are learning today?

microbial growth, UV, membrane, DNA

2. Which of the 8 planets in our solar system contain life and explain why?

Earth because it has water and oxygen which can sustain life and magnetosphere keeps unhealthy ultraviolet radiation from the sun away

3. Why is Mars unlikely to contain any life?

Uninhabitable conditions, lack of water and oxygen, high intensity of UV light

Identifying variables and selecting the best method (Independent enquirers)

Background:

Could there be life on Mars? Perhaps so, although the high intensity of UV light means that it is unlikely to be found on the surface. The following experiment will demonstrate why this is the case.

Bacterial cells contain DNA just as plant and animal cells do, and the DNA in cells is damaged by UV radiation. On Earth we have our atmosphere, particularly the ozone to protect our DNA from harmful UV radiation. Mars however has no ozone layer and so its surface is not protected from this radiation. Follow the method below to see the effect of UV light on cellular life forms (bacteria).

Can you use the following apparatus/equipment list to help you write a method and identify the variables for this investigation?

Equipment list:

- UV cleaning device
- 4 nutrient agar plates per group
- 4 sterile swabs per group
- 4 dirty places – computer keyboards are ideal as they are difficult to clean
- Tape
- Marker pen
- Access to an incubator

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Headings	Answers	Hints
Title of investigation	Can UV light really cause total sterilization of an area?	What substances are you testing? What type of reaction will you observe?
Hypothesis	less bacterial growth with the use of the UV Light exposure	What do you think will happen? Write your prediction.
Independent variable	The places we collect dirt from	What you change in an investigation.
Dependant variable	number of bacterial colonies grown on agar plates	What you measure in an investigation.
Control Variable	UV intensity and exposure time, dirty areas before and after	What variables you keep constant (you don't change them).
Method	<p>Firstly use a marker to split the agar tray into two- before and after UV light.</p> <p>Secondly, select dirty areas to collect the samples from.</p> <p>Thirdly, use one side of a cotton swab to collect bacteria and swab it gently on the agar jelly on one side.</p> <p>Fourthly, we use UV light and hold it 1cm away from the same location for 30 seconds, then swab it and place it on the agar.</p> <p>Leave for 2 days to incubate.</p> <p>Lastly, record observations.</p>	<p>Firstly.....</p> <p>Secondly.....</p> <p>Thirdly.....</p> <p>Lastly.....</p> <p>Include a description of what your control variables are and how you are going to keep them constant.</p> <p>What equipment will you use and how/why?</p>

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Results

Dirty place 1



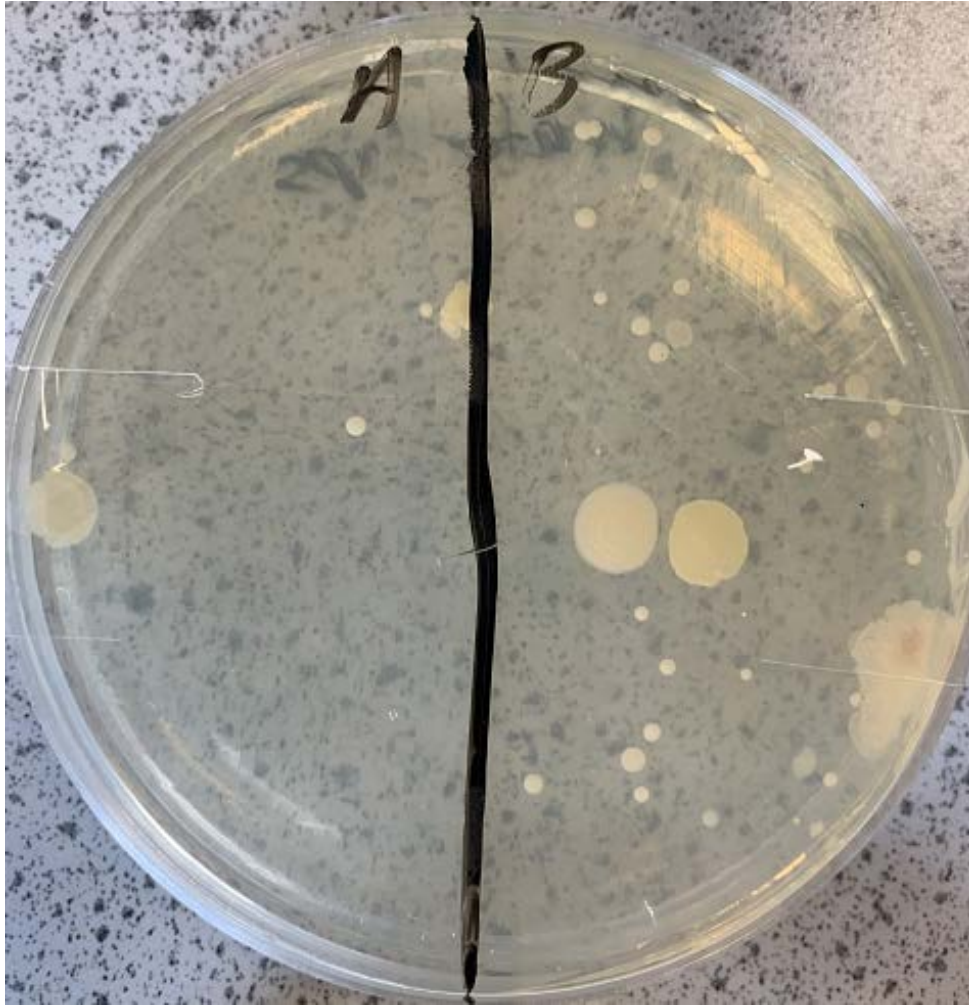
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Dirty Place 2



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Dirty Place 3



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Dirty place 4



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Following the method and collecting data (team workers)

	Dirty place 1 floor next to me	Dirty place 2 classmate shoe	Dirty place 3 doorknob	Dirty place 4 window
No. of colonies before UV exposure.	between 56-75	The whole side of the jelly was covered	34	5
No. of colonies after UV exposure.	54	200-400 colonies (significantly less)	4	4

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Conclusions and evaluations (reflective learners)

1) Use your results to explain which area was the most contaminated with bacteria and why?

My classmates' shoe was the most contaminated by far due to the fact that the shoe is recurrently used daily to do many activities such as football, running, walking etc

2) How effective was UV light exposure at sterilizing an area? Did it produce 100% sterilization?

It did not produce 100% sterilization however for the shoe, it significantly decreased the presence of bacterial colonies.

3) How did you ensure your investigation was a fair test?

We used the same intensity of UV light and kept the exposure time the same

4) Can you suggest any improvements, how would you improve your results?

We could have more areas and more attempts to ensure a more representative result and to ensure accuracy or use a blacklight box to ensure that there is no human error in the UV exposure.