

Evaluating Air Quality

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Abstract

An experiment was conducted by the eleventh graders at Walker Memorial Academy. Prior to beginning the experiment, an observation was made about the location or setting of Walker Memorial Academy. Realizing that Walker grounds is more in the rural setting than in an industrialized setting, a hypothesis came across. It went something like this: since Walker is located in a more rural setting instead of in an industrialized setting like Los Angeles, Walker should have good air quality. After a step-by-step list of procedures we came to the conclusion that Walker does indeed have good air quality, which can be proven by the amount of particulate matter in the air and an instrument that utilizes optical lasers.

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I. *Research Question...* What is the air quality like at Walker Memorial Academy? Can using Vaseline on a Petri dish be a biomonitor?

II. *Hypothesis...* Air quality at Walker Memorial Academy is good based on the fact that it is located in a more rural setting instead of in an industrialized one.

III. *Materials...*

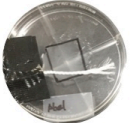
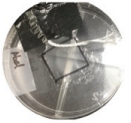
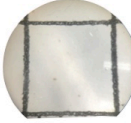
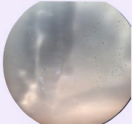
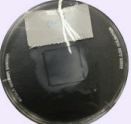
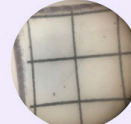
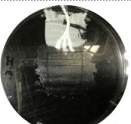
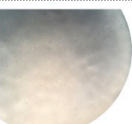
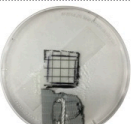
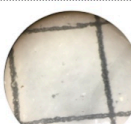
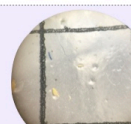
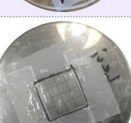
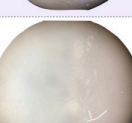
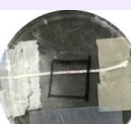
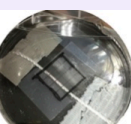
- iPad
- Vaseline
- Petri dish
- String
- Tape
- Triple beam balance
- Dissecting microscope

IV. *Procedures...*

1. Construct a 1 by 1 inch square onto the bottom Petri dish
2. Apply a thin layer of Vaseline on Petri dish bottom
3. Take a photo of the bottom dish
4. Weigh only the bottom of the Petri dish with triple beam balance
5. Place dish under dissecting scope
6. Take a photo of dish through the lens of the dissecting scope
7. Place Petri dish top onto Petri dish bottom
8. Select a location to hang the dish

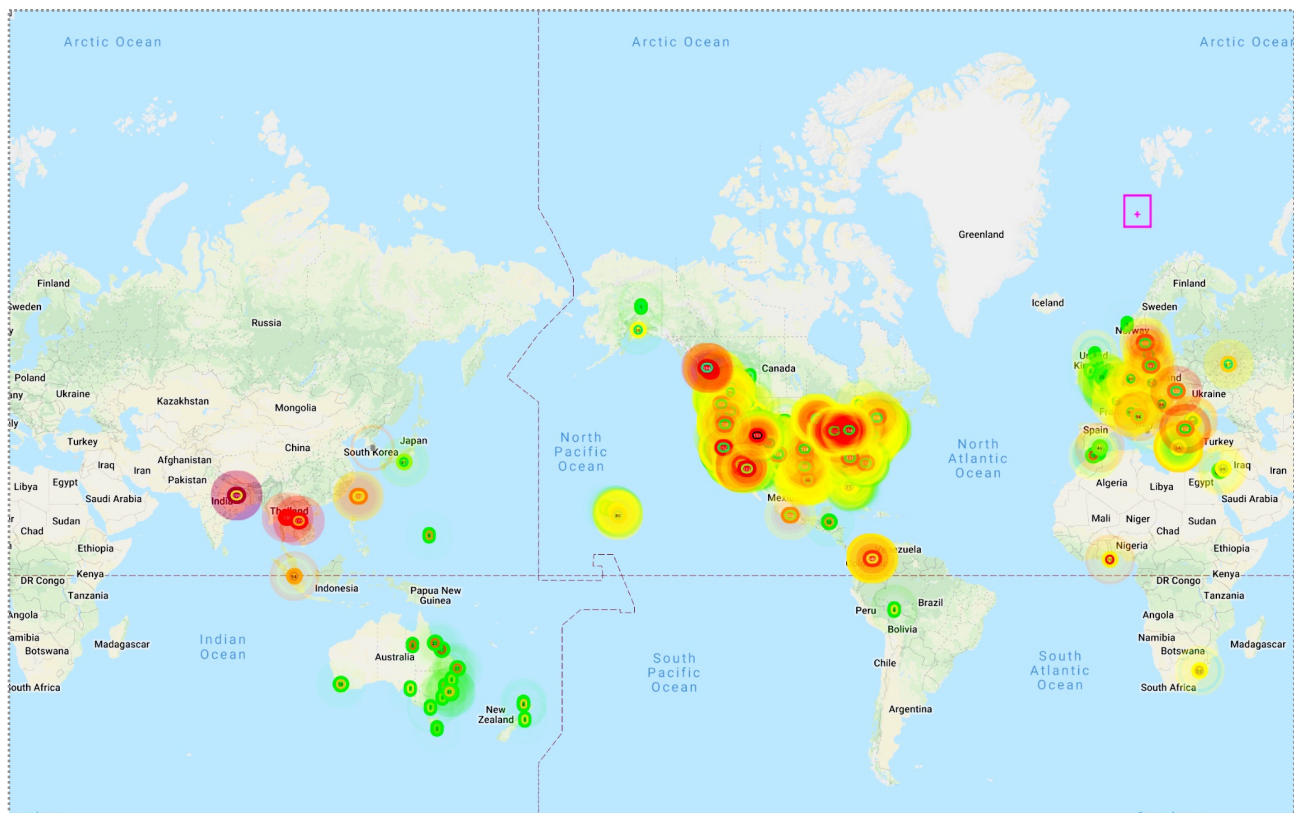
9. DO NOT, UNDER ANY CIRCUMSTANCES, REMOVE PETRI DISH TOP FROM
PETRI DISH BOTTOM UNTIL HUNG
10. On google maps, each student must pin point their selected location
11. A photo with an app will be taken to find coordinates
12. Hang the bottom Petri dish at selected location
13. Remove Petri dish top
14. On the fifth day, take a photo of the dish
15. Cover Petri dish bottom with the dish top and take it down
16. Re-weigh the bottom Petri dish and record
17. Place Petri dish under dissecting scope
18. Take another photo of the bottom Petri dish through the lens
19. Count number of particulates within the square
20. All data collected must go into a data table

V. Data...

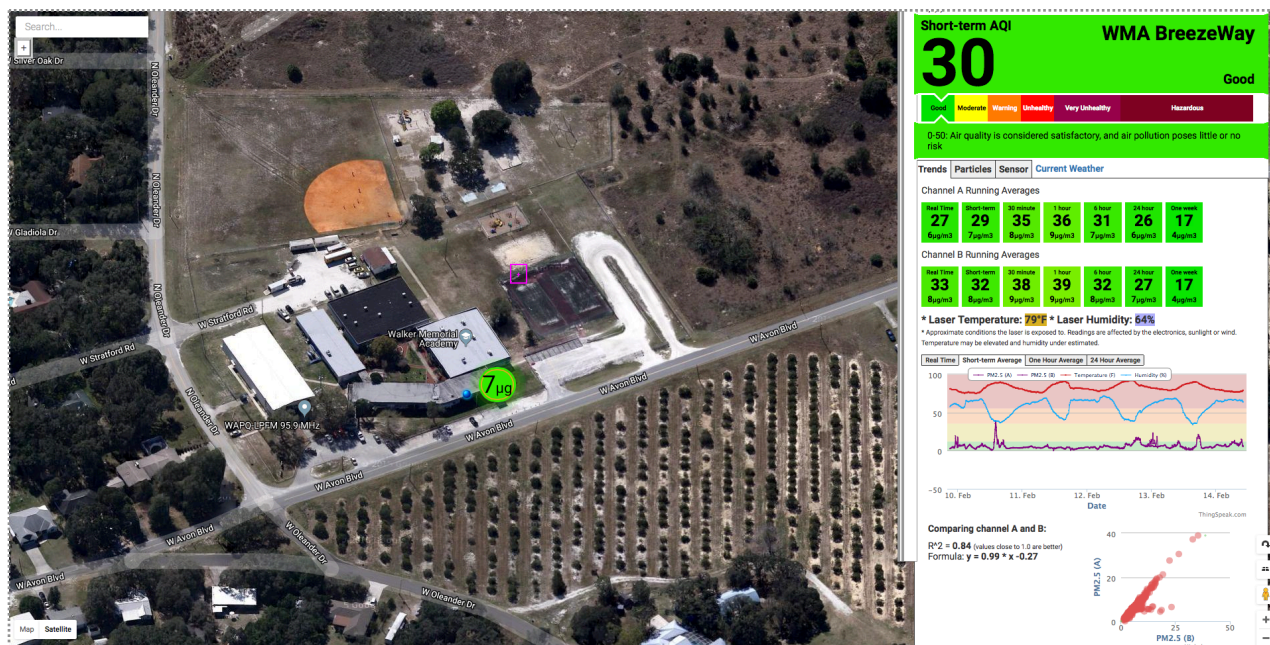
Students	Date (start to finish)	Before Weight	Air Quality		Location	After Weight	Weight difference	After Photo	After Photo (under scope)	Particulates Count	Metadata
			Before Photo	Before Photo (under scope)							
Abel	Jan. 17—Jan. 22	9.1 g			(27.627640, -81.523455)	9.4 g	0.3 g			91	N/A
Ashley	Jan. 17—Jan. 22	4.85 g			(27.627631, -81.523440)	6.3 g	1.45 g			117	N/A
Ifiok	Jan. 17—Jan. 22	9 g			(27.627772, -81.523728)	9.1 g	0.1 g			191	N/A
Isaac	Jan. 17—Jan. 22	8.3 g			(27.6271820, -81.5241397)	8.4 g	0.1 g			364	N/A
Levi	Jan. 17—Jan. 22	13.8 g			(27.628012, -81.523084)	13.9 g	0.1 g			246	N/A
Misty	Jan. 17—Jan. 22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Richard	Jan. 17—Jan. 22	10 g			(27.6276625, -81.5235754)	10 g	0 g			207	N/A
Rory	Jan. 17—Jan. 22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zarlinn	Jan. 17—Jan. 22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
/	/	/	/	/	/	/	/	/	/	/	/
Total	...	55.1 g	...	...	...	57.1	2.05 g	...	...	1,216	...
Averages	...	9.18 g	...	...	...	9.52 g	0.41 g	...	...	203	...



The image above is a google maps image in which each student's Petri dish is pin pointed.



This is an image that represents air quality in different parts of the globe.



Air quality at Walker Memorial Academy and what the air quality has to say about the surrounding area.

VI. *Analysis/Results...* From completing this experiment for the second time around, a scientist tends to reflect on their initial mistakes and try to improve their wrong doings or habits so that the next time they are more prepared. Same goes for this experiment. After attempting this experiment before we found flaws in our doings and reflected upon them to see better results. Now that our data is actually valuable, it is easy to see that our air quality is good based on the pictures above and the amount of particulate matter at Walker Memorial Academy.

VII. *Conclusion...* In a nutshell, scientists can always improve in their works. An experiment is hardly ever perfected on the first try. However, eventually, the hypothesis was proven to be true. The air quality at the school was classified as good utilizing the Vaseline on the Petri dish. So, the Petri dish with the Vaseline coat on top was a good biomonitor like lichen.

VIII. Discussion...

- A. **Why did my Petri dish obtain one of the least amounts of PM?** My Petri dish was placed within the courtyard of the WMA campus. This area is enclosed with little pollution due to it not being as exposed to the roads as other locations like Isaac's. His Petri dish was alongside a gravel road which resulted in his Petri dish having the most amount of particulate matter because of the vehicles passing by and swirling around the PM. So, it is proven that the Petri dishes inside the courtyard have a lower amount compared to other Petri dishes that are exposed to roads.
- B. **Purple Air?** By the means of optical lasers and a site known as purple air, the juniors of Walker Memorial Academy were able to participate in a worldwide phenomenon to allow others to know the type of air quality at the school.
1. **What is particulate matter (PM)?** The sum of the suspending solid and liquid particles in the air, with a mixture consisting of, for instance: dust, pollen, soot, smoke, and liquid droplets.
 2. **How does PM affect human health?** Despite the size of the particles, they can effect all age groups, even in the absence of other air pollutants. In some parts of the world, such as Europe, long-term exposure to PM concentrations can affect the lungs of humans and decrease their life expectancy.
 3. **How are we exposed to PM?** Studies have shown that motor vehicles and coal combustion are connected to health effects, however, personal exposure is dependent on PM levels in the surrounding environment relating to smoking or exposure at work.

4. **Should current PM guidelines be reconsidered?** Recommended guidelines are to be set for long-term and short-term exposure to particulate matter because of the health. To enable the development of effective risk reduction strategies based on qualitative and quantitative knowledge, further data analysis and more comprehensive monitoring is recommended.
5. **Are certain population groups particularly vulnerable?** In setting standards to protect public health from the effects of air pollutants, the concept of thresholds may not be useful, because certain population groups are very sensitive, and effects are detected even at low levels.

Reference

Facts, Green. "*Air Pollution Particulate Matter*." Scientific Facts on Air Pollution Particulate Matter, Aug. 2005, www.greenfacts.org/en/particulate-matter-pm/index.htm.