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GODDARD CADET SQUADRON'S  
2022 NATIONAL CIVIL AIR PATROL HIGH  
ALTITUDE BALLOON CHALLENGE TEAM



# CAP National High Altitude Balloon Challenge

## Goddard Squadron Enters CAP's 2022 National High Altitude Balloon Challenge as the Reigning Champions

Submitted by C/1st Lt Sweta Chandra Mohan

This year, Cadets Rebecca Singley, James Niall, Tommy Webster, Henry O'Brien, Sage LaFleur, Sweta Chandra Mohan, and Ita Carrigg participated in the second annual National High Altitude Balloon Challenge. While countless hours were spent through the process of this challenge, the cadet's drive and intellectual curiosity led to win third place nationally out of over 120 teams!

This year's theme, was health and wellness with a concentration in medical technology. Planning sessions began in February 2022. The team took several months to select their experiments. The goal was to determine the impact of the space environment on the following:

1. Effect of extreme low temperature on the adhesive properties of Dermabond™ Topical Skin Adhesive

2. Will high levels of radiation negatively impact the ability of Neosporin™ Triple Antibiotic ointment to kill Escherichia coli?
3. Determine whether or not high levels of radiation will affect the ability of fluorescein dye to fluoresce. This dye is used to detect scratches on the cornea.
4. Effects of high levels of radiation on the ability of a fluoride-releasing sealant to release its fluoride content
5. Effects of high levels of ultraviolet radiation on the ability of nutrient agar to support bacterial growth on a culture medium
6. Will extreme pressure and temperature variations affect the ability of a UV-blocking contact lens to effectively block UV radiation?
7. Will the high levels of ionizing radiation decrease the vitamin D content of a Performance Readiness cereal?



Ita and Sweta at Hopkinton Drug, weighing and packaging each experiment into a small plastic launch tube.

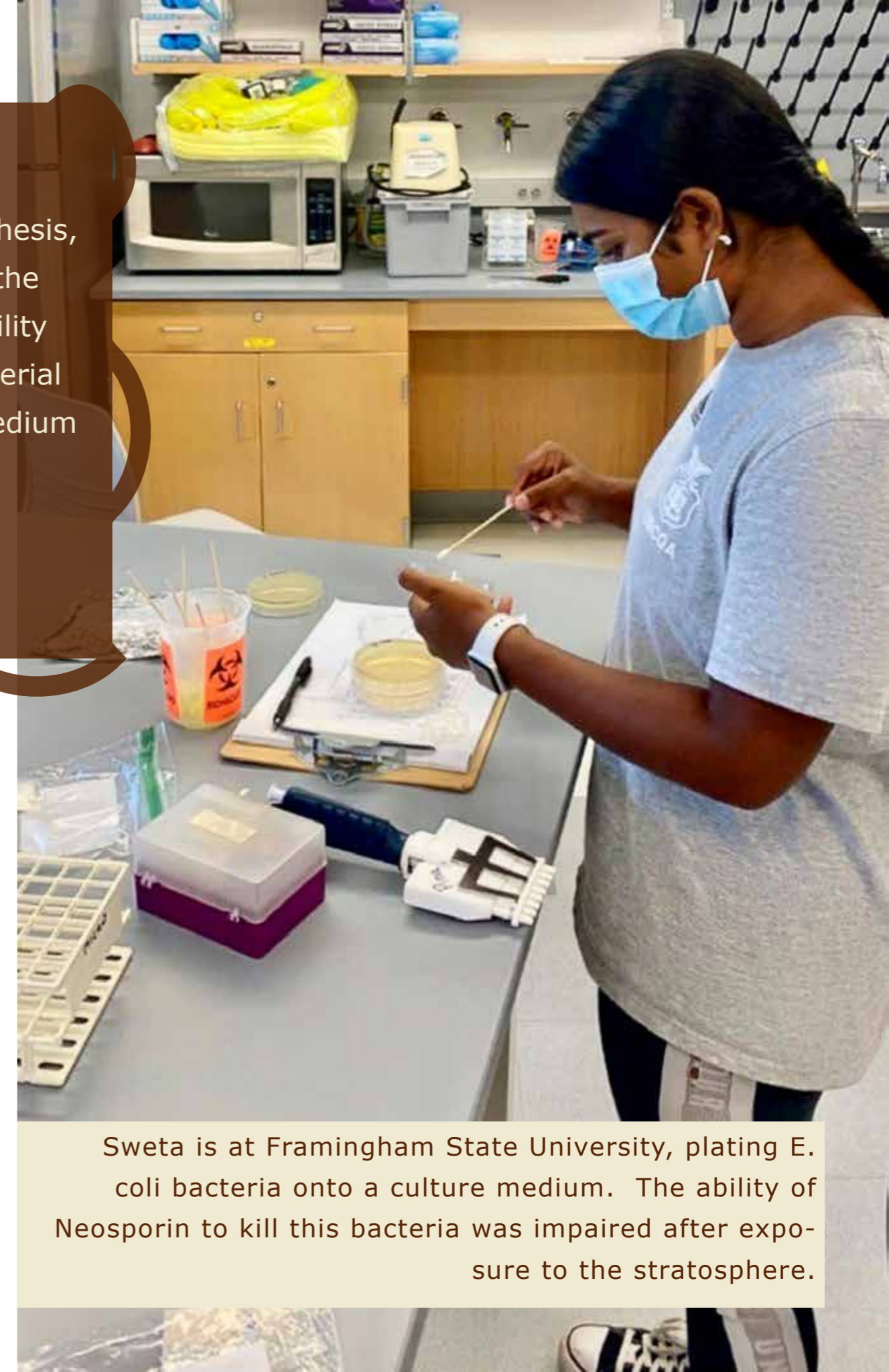


Contrary to Ita's hypothesis, there was no effect of the stratosphere on the ability of agar to support bacterial growth on a culture medium

Not only did the team learn how to conduct experiments without bias, but they also had the opportunity to have their experiments, packed into one small plastic tube) launched into the stratosphere! Here, in the harsh environment of space, the contents would experienced extreme low temperature, high levels of radiation, and various amounts of pressure. After returning to Earth, the cadets analyzed the data and compared

results against their hypotheses. To conclude the experiment, cadets created a video and slideshow to present their results and implications.

While cadets enjoyed this unique opportunity, it was also extremely rewarding because they took vital steps to ensure the promise of life on another planet.




Sweta is at Framingham State University, plating E. coli bacteria onto a culture medium. The ability of Neosporin to kill this bacteria was impaired after exposure to the stratosphere.



James, in Lt Col Maffei's basement, has reconfigured a shelving unit to test the adhesiveness of Derma-bond in test and control samples



In Rebecca's experiment, the flight and control tablets were placed in distilled water and sent to an environmental laboratory. The ability of the fluoride-releasing sealant was decreased in the flight sample as compared to the control.



**ETR Laboratories**  
Environmental Testing and Research Laboratories, Inc.  
Same as Client

Report #: 829222331  
Date: 8/29/2022  
P.O. Number: 8/29/2022 Visa

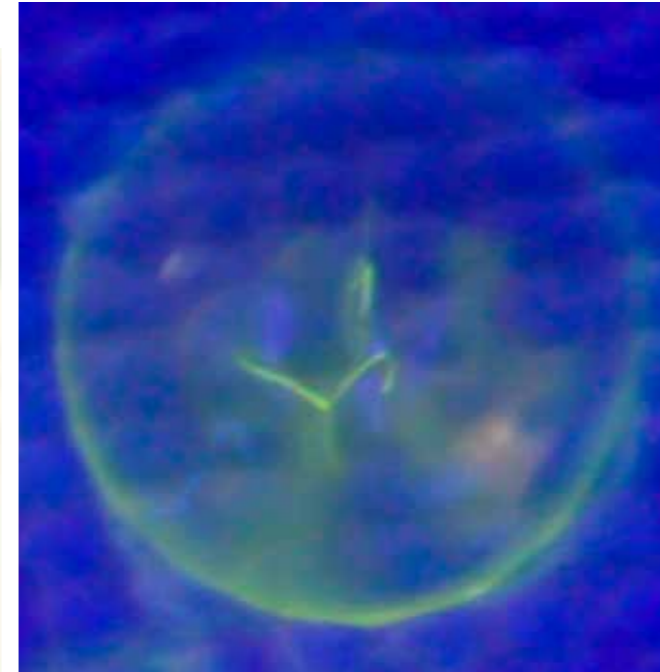
**Matrix:** Water  
**Client:** Henry O'Brien  
**Sample:** 100 Dudley Road  
**Location:** Templeton MA 01468  
**Phone:** (978) 939-2536  
This sample taken by Henry O'Brien at on 8/29/2022.  
Point of collection: Control and Flight Samples

**Miscellaneous Scan Report**

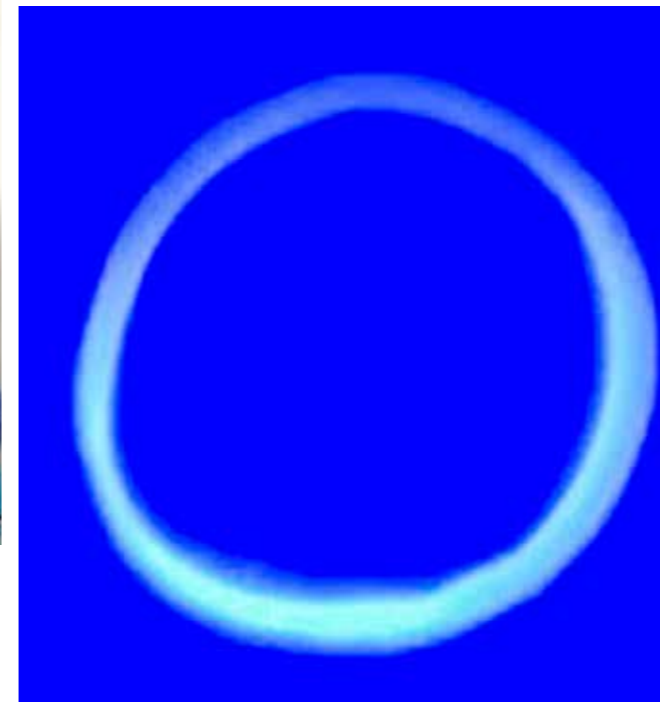
Analytes	Results	Description	EPA Limits
<i>Misc. Tests</i>			
Fluoride from Control Sample	0.60 mg/L	Additive or Naturally Occuring	4.0 mg/L
Fluoride from Flight Sample	0.18 mg/L	Additive or Naturally Occuring	4.0 mg/L



Tommy is making a criss-cross cut on each of two contact lenses. Will the fluorescein dye from the control and flight samples be able to pick up the scratches?



The control dye did fluoresce and pick up the scratch on this contact lens.



The flight dye sample was not able to pick up the scratch on this contact lens.



Henry, with his mother SSgt Pauline O'Brien, is at the U.S. Army Natick Soldier Systems Center with scientist Alan O. Wright, about to test the Performance Readiness cereal

Analyte/Measure/Test		*Results		Units (x/100g when feasible)	Method/Reference	Notes
		DWB	WWB			
Control (earth) PRC--Vitamin D		87.7	<b>80.8</b>	µg/100g	AOAC 2002.05/2011.11	Vitamin D3 3233.6 IU/100g WWB
Control (earth) PRC--Calcium		2.13	<b>1.96</b>	g/100g	AOAC 2011.14	ICP-OES
Control (earth) PRC--Phosphorus		335	<b>308</b>	mg/100g	AOAC 2011.14	ICP-OES
Control (earth) PRC--Magnesium		63.1	<b>58.2</b>	mg/100g	AOAC 2011.14	ICP-OES
Control (earth) PRC--Iron		25.9	<b>23.9</b>	mg/100g	AOAC 2011.14	ICP-OES
Control (earth) PRC--Zinc		6.13	<b>5.65</b>	mg/100g	AOAC 2011.14	ICP-OES
Control (earth) PRC--Sodium		610	<b>562</b>	mg/100g	AOAC 2011.14	ICP-OES
Control (earth) PRC--Potassium		229	<b>211</b>	mg/100g	AOAC 2011.14	ICP-OES
Earth PRC--%Dry wt    **%Moisture		92.1%	<b>7.86%</b>	%	AOAC 934.01, 950.46, 925.45A	Vacuum oven
Flight PRC--Vitamin D		83.1	<b>76.3</b>	µg/100g	AOAC 2002.05/2011.11	Vitamin D3 3051.3 IU/100g WWB
Flight PRC--Calcium		2.09	<b>1.92</b>	g/100g	AOAC 2011.14	ICP-OES
Flight PRC--Phosphorus		334	<b>307</b>	mg/100g	AOAC 2011.14	ICP-OES
Flight PRC--Magnesium		61.2	<b>56.2</b>	mg/100g	AOAC 2011.14	ICP-OES
Flight PRC--Iron		24.8	<b>22.8</b>	mg/100g	AOAC 2011.14	ICP-OES
Flight PRC--Zinc		5.97	<b>5.48</b>	mg/100g	AOAC 2011.14	ICP-OES
Flight PRC--Sodium		535	<b>491</b>	mg/100g	AOAC 2011.14	ICP-OES
Flight PRC--Potassium		224	<b>206</b>	mg/100g	AOAC 2011.14	ICP-OES
Flight PRC--%Dry wt    **%Moisture		91.8%	<b>8.19%</b>	%	AOAC 934.01, 950.46, 925.45A	Vacuum oven

**NOTES**

"WWB" (Wet Weight Basis) means the analyte value as measured on the sample as received at its original moisture content level.  
 "DWB" (Dry Weight Basis) means the analyte value as calculated on the sample if all of the moisture content were removed.  
 \*\*Needed to calculate "Total Carbohydrate."  
 \* 3 Significant Figures unless otherwise noted

Form (auto) Date: 9/21/2022 12:13

The vitamin D content in the performance readiness cereal did decrease in the flight sample as compared to the control.

**The Harry Potter theme was featured in our first of two videos sent to the CAP National High Altitude Balloon Challenge judges.**



# ROCKET BUILD

Army National Guard Base

SEPTEMBER 18, 2022



*Cadet Christian Sargis with TFO Dimitri McPherson, Goddard Squadron's lead Aerospace Education Officer.*



*Senior Member John Reid with Cadet Tyler Nolan*





*Cadets Nicholas McCaffrey & Joshua Sallet*

*Capt Antonio Fontes, Goddard Squadron's Commander and Very Own ROCKET MAN, is mentoring Cadets Will Callaghan & Nick McCaffrey*

Goddard Cadet Squadron has a tradition of going to Six Flags New England for "Fright Fest" every October. This year, as Lt Col Maffei is the Massachusetts Wing's (MAWG) Cadet Activities Officer, why not bring along our friends from across the Wing? That's just what we did!

On Sunday, October 9, 2022, thirty-five cadets and 10 senior members from four MAWG squadrons took part in the festivities. The senior members, of course, with deeper pockets, bought the Flash Pass in order to get on more rides. Oh, that was supposed to be kept under wraps. It was a great night. Next year, I think we need to be there all day!



Left to right, counterclockwise:  
Keith, John, and Lydia Reid





Joint Aerospace Excellence Activity  
With Coastal Patrol 18

Sunday, October 30, 2023  
Fall River, Massachusetts



**CONSTRUCTION PHASE**





# LAUNCH PHASE















PUBLISHED  
BY  
GODDARD CADET SQUADRON

PHOTOGRAPHERS

2d Lt Marie Carrigg  
Ghost



ILLUSTRATED

BY

VK DESIGN