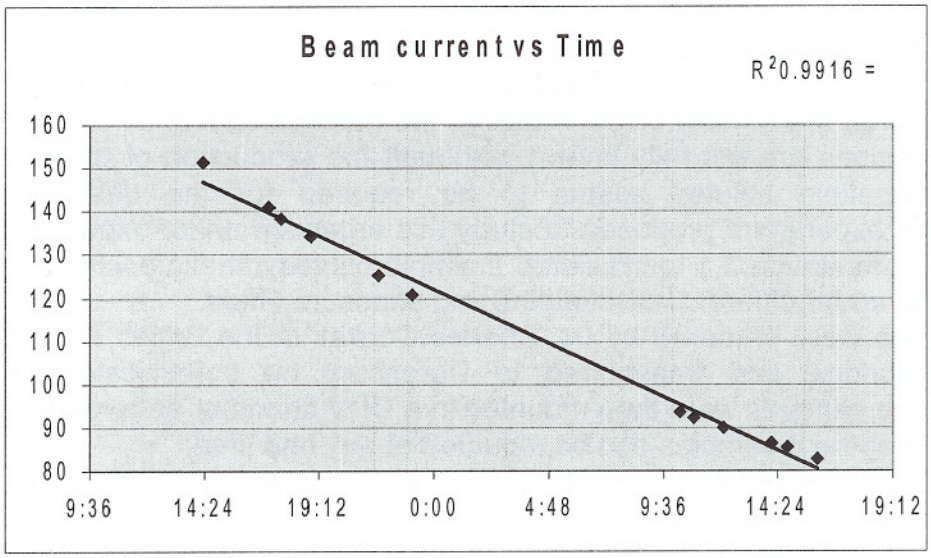
The extremophile, *Chroococcidiopsis,* is a photosynthetic cyanobacterium found naturally growing in rocks in hot and cold deserts. It is highly desiccation and radiation resistant. These attributes allow it to survive for extended periods in extreme desert regions exposed to solar radiation and absence of water. The organism has been found growing with sandstones in the Negev desert, where rock temperatures can exceed 80^{C} and within the sandstones in Antarctica, where temperatures are usually below freezing, the mechanisms of its tolerance of extreme conditions are not fully known, although the production of trehalose and other compatible solutes seems to be required for the desiccation resistance,. This experiment proposed to study this organism under exposure of UVC radiation from station 3.1 to irradiated a simple photosynthetic bacteria and study its survival under different wavelengths and exposure times.
Bacterial samples were prepared by Dr. Charles Cockell at the British Antarctic survey in Cambridge and transported to Daresbury on borosilicate glass substrates. These samples were then mounted in a UHV chamber on a rotational turntable such that the 6 samples can be mounted at any one time.
The beam from the synchrotron ring to the station 3.1 experimental setup was adjusted so that 3 samples could be irradiated at any one time. A pump was used to create a vaccumn within the sample holding chamber; this change in pressure was monitored and maintained during sampling.
A problem occurred when the bellows between a glass window to the sampling chamber and the metal window that lead to the main 3.1 system leaked and caused the shut off of one of the valves further up the line. Another set of bellows was supplied and the system was left to evacuate (removal of air) overnight.

On the second day of experimentation the synrotron beam was suffering faults and these faults meant that the beam line was not filled as it would normally be. The reduction on beam status has been recorded in the excel file attached. Excel sheet attached contains the readings, times, beam current for each of the experiments.

The following graph shows the decrease in beam current in relation to time for the experiments.



For the experiments four different treatments were performed.
The samples;

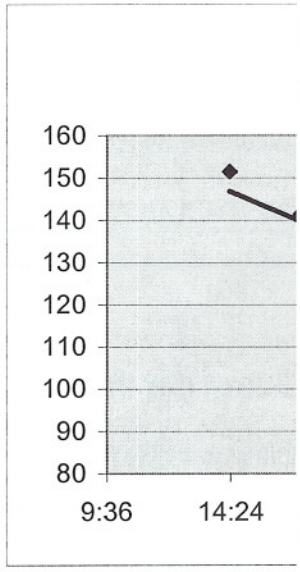
1. Exposed to above 200nm of light within a vacuum.
2. Exposed to above 200nm of light within near atmospheric pressure.
3. Exposed to below 200nm of light within a vacuum.
4. Exposed to below 200nm of light within near atmospheric pressure.

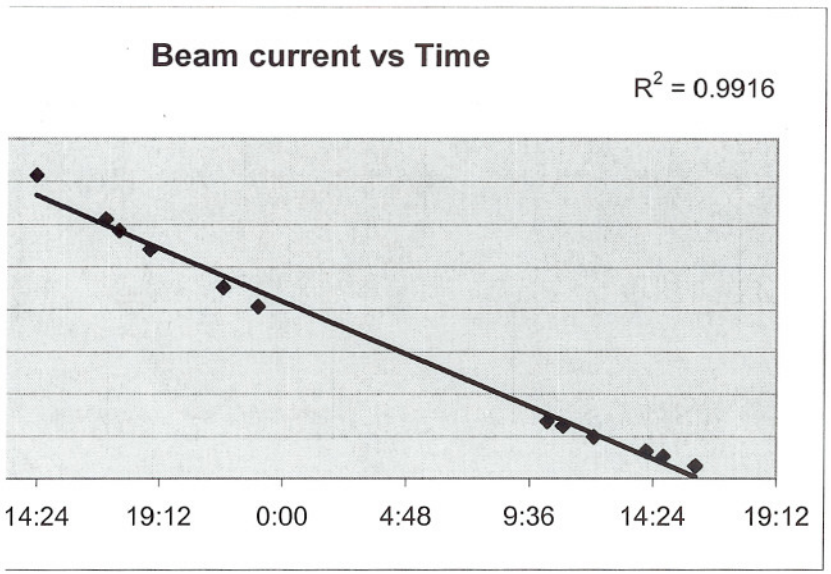
The samples were exposed to these treatments for varying time periods;
Minutes: 1, 5, 10, 15, 30, 45, 120.
The controls for this experiment were samples exposed to the vacuum but kept in the dark and samples which received no treatment at all.

The preliminary results received from Dr. Charles Cockhell indicate that there is growth on the control, one minute, five minute and ten minute exposure samples. The samples taken from exposure times above this namely the 30 minutes, 45 minutes and 2 hours have yielded no observable growth.
This indicates that exposures greater than five minutes have a detrimental effect on the culture.
So far there is no desirable difference between treatments above or below 200nm.
According to Dr. Cockhell the fact that the controls are growing after their treatment under vacuum means that quantifiable results can be obtained. He also stated that the lack of any apparent effect on pigments is consistent with previous simulated Mars data, where viability decreased after 30 minutes, but reduction in pigment fluorescence took 4 hours. Wavelength <200 nm reduce cell viability, but seem to have little impact on the biomolecules of the photosynthetic apparatus during that same time period.

1st Irradiation start time	Holder No.	1	2	3	4	5	6	P4 (mB)
	Time/min							
	<200 (no air)	120	120	120	CNTRL	CNTRL	CNTRL	
8/29/04 2:21 PM	1	1	2	3	4	5	6	2.00E-05
		1	1	1	5	5	5	
8/29/04 5:05 PM	2	69	70	71	72	73	74	5.00E-05
		10	10	10	30	30	30	
8/29/04 5:36 PM	3	7	8	9	10	11	12	3.60E-05
		45	45	45	CNTRL	CNTRL	CNTRL	
8/29/04 6:49 PM	4	13	14	15	16	17	18	3.20E-05
	>200 (air)	1	1	1	5	5	5	
	5	19	20	21	22	23	24	3.80E-05
		10	10	10	30	30	30	
8/29/04 9:41 PM	6	25	26	27	28	29	30	
		45	45	45	CNTRL	CNTRL	CNTRL	
8/29/04 11:02 PM	7	31	32	33	34	35	36	4.40E-05
	<200 (no air)	1	1	1	5	5	5	
8/30/04 10:17 AM	8	37	38	39	40	41	42	3.40E-05
		10	10	10	30	30	30	
8/30/04 10:53 AM	9	43	44	45	46	47	48	3.50E-05
		45	45	45	CNTRL	CNTRL	CNTRL	
8/30/04 12:06 PM	10	49	50	51	52	53	54	2.90E-05
	>200 (air)	1	1	1	5	5	5	
8/30/04 2:08 PM	11	55	56	57	58	59	60	3.40E-05
		10	10	10	30	30	30	
8/30/04 2:48 PM	12	61	62	63	64	65	66	3.60E-05
		45	45	45	CNTRL	CNTRL	CNTRL	
8/30/04 4:03 PM	13	67	68	75	76	77	78	3.80E-05
	no treatment							
		79	80	81 x2				

BC (mA)	DC (A) E-9	PD (A) E-7	P4 (mB)	BC (mA)	DC (A) E-9	PD (A) E-7	notes
Start of sample run				**End of sample run**			
151.5	0.53	1.1	4.20E-06	143.1	0.28	0.75	
		#N/A					
141.2	0.59	0.76	1.70E-05	140.3	0.6	0.73	
		#N/A					
138.5	0.55	0.7	7.50E-06	135.9	0.77	0.62	
		#N/A					
134.1	0.48	0.63	6.50E-06	131.4	0.3	0.58	
		#N/A					
		#N/A			DC (A) E-9	PD (A) E-9	
129.6	0.55	0.55	#N/A	128.7	0.17	0.19	
		#N/A					
125.2	0.45	0.54	#N/A	122	0.23	0.25	
		#N/A					
120.7	0.46	0.47	#N/A	118	0.47	0.5	
		#N/A					
		#N/A			DC (A) E-9	PD (A) E-7	
93.5	0.45	0.36	1.10E-05	93.1	0.35	0.36	
		#N/A					
92.4	0.47	0.36	5.00E-06	90.8	0.24	0.33	
		#N/A					
89.8	0.48	0.32	6.00E-06	88.4	0.25	0.28	
		#N/A					
		#N/A			DC (A) E-9	PD (A) E-9	
86.4	0.44	0.28	#N/A	85.9	0.15	0.15	
		#N/A					
85.2	0.43	0.285	#N/A	83.7	0.13	0.14	
82.9	0.44	0.23	#N/A	81.4	0.17	0.17	




Beam current vs Time
R^2 = 0.9916
14:24
19:12
0:00
4:48
9:36
14:24
19:12