

Mojave Monkey Adventures

My time spent with NASA during Spaceward Bound: Mojave!

**as recorded by
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After the last briefing on-line, I got a better idea of what needed to be done. I was thinking of doing my journal on the computer, so then I could e-mail it to those who needed to see it (and consequently, I have). But I couldn't get in a rhythm of completing it regularly. I was very happy to hear our journals could be done on paper. A journal should include drawings, charts, and other mementos of one's thoughts and experiences. For me, that's harder to do on a computer. I really believe the intimacy and romanticism of an experience is lost if it is simply recorded to a computer. I guess I prefer to keep some things less influenced by modern advances. At any rate, I got myself a new tablet and am starting a new journal just for this experience.

So far, with regard to how things are going with Spaceward Bound: Mojave, everything is going okay. I did enjoy doing the first assignment. Living here in Twentynine Palms, I knew a lot of information as far as the general geology of the area. But while researching the topics, I was able to develop a better perspective of the entire system. I gained a greater outlook on the entire ecosystem, past and present. I am so looking forward to this research opportunity. I have recently printed out the articles for our second assignment. Having skimmed them, they appear interesting and I anticipate they will be interesting reads. I have no questions at this time.

February 24, 2007

I was looking at some of the websites assigned to us and read the various articles. For the most part, I think I understood them just fine, though I did have a problem reading about the actual techniques used. It's always difficult for me to read about various procedures unless some type of direct observation of the processes is available. The general theme of the articles was in relation to the extreme conditions in which bacteria and other microorganisms must endure to survive on Mars. Extreme environments include regions of very little moisture, highly variable weather patterns, and extensive exposure to radiation. Overall, there are several species of bacteria resilient to these conditions. Thus, these prokaryotes and photosynthetic microorganisms may be the focus of our research in the Mojave Desert.

I really enjoyed reading the articles. I also really enjoy teaching, but it is nice to read some truly scientific literature for a change. I try to do this when I can, but my reading list over the last several years has been dictated by my pedagogical development.

At this point, I feel like I'm getting ready to go to summer camp. The more I think about the experience, the more I imagine how I can bring this information back to my students. This past week, I had my students set up petri dishes with samples of various bacteria on our school site, including our school garden. I'm hoping to couple this lesson with the work we do for Spaceward Bound: Mojave.

February 28, 2007

Just a couple of days ago, the Discovery Channel aired a show titled Mars Rocks! (2005). Mostly describing the accomplishments of the Spirit and Opportunity rovers, the show discussed how the layering of rock exists on the Red Planet. In fact, in one crater, the rovers discovered mudcracks and sediment and salt layers in what might have been a shallow sea. The salt layer is more like epsom salts. On the opposite side of the planet, the other rover was crossing terrain mostly seen in past expeditions; a plain with lava boulders. However, the significance of its travels came when it left the lava field and came across a geologic boundary' new types of rocks were found. The new type of rock looks kind of scaly drops. This is important because such diversity in rock types means there were some dynamic events occurring in the past. I wish the show would have discussed the rock in more detail. In addition to the rovers, NASA and the ESA (European Space Agency) have numerous orbiting probes around Mars. These devices use remote sensing to gather information about the topography and content of Mars' surface. The Mars Reconnaissance Orbiter is a high tech probe capable of checking out different layers of Martian rock formations. Sometime this year, another probe (the Phoenix) will investigate areas near the polar ice caps on Mars. What I found really fascinating was the brief description of a Mars expedition to be launched in 2009. This new probe will contain a miniature laboratory for studying Mars' surface. Is this what we are preparing for in the Mojave Desert? Either way, it felt exciting knowing I was going to be a part of it all, be it a teensy part, but involved.

March 25, 2007

Here we are. I have met so many different people so far, I don't know if I'm going to even remember everyone. It's nice to have met those from around here (Southern California), locals like myself. It's kind of funny watching all these folks with their internet, kind of amazing really how we've progressed. At one time, we'd all sit and write and read. We work to get away from the world. Now we bring the world with us. At any rate, seeing all of these people with their laptops makes me feel a little under prepared. I have to admit, I tend to be a little "old school" when it comes to such things.

The scenery here is comparable to Twentynine Palms. Reminds me of camping along Bristol Lake. They're firing up the torch for the balloon. Maybe I'll go over and check it out later. They're still unloading it from the trailer, so I'm sure nothing will be done with it until after dinner. The living quarters are tight, about 12 to 20 people per small room sleeping on bunk beds. I can get a bit claustrophobic. If push comes to shove, I'll sleep out here on the veranda. Just had a nice talk about standards and education with Matt, a good talk. I am really looking forward to talking with my peers here.

We had a delightful dinner this evening. Lasagna with sausage and salad. Dinner conversation was limited to getting acquainted with the other people here, but was great nonetheless. Tonight we had a meeting discussing the general geologic history of the Mojave Desert and safety relative to the native organisms. I had fun listening and watching the reactions from those folks who don't live out here, a lot of "ooooos" and "aaaahs." We also were introduced to the various research teams and teacher groups. In addition, a rundown of the daily procedures were given. Each day we need to sign up for a trip being led by one of the many scientists that day. The geology trips with Deborah Bazar sound great! The transect being conducted tomorrow also sounds interesting. On Wednesday, Linda and I have been assigned to write a blog for our teacher group. Breakfasts will be at 7:30AM

and dinner at 6:30PM (*later changed to 7:30PM*). Everything seems very straightforward; I just have to pay attention. Wednesday will be media day when the press convenes for interviews and conferences. If we want to be interviewed by the press, we would have to create a little speech explaining who we were, what we wish to accomplish this week, and what we plan to bring back to the classroom.

I mentioned everything seems straight forward, but at the same time it's all a bit overwhelming. Chris McKay loaned me a little LED flashlight. I never carry a flashlight with me. We are approaching full moon so the evenings will be visible thanks to the moonshine, at least for me. The bottom line, I'll get by. I generally do. My evening ended with a little night sky viewing with Brian Day. He had his Meade LX200R out looking at Saturn and some Messier objects. The views were great! We could make out the dust trails through M-3. One day, I will possess such an instrument. *Amy, if you're reading this, I will own my own Meade one day.*

March 26, 2007

“Good morning star shine. The Earth says hello!”

It's kind of chaotic this morning, especially with regard to sign ups for today's activities. After getting cleaned up, I went to the main building where the sign up sheets were. At first, I was going to sign up for one of the geology expeditions, but was told by Matt to wait because somebody was going to let us know what the exact procedure was for doing so. I got some breakfast, and then waited for someone to tell us to sign up again, but nobody ever did. Apparently, arrangements for where people were going to go wasn't settled, possibly. I can understand the need for scientists to adapt to changing conditions. But as for arranging teachers to go to a particular destination, things could have been a bit more organized.

I signed up to go help with the meteorology group. Our task today will be to set up a weather station, which will record various environmental conditions during the week. As part of our weather station, we will include various components to measure soil moisture levels at various depths below the surface, barometric pressure, air and soil temperatures, relative humidity, wind direction, wind speed, and the photosynthetic active radiation (wavelengths at just over 700 nm). The latter is the wavelength of light most widely used by plants. In keeping with our theme for utilizing Martian analogs, we'll be trying to set up our weather station in the most apparently lifeless soil in our area. We'll also be collecting soil samples to check for bacteria growth at the site we choose. As Leo works to get the hardware wired, Monika Kress mentions the tendency for science to be slow at times. There's always a lot of concerns setting up an experiment or instrument as well as a lot of problem solving before any data is even recorded. Then there's about five minutes of excitement, and back to sorting through the data. At any rate, much of the amusement I find in science, as is probably the case with Dr. Kress and other professional researchers, is the problem solving process. It's fun trying to set up some procedure in anticipation of learning something new! Looking at the equipment, I keep thinking to myself how such a weather station would be great to have on our campus, especially in our garden. We do have a weather station at our site, but our school was “modernized” about 9 to 10 years ago and the station was not electronically connected to the classroom. We need to replace it. I will most certainly work to obtain a grant and set something like this up.



*The weather station.
Photo courtesy of Mike Lum*

So we went out and discovered a location for our weather station. Prior to discovering the spot, we had to put some components together, which I got to help with. Roberto and I soldered some electrical connections and secured them with tape. All of the probes are hooked into a couple of recording boxes, which collects and stores data every five minutes. Afterward, we plug the box into a computer and download the data for analysis. We found some alluvium satisfying the criteria communicated by Monika. In addition to setting up the station, I took some soil samples for analysis by the soils team. Ray and Mike followed Dr. Kress to other sites to plant some remote temperature and humidity sensors in the area. Once the station and the probes were set up, we were done. If there was a day to do the meteorology work, today was it. As a result, I feel very confident I could set up a weather station on my own.



*Me getting a soil sample with Roberto and Leo
Photo courtesy of Mike Lum*

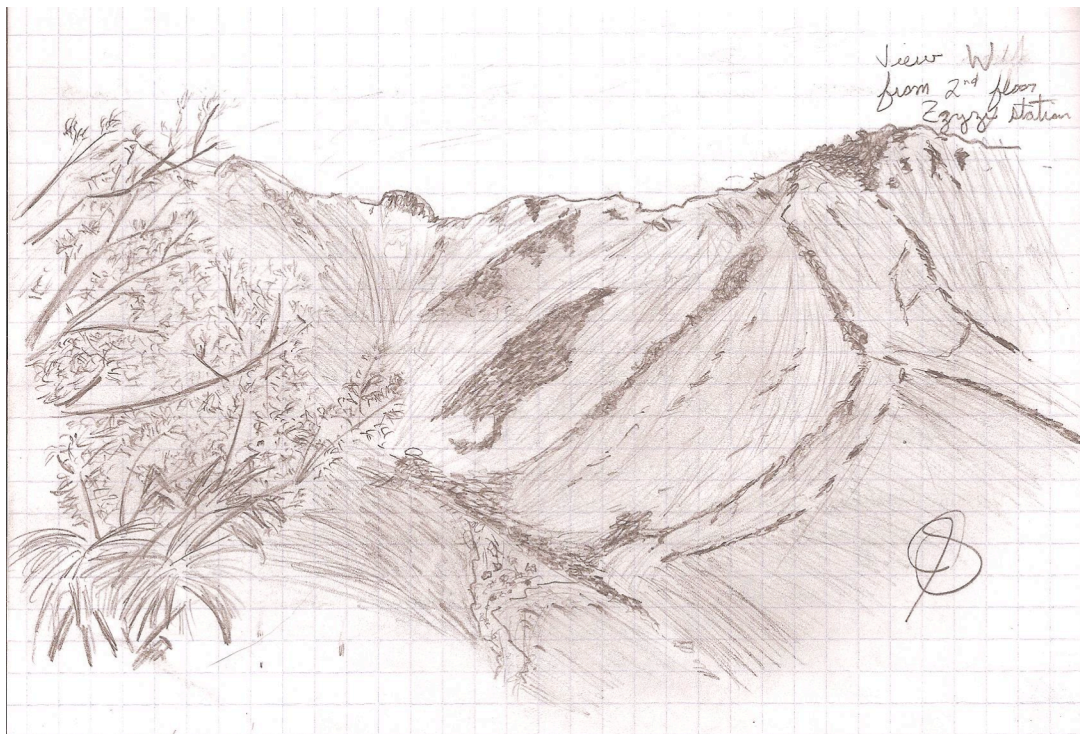
Already an established astrobiologist and professor at San Jose State University, Dr. Kress was very informative and a pleasure to be with today. She has brought with her a team of graduate students for this week's work. I had just as much fun watching the dynamics of how her team operates. While Dr. Kress instructed everyone as to what needed to be done, then plotted and took care of other matters, Leo was mostly in charge of setting up the hardware. I wish I had a "teaching team" for my classroom. I could write and plan curriculum, create partnerships, write grant proposals, and setting up learning activities in the community for my students while my apprentice or teaching team took care of the administrative duties associated with teaching (grading papers, parent communications, attendance, setting up labs, etc.). That would be nice.

We were told there wouldn't be much down time this week. Today turned out to be all about down time. I couldn't attend any of the other activities because the other groups were all in other places away from the research station. *Mike Lum, part of today's meteorology team, happened to be in the right place at the right time and got to join a trip out to the lava tubes.* The reason I had a lot of time off was due to what I signed up for; the weather station only took a few hours to set up. So I spent the afternoon getting caught up on some reading and sketched the nearby mountains. The other groups are first returning now, its 7:40PM. Apparently, the soil transect team drove nearly all the way to Tehachapi collecting samples. That is one long trip! Dr. Penny Boston, head of the caving team, is giving a presentation tonight. She is one interesting lady. I was helping her hang some of her posters; she has developed some neat concepts for planetary probes. One concept developed by Dr. Boston is a soil collecting probe designed to operate like a tumbleweed. Little energy is needed to propel it across the landscape, only the force of wind. Also, she has considered the use of hopping microrobots to explore the interiors of caves. She believes our quest for life on other planets could be done successfully using practical, low cost methods as compared to the bulky rovers we use today. Anyhow, Penny began her presentation explaining how astrobiology is a field requiring the interaction of all the sciences. YES! Science shouldn't be taught in separate fields anyhow; the goal of each branch of science is the same, to understand the existence and behaviors of matter, to comprehend nature as a whole. Penny continued to describe the purpose of our efforts, to construct a

field guide for something we haven't discovered yet, life on another planet. To find an extraterrestrial, we need to learn four things:

1. How to look for extraterrestrial life
2. How to recognize extraterrestrial life
3. How to preserve it once extraterrestrial life has been found
4. How to study extraterrestrial life.

All of these issues are compounded by the problem of our expectations of what extraterrestrial life will be. It will probably have a completely different chemistry and biomolecular structure. In other words, scientists will need to be prepared to embrace a new paradigm of how life exists. Life on another planet could quite feasibly have similar characteristics to organisms on Earth. Brian Day mentioned to us last night that spectrographic data suggests the existing of amino acids on asteroids and other small celestial bodies. If this is true, the concept of life on this planet starting from organic molecules from a foreign body becomes quite plausible. Penny wrapped her presentation with a description the symbiotic ecosystem existing beneath the desert varnish. She also discussed her idea of using Martian caves as living quarters for future astronauts. Again, she is looking to use what Mars provides for us and reducing the cost and bulk load needed for such an expedition.



My sketch of the adjacent mountains west of the Zzyzx Research Station