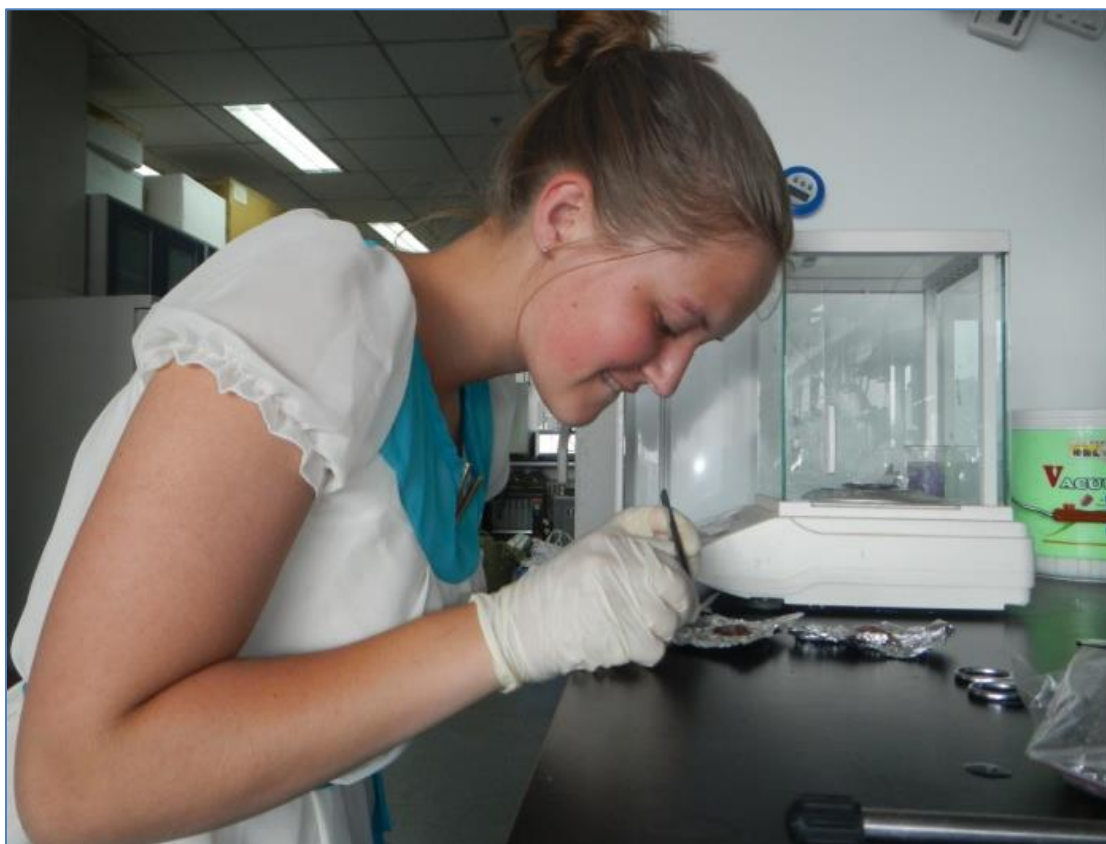


Purpose, Patience, and Pyrroloquinoline Quinone: My Summer in Beijing, China



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About Me

My name is Jessica Blosberg and I reside in Shoreview, Minnesota. When I wrote my report for eligibility to attend the World Food Prize Symposium in Des Moines, Iowa, I was between my junior and senior years at the Academy for Sciences and Agriculture. I am now enrolled as a freshman in the College of Food, Agricultural, and Natural Resource Sciences at the University of Minnesota and am double-majoring in Animal Science and Agricultural Education. I have always been interested in animals and wanted to work with them for my career, but I did not decide to major in agricultural education until my senior year of high school. As an involved member of the National FFA Organization, and participant in the World Food Prize Global Youth Institute, I realized this past year how important education can really be for a person's life.

As I wrote my research paper in the summer of 2011 about managing water scarcity and adapting farming practices in Kuwait, I learned about how countries all over the world are connected by food. One thing that struck me the most was how water is now becoming the "new oil." It is predicted that future wars will be over water sources, rather than oil. I quickly became enthralled by the information I was finding and often became so absorbed in my research, that writing my paper would fall to the wayside as I studied water scarcity for hours at a time. I had never studied water or food scarcity in such depth before, and it fascinated me.

Minnesota students are competitively selected to attend the World Food Prize Symposium. After the process of scoring my paper, my high school transcript, my conduct in a group discussion, and my impression and answers during an interview, the Minnesota Youth Institute committee gave me the news that I would be going to Iowa!

Before attending the 2011 World Food Prize Symposium and Global Youth Institute, I was told I would meet important people, such as world leaders, CEO's of companies, and top global scientists. I was not sure where the experience would take me after that. Throughout the weekend, I had opportunities to introduce myself to Mizengo Pinda, the Prime Minister of Tanzania; Joaquim Chissano, the former president of Mozambique; and Jo Luck, founder and former CEO of Heifer International. Jo Luck and I had lunch together twice, and she encouraged me, as did the 2011 Borlaug-Ruan interns and my high school teacher, to apply for a 2012 Borlaug-Ruan International Internship position.



Jeanie Borlaug-Laube with the MN Global Youth Institute Participants

I started the application as soon as I got home from Iowa and just a few months later, I found myself back in Des Moines for an interview for the internship. In March of 2012, I received a letter from the World Food Prize Foundation. As I excitedly opened the envelope and pulled out the gold letterhead, I read the first line, "I am extremely pleased to be able to inform you that the Chinese Academy of Agricultural Sciences (CAAS) in Beijing, China has agreed to accept a World Food Prize Borlaug-Ruan International Intern this summer and we have designated you for assignment to that location". I was going to China!

About CAAS

Beijing is a city full of thousands of years of history. Today, it is the capital of China and the second-most populated city in the world. Along with hosting millions of residents, it is also home to my host institution, the Chinese Academy of Agricultural Sciences.¹

CAAS was established in 1957 as a national agriculture research institution.¹ The academy focuses on agricultural applied research, applied basic research, and high and new technical research. It is associated with the Ministry of Agriculture of the People's Republic of China. CAAS boasts 39 research institutes around China, a graduate school, and a research publishing division. The graduate school, research publishing division, and 13 of the research institutes are located in Beijing. The research institute I was involved with is called the Institute of Feed Research (IFR), located in the northwest part of Beijing.

The Institute of Feed Research focuses on animal husbandry.² My project was one of many being conducted this summer. Other experiments conducted in my laboratory were also based on findings in effects of bodily functions of chickens. However, unlike my project, which was focused on the immune system, these other projects were examining the genetics of different birds.

My Research Partners

My professor and supervisor during my time in Beijing was Dr. Guang Hai Qi. He began working at the Chinese Academy of Agricultural Sciences in 1983, after he received his bachelor's degree. While working, he pursued and obtained his master's and PhD. Dr. Qi was

placed by the government to work in his position at CAAS because he was interested in science and loved researching new information. Until 1997, the government chose where people worked after obtaining their college degrees. This has since changed.⁶



Dr. Guang Hai Qi (in the red) with me and my laboratory partners

The primary researcher of the project is Samuel Kesete. Samuel is from Eritrea and is being funded by his government to study in Beijing. He is making the most of his time at CAAS by learning as much as he can about the culture and people. Samuel did not know any Mandarin Chinese before coming to the country, but after living in Beijing for nearly a year, he is picking up on the language quickly by trying to converse in Mandarin with his laboratory partners as much as possible. As part of his course load, he took three months of Chinese after arriving in Beijing. Before coming to China, Kesete worked as a graduate assistant in the only agricultural college in Eritrea. Now, he is pursuing his Master's degree at CAAS and hopes to continue on to earn his PhD⁴.



Me with Samuel Kesete, my partner from Eritrea

Samuel and I were assisted by Zhang Ya Nan, a graduate student at CAAS. She was raised in “DeZhou, a beautiful city at the west-northern of Shandong province”⁸. She went to a school in Qingdao, a city also located in the Shandong province, for her undergraduate degree. Zhang Ya Nan told me she chose to go to CAAS for her postgraduate education because she believes it is one of the best schools in China for her major. She also said, “[Beijing is] the most beautiful city and important city to Chinese, I have imagined living here many times [.] I wanted to experience the life in Beijing.”⁸



Zhang Ya Nan with me at the Badaling section of the Great Wall

The Project

Pyroloquinoline quinone (PQQ) is a vitamin-like enzyme cofactor which can be manufactured by the human body, but only as a very small amount (Zhang). Humans can add PQQ to their systems by consuming foods such as celery, parsley, and green peppers.⁵ PQQ dietary supplements are currently being investigated as a possible option for future use in animal diets in place of antibiotics. That concept was part of the focus of the project I assisted at the Chinese Academy of Agricultural Sciences with partners Zhang Ya Nan and Samuel Kesete, and supervisor Professor Guang Hai Qi. I was interested to find that the project I assisted is being funded through a contract between CAAS and a chemical manufacturing company, Nanjing Jiancheng Bioengineering Institute (NJCBio).

This project is part of Samuel's requirements for his master's degree. I was assigned to work with him, rather than on my own project, because the process for this experiment had already begun. My professor also informed me that most experiments at CAAS take much longer than two months to complete, so it would be very difficult for me to have a project of my own for the duration of my internship. The experiment I assisted with is titled, "Effects of Different Levels of Pyroloquinoline Quinone on Growth Performance, Muscle Development, and Antioxidant Defense Systems in Broiler Roosters." The hypothesis we tested was the thought that PQQ can improve the growth performance of broiler roosters and increase their antioxidant capacities as more PQQ supplements are added to the roosters' diets. According to Zhang Ya-Nan, one of the graduate students working on this project, "we chose the hypothesis for the physiological property of PQQ in the antioxidant systems of organisms. We [...] conducted the experiment on laying hens, and the results show[ed] that PQQ improves the antioxidant capacity

of laying hens. Based on these results, we hypothesize[d] that PQQ has some effect on improving the antioxidant capacity in broilers.”⁸

Pyroloquinoline quinone has been shown in multiple studies to be a key component of skin health, proper immune system function, fertility levels in female rats, and the learning abilities and memory functions in rats. It is also useful in models of cardiac ischemia, meaning that it helps to control adequate arterial blood flow.⁷ When asked for more information about why we chose to focus on broiler roosters, Zhang Ya Nan told me “[i]t is because of the production environment of broilers in China and the physiological property of the PQQ. The environment is filled with a variety of stress, and the most harmful stress is oxidative stress [...] PQQ has an important function in [the] body’s antioxidant defense system [...] it has been widely studied in mammals, but there [are] few stud[ies] in broilers.”⁸

To prove or disprove our hypothesis, we used the “Maleic Dialdehyde (MDA)”, “Superoxide Dismutase (SOD)”, and “Total Anti-oxidative Capacity (T-AOC)” assay kits from Nanjing Jiancheng Bioengineering Institute to test the oxidative capacity of broiler roosters. The hypothesis and project were chosen because, while multiple studies have been conducted to explore the effects of PQQ on mammals and birds, including laying hens, the effects of PQQ on broiler roosters is unknown. Samples from 360 roosters were tested with the assay kits and analyzed for absorption rates. The different tests displayed results for absorption rates of MDA, SOD, and T-AOC. Before the start of the experiment, it was predicted by Zhang Ya Nan that with “the increase of the amount of PQQ in the feed, the [content levels] of T-AOC [and SOD] in the blood and liver will be increased [...] the contents of MDA will be decreased.”⁸

For the first two weeks of the procedures, Zhang Ya Nan translated the Mandarin instructions from NJJCBio to English so Samuel and I would be able to conduct the experiments

without her help. As she translated, she and Samuel tested samples and I took notes. Each afternoon, I would type the notes on my computer and edit them with Samuel's help so we could both understand them. These typed notes became very useful in the last couple weeks of my work in the laboratory as we did not have Zhang Ya Nan's assistance most of the time. We followed the notes I had taken and duplicated the procedures for each of the assay kits. I used more of the laboratory equipment in these weeks and started to understand more of what the project was about.



Samuel and me hard at work in the laboratory

Personally, contributing to this research project gave me a chance to learn about a topic I never knew existed. It was definitely an educational experience as I learned more about how roosters' bodies function and how a small amount of a naturally-made chemical can change their bodies. I had opportunities to learn how to use different laboratory equipment and now have an idea of what it is like to be a graduate student in a Chinese university. I also learned about different laboratory procedures and can now compare them to previous procedures I have used in America. As a broader result of this study, if PQQ proves to improve the antioxidant capacity of broilers, further studies may be done to test if dietary supplements might be helpful to producers.

Dietary supplements would be healthier for the animals and have the potential of also being lower in cost. Additional studies can also be done to investigate how exactly PQQ affects the antioxidant systems of broilers.

Unfortunately, after one month of conducting experiments with the assay kits, it was discovered that we were missing too many samples (some were lost in transport from the research farm), and the results were not at all in line with what we had predicted would happen. Rather than the PQQ affecting the roosters greatly, the PQQ had only a slight effect on differences in growth performance, muscle development, and the antioxidant defense systems. These were not the results we expected. It was decided that the experiment would be restarted from the beginning with a new batch of roosters. In addition to new birds, the procedures needed modification and the transportation of the samples would require better monitoring, so as to ensure there would not be any lost samples.

I left the country before the group started the project again, but have since heard that they are being successful in raising the roosters. The birds are being fed diets with higher levels of PQQ than before and will soon be harvested for samples for the next round of experiments.

Materials and Methods

The following instructions cover the three assay kits used in this research. Each has similar procedures, but different materials. All were provided by Nanjing Jiancheng Bioengineering Institute (NJCBio). Due to the contract between CAAS and NJCBio, we were unable to determine the exact chemical composition of the reagents. The only information we were given is these were the chemicals to use, along with instructions for what to do with them.

MDA Assay Kit

Materials:

54 centrifugal tubes	1 glass stirring rod
2 metal centrifugal tube racks	1 500ml translucent dark brown glass bottle
1 250 ml graduated cylinder	60ml acetic acid
1 100ml graduated cylinder	1 500ml beaker
Reagent 1	1 manual pipette for 1000 μ l
Reagent 2	1 manual pipette for 5ml
Reagent 3	1 piece of wire – 3 inches long
500ml flask	1 pair of gripping scissors
1 200ml beaker	
1 source of small flame (for heating wire tip)	1 centrifuge
1 water bath tank	1 well cell culture cluster for 96 samples
1 timer – at least for 80 minutes	1 microplate reader

Reagent Preparation:

Reagent 2:

1. Pour 250ml room temperature pure water into a graduated cylinder
2. Pour 90ml room temperature pure water into a second graduated cylinder
3. Use water from graduated cylinder with 90ml to flush reagent 2 into a 500ml flask
4. Pour water from both graduated cylinders (340ml) into flask with reagent 2
5. Label flask “MDA” on first line and “R-2” on second line

Reagent 3:

1. Boil pure water for 9 minutes
2. Pour 60ml of boiled water into 200ml beaker
3. Dissolve reagent 3 in water in beaker
 - a. Stir until dissolved
4. Check measurement again (60ml)
5. Add water if needed
6. Pour solution into translucent dark brown bottle
 - a. Note: reagent 3 is sensitive to light

7. Measure and pour 60ml acetic acid into brown bottle

Procedure:

1. 5.7ml reagent 1 into 500ml beaker
 - a. Note: ml amount depends on number of samples
 - i. 0.1ml/sample
 - ii. We had 53 samples, but made for 57 in case we needed more
2. 171ml (57*3) reagent 2 solution added to beaker with reagent 1
3. 57ml (1ml for each sample) reagent 3 solution added to beaker with reagents 1 and 2
4. 0.1ml of $C_{11}H_{24}O_4$ (10nM/ml) into 3 centrifugal tubes labeled "S"
 - a. "S" means "standard"
5. 0.1ml of CH_3CH_2OH into 3 centrifugal tubes labeled "Sb"
 - a. "Sb" means "standard blank"
6. Put 0.1ml sample into "sample" centrifugal tubes using a manual pipette
7. Put 4ml reagent mixture into all (sample, S, and Sb) centrifugal tubes using a manual pipette

	Standard (S)	Standard Blank (Sb)	Sample (Numbered)
$C_{11}H_{24}O_4$	0.1ml	-----	-----
CH_3CH_2OH	-----	0.1ml	-----
Sample	-----	-----	0.1ml
Reagent Mix Solution	4ml	4ml	4ml

8. Close tubes
9. Hold a small wire over a flame with gripping scissors to heat the wire
10. Puncture a hole in the middle of the lid of each centrifugal tubes with the heated wire
 - a. The small hole is to allow steam and heat to escape during heating
11. Place racks of centrifugal tubes in water bath tank set at 95.1°C for 80 minutes
 - a. Use an empty centrifugal tube to keep the water bath tank lid open by placing the lid of the tube under the edge of the water bath tank lid
 - i. This is so steam can escape
12. Put reagents 1, 2, and 3 into refrigerator at 4°C for storage
13. Cool tubes in their racks with tap water

- a. Solutions are light pink when removed from water bath
 - b. No definite time for cooling, but solutions will be warm to touch, not scalding
14. Place all tubes in centrifuge at 6600rpm for 15min
- a. Make sure the tubes are set in symmetrically around the centrifuge!
15. Remove tubes from centrifuge
16. Transfer 0.2ml from each tube to individual cells in the well cell culture cluster
- a. Keep careful track of the order of the samples
17. Place culture cluster on microplate reader
18. Set temperature to 32.4°C and wavelength to 532 microwaves

T-AOC Assay Kit

Materials:

1 100µl manual pipette	3ml yellow reagent 3 (stock solution)
1 100ml flask	4 centrifugal tube racks
1 250ml flask	48ml reagent 3
1 250ml graduated cylinder	57ml reagent 3 (clear solution)
1 96 well glass cuvette	96 centrifugal tubes
1 stirring rod	96ml reagent 1
1 water bath tank	Microplate reader (for learning absorbance values)
10ml reagent 4	
2 reagent 2 (unknown weight)	

Procedure:

1. Set water bath to 37°C
2. Pour 240ml (120ml for each tube of reagent 2) into a 250 ml graduated cylinder
3. Fill reagent 2 tubes with water to flush powder out and into a 250ml flask
 - a. Continue filling and flushing tubes until powder is completely out
4. Pour water from 250ml graduated cylinder into 250ml flask containing reagent 2 and stir until reagent 2 is dissolved
 - a. Place 250ml flask with reagent 2 in water bath to assist dissolving process

- b. Continue stirring occasionally until dissolved
- 5. Put 3ml stock solution into 57ml clear reagent 3 to dilute stock solution
- 6. Set centrifugal tubes in racks and label with treatment, replicate, and sample numbers
- 7. Label 2 centrifugal tube racks for samples and 2 for controls
- 8. Follow instructions below, or use the table below for guidance for steps 9-16

	Control Tubes	Sample Tubes
Reagent 1	1.0ml	1.0ml
Sample	-----	0.1ml
Reagent 2	2.0ml	2.0ml
Reagent 3	0.5ml	0.5ml
*	Mix well on vortex stirrer. Then incubate in 37°C water bath for 30 min	
Reagent 4	0.1ml	0.1ml
Sample	0.1ml	-----

- 9. Put 1ml reagent 1 into each centrifugal tube using the manual pipette
- 10. Using the manual pipette, put 0.1ml of each sample into its corresponding centrifugal tube in the “sample” racks
 - a. Use pipet for this process
 - b. Use a different pipet for each sample
- 11. Using the manual pipette put 2ml of reagent 2 into each centrifugal tube
- 12. Using the manual pipette put 0.5ml reagent 3 in each centrifugal tube
- 13. Homogenize the samples with the vortex stirrer
- 14. Place all racks in the water bath tank and warm at 37°C for 30min
- 15. Using the manual pipette put 0.1ml reagent 4 in each centrifugal tube
- 16. Using the manual pipette a new pipet tip for each sample, put 0.1ml sample in the centrifugal tubes on the “control” racks
- 17. Homogenize tubes on “control”racks
- 18. Let sit for 10min
- 19. Using a manual pipette, transfer 0.2ml of each solution to the wells of the cell culture cluster
 - a. One sample per well
- 20. Set the well cell culture cluster on the microplate reader

21. Adjust the temperature to 33.1°C and wavelength to 520nm to analyze the absorbance value of each sample

SOD Assay Kit

Materials:

10ml reagent 1 (stock solution)	Acetic acid
1 water bath tank	30ml reagent 7 *Note: no dilution/dissolving necessary for use
10ml reagent 2	
10ml reagent 3	50ml saline (0.9% NaCl in water)
2 bottles 350µl reagent 4 *Note: cannot be frozen	18 centrifugal tubes
10ml diluent 4	1 centrifuge
1 bottle reagent 5 powder *Note: keep in dark location	1 manual pipette for 1000µl
	1 manual pipette for 5ml
1 bottle reagent 6 powder *Note: keep in dark location	1 100ml beaker
	1 vortex stirrer

Reagent Preparation:

Reagent 1:

1. Dilute 10ml of reagent 1 into 90ml of redistilled water to make a total of 100ml of solution

Reagent 2, 3, and 7

1. no change

Reagent 4:

1. Mix the powder reagent 4 with 10ml of the diluent (liquid) reagent 4 in the ratio of 1:14 (powder:liquid)

Chromogenic Reagent:

1. Dissolve reagent 5 in 75ml redistilled water which has been heated in a microwave for 9-10min
 - a. Water should be 70°C-80°C

2. Dissolve reagent 6 in 75ml redistilled water that is at room temperature
3. Combine 50ml acetic acid with dissolved reagents 5 and 6 in 500ml beaker
4. Stir

Procedure:

1. 50ml saline in 100ml beaker
2. Label 8 centrifugal tubes with ratios (1:1, 1:4, 1:8, 1:16 – x2 for each ratio)
 - a. Ratio is “Sample Amount” : “Saline Amount”
 - b. *Note: use manual pipette for transferring solutions for steps 4-14
3. Place tubes on centrifugal tube rack
4. 100µl saline in both 1:1 tubes
5. 200µl saline in all 1:4 and 1:8 tubes
6. 240µl saline in both 1:16 tubes
7. 150µl sample 2-3-2 in 1st 1:1 tube
8. 150µl sample 5-4-1 in 2nd 1:1 tube
9. 50µl sample 2-1-2 in 1st 1:4 tube
10. 50µl sample 5-2-1 in 2nd 1:4 tube
11. 30µl sample 2-1-2 in 1st 1:8 tube
12. 30µl sample 5-2-1 in 2nd 1:8 tube
13. 20µl sample 2-3-2 in 1st 1:16 tube
14. 20µl sample 5-4-1 in 2nd 1:16 tube
15. Close all tubes and mix on vortex stirrer
 - a. 1st tubes are for treatment 2 and should have a “2” on each of their sides
 - b. 2nd tubes are for treatment 5 and should have a “5” on each of their sides
16. Label new set of 8 centrifugal tubes with ratios (1:1, 1:4, 1:8, 1:16 – x2 for each ratio)
 - a. Ratio is for “Sample Amount” : “Saline Amount”
17. Place tubes in a row on centrifugal tube rack, with blank tubes in the 1st and 6th place on the rack
18. 200µl reagent 7 in each of the 10 new tubes using manual pipette
19. 200µl of each sample solution (from steps 4-14) into the new tubes
 - a. One sample solution for each new tube, do not mix sample solutions

- b. Sample 2-1-1 has no dilution, but goes in the 1st blank tube
 - c. Sample 5-3-2 has no dilution, but goes in the 2nd blank tube (6th in the row)
20. Close all tubes and mix on vortex stirrer for 1min
 21. Set sample solutions in centrifuge
 22. Set centrifuge to 5000rpm for 15min at 27°C
 23. Remove from centrifuge
 24. Follow instructions on Table-1 for adding remaining reagents
 - a. “T-SOD Control” refers to
 - b. “T-SOD Sample” refers to the samples from steps 4-16
 - i. These samples should not have any reagent 7 in them
 - c. “CuZn – SOD Control” refers to
 - d. “CuZn – SOD Sample” refers to the solutions that were in the centrifuge for steps 21-23

Table-1: Components of Step 3

	T-SOD Control	T-SOD Sample	CuZn – SOD Control	CuZn – SOD Sample
Reagent 1	1.0ml	1.0ml	1.0ml	1.0ml
Deionized Water	10µl	-----	-----	-----
Sample	-----	10µl	-----	-----
Control Supernatant	-----	-----	10µl	-----
Sample Supernatant	-----	-----	-----	10µl
Reagent 2	0.1ml	0.1ml	0.1ml	0.1ml
	0.1ml	0.1ml	0.1ml	0.1ml
	0.1ml	0.1ml	0.1ml	0.1ml
Mix on vortex stirrer			Warm in water bath tank at 37°C for 40min	
Chromogenic Reagent	2ml	2ml	2ml	2ml

25. Mix solutions on vortex stirrer
26. Let stand for 10min
27. Add each sample to a well cell culture cluster
28. Read using microplate reader set at 550nm

How did the overall experience impact you?

When I first learned I had been invited to work at CAAS, I was excited, but did not know what to expect. I had never learned much about China, the culture, or the history. As I boarded the airplane in Minneapolis, I tried to have as few expectations as possible for what lay ahead. After a difficult flight, I finally landed in Beijing on a beautiful Sunday morning. A Chinese man by the name of Huang picked me up and we took a taxi together back to CAAS. My first impression of Beijing as we headed towards the heart of the city was that the tall trees and crazy traffic reminded me of Orlando, Florida. The air was warm and some of the trees seemed familiar as we drove past. As we got closer, those impressions changed. I began to see vehicles I had never seen before, such as bicycles with three wheels, a trailer, and an engine. People were loading large piles of recyclable items on the trailers to bring them somewhere so they could earn a little money. I saw people digging through trash bins to pull out plastic bottles. Dogs were walking with their owners without being on a leash and children were sauntering down the street without parents in tow. It was before we reached the institute that I was reminded I definitely was not in America anymore.



My friend, Li Hua, taught me how to make authentic Chinese food.

As I spent more time in China, I began to learn some things about myself and the world around me. I believe the most important lesson I learned is the importance of patience. In China, unlike the United States, things do not often happen instantly. Planning ahead is important, and asking questions is a must. This made me realize how much I depend on things happening right away, and quickly adapted to the new ways of waiting for things to happen, rather than getting what I want right away. Patience was also needed when bargaining in the markets. People shout out prices and try to usher potential buyers into their shops at every opportunity. Rather than getting frustrated with all the commotion, I learned to communicate with shopkeepers to lower prices, and politely ignore those who were a little more forward with their sales efforts.

I also learned that it is ok to be independent, but independence does not mean that a person cannot ask for help when they need it. I was now responsible for finding my own meals and making sure my laundry was done when needed. To get around the city, one of my laboratory partners, Zhang Ya Nan, taught me how to use the bus and subway systems. It was because of her that I was able to travel all over the city with ease. My friend's aunt and uncle were great at showing me some American and European restaurants and stores in the city so I could feel a little more at home. There were some days where I would get homesick. Before this trip, I had never been away from home for more than two weeks, with or without my family. I communicated with my family when I could and tried to keep myself busy by spending time with new friends and exploring the city.

As my roommate, Lauren, and I visited the most common tourist destinations in the city, we began to find some of our favorites. My personal favorite tourist destinations were the Summer Palace and the Great Wall. I love the history behind each of these places and the architecture was spectacular. I learned that visiting popular tourist destinations can be fun, but

sometimes it is the hidden treasures, such as new locations or a small family restaurant, that can add an even better adventure to a person's day. While visiting well-known places, Lauren and I also found some locations off the beaten path that we enjoyed. I believe we both agreed that the White Cloud Temple was a favorite for both of us. It is a Taoist temple located in the southwest part of the city. While visitors are welcome to come in, there are also reminders that it is still a temple of worship and the areas must be respected. We were fortunate enough to witness a ceremony during our visit, but politely left after about half an hour so we could see the rest of the temple grounds.

I believe my personality has grown with this experience. I am more willing to wait, better at listening carefully to what others say, and much less forgetful than I was before my trip. Moving to college was an easier transition because this time, I am only a few minutes away, rather than halfway around the world. I do not take my family and friends living close to me for granted anymore and try to spend as much time with them as I can. I have learned to live for the moment while planning for the future. Most of all, I have learned how everyone on this earth is connected, whether we know it or not. How exactly we are all connected is not quite known, but should be acknowledged. If we care for others, we are caring for ourselves as well. As Dr. Norman E. Borlaug said, "The destiny of world civilization depends upon providing a decent standard of living for all mankind."³ I hope to continue being a part of that.

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