

# From Cedar Falls, Iowa to Beijing, China

*The story of my two-month journey into a land rich with culture,  
heritage, scientific advancements, and, of course, rice.*

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## **Personal Background**

Never in all of my whopping eighteen years of life would I have dreamt that I would get the opportunity to travel abroad for two months and learn about pressing issues in food security amongst some amazingly distinguished scientists. Never would I have dreamt that I would see the Great Wall of China in person, much less climb any of its steps. Never would I have dreamt that I would have little boys and girls running up to me, grabbing my hands, kissing them and begging for money.

But it happened, all of that and more.

My name is Morgan Chelsey Moe, and until October of 2004, when I attended the World Food Prize Youth Institute, I never would have thought I would have the chance to go to China and experience an entirely different culture for two months. Just participating in the Youth Institute was enough of an experience to amaze me and influence some of my views on the world. At the Youth Institute, I heard from distinguished scientists and researchers who have been trying, and are still trying, to increase food security throughout the world. I listened to speeches from the governor of Iowa and such distinguished and accomplished players in the role of food security as Norman Borlaug. Never in my life have I seen so much passion for any issue as I did over the three days I attended the World Food Prize Youth Institute. While I've always been passionate about a number of causes, ideas, and events, it wasn't until I spent time with the likes of Ambassador Quinn and 2004 World Food Prize Laureate, Monty Jones of Sierra Leone, that I realized that food security is an issue of the utmost importance that deserves such passion as these people exude. What can I say? I was hooked.

While I was in awe of these people and their ambitions for trying to eliminate hunger and starvation, I also felt quite ashamed that I had never seen the situation for what it was

beforehand. Regardless of my participation and intense interest in a class I took as a junior that focused on African and South American development issues, I felt as though I knew nothing about the world around me. Like the average teenager, I didn't pay very much attention to things other than homework, going out with friends, and getting into college. I found myself thinking, "How have I lived in this world for seventeen years without once realizing that there are people out there who aren't as comfortable as I am?" It disgusted me. I felt as though I had taken for granted my privileged life, complete with clothes, education, and, of course, food. The feeling was overwhelming and depressing, but it soon vanished with the realization that I could make a difference. After all, Norman Borlaug had to start somewhere, and if he can do it, why can't I? Plus, the encouragement of everyone at the World Food Prize Foundation, the former interns that I became friends with, and my friends and family were all rooting for me.

And to think that all of this stemmed from my eleventh grade chemistry teacher noticing my interest in third world countries. Her simple question, "Hey, have you heard of the World Food Prize?" swept me into a world of knowledge, passion, and determination that, to this day, thrills me.

So I got involved. After the Youth Institute, I read up on the current situations in food security in nations like Kenya, Africa, and Brazil. I talked to teachers, professors, and scientists about what they knew and what they thought could be done. Sometimes I just sat and thought to myself, wondering if I could actually do anything. Every time I did that, I wound up with the same answer: "Who knows unless you try?" While it may not have been clear as to whether or not my willingness to help would, indeed, help anyone, I felt the burning need to try. I wanted to make a difference, and that passion is what got me the trip of a lifetime and taught me many

valuable things that I won't soon forget.

### **University and Laboratory Background**

Perhaps the most poignant memory I have of my internship is the center I stayed at. For two months I studied at the National Laboratory of Protein Engineering and Plant Genetic Engineering at Peking University in Beijing, China. While I've not by any means been to or even read up on the centers that my fellow interns studied at, I consider myself to be the luckiest among them. Not only was Peking University welcoming and full of fascinating history, it's quite possibly the most beautiful place I have seen and will ever see in my entire life. There are no better words to describe it than stunning, gorgeous, and breathtaking. Everywhere you look there are flowers, trees, ancient architecture, traditional paintings, and people. Oh, so many people! As a person who loves being in a busy, bustling place, Peking University was the ideal setting for me.

What was even better about Peking University was that its wonder went deeper than the landscape. It's full of a rich history that blew me away. The school was founded in 1898 during the Qing (pronounced "ch-ing") Dynasty. As I've already mentioned, the seven hundred-acre school is filled with lush flowers and trees, which, as I learned early on in the internship, are home to many large cats that are less than friendly. Not only are the plants beautiful, the architecture is quite magnificent as well. Nearly every building on campus has a red roof that makes it hard to differentiate which is which. Luckily for me, the building I was in is fairly new, and is more modern in architectural style. That and the huge DNA double-helix were good indicators that yes, I was where I was supposed to be. Amongst the many red-roofed buildings were many almost secretive pagodas that are filled with the most intricate, gorgeous paintings

I've ever seen. Ranging from people to mythical beings to flowers, the paintings are each different and have painstakingly-large amounts of time built into each small scene.

With such magnificence, it's a wonder that I had never heard of this school before attending the World Food Prize Youth Institute. On top of that, Peking University is considered the top school in all of China. Many movements have originated here and many great figures in Chinese culture have studied, taught, or been involved with the university.

While the school is very broad in topics to be studied, I was involved with the Biotechnology Department. The National Laboratory of Protein Engineering and Plant Genetic Engineering was developed in 1987 and has been running strong ever since. To my surprise, the lab incorporates many scientific aspects in its research, ranging from molecular biology to computer science (something that I found intensely fascinating, yet baffling). However, even though the lab dabbles a bit in many different topics of research, the main topics center on agriculture and the environment.

### **The Project**

Seeing as how I was a seventeen-year-old fresh out of high school, you could imagine how vast my knowledge was of any sort of biotechnology. If you guessed anything other than "next to nothing," you're wrong. While I was eager to learn all I could about food security and ways I could help, I knew that I was in for a confusing and meticulous two months. As a result of my lack of knowledge in a lab full of graduate students, I wasn't assigned a particular project. Instead, I sort of took on the projects of the graduate students as my own whenever I could help them. My days were full of assisting the students, and Dr. Kang on occasion, with whatever they needed that I could do without completely ruining the experiment (which is insanely easy when

working with 1/1000 of a mL at a time).

The students in the lab mainly focus on cloning the genes of the Arabidopsis plant in order to find their function so that they can then be mutated and modified to withstand cold temperatures, drought, fungi, and other harsh environmental conditions. It is hypothesized that if genes can be mutated as such in the Arabidopsis plant, the same techniques can be applied to rice. Rice could then grow in more areas of China, creating a bigger food supply for its ever-expanding population.

Arabidopsis is a valuable tool when working in the field of molecular biology. Because of its simplicity, yet its similarity to rice, scientists can execute experiments much more quickly than they could otherwise. In the year 2000, the entire gene sequence of the Arabidopsis was pinpointed, which is another reason that this plant is such a valuable experimental tool. With the genes already known, researchers can focus entirely on mutation. Along with these factors, Arabidopsis is valuable because of a number of other reasons. It's quite small and easy to use in the lab, has a short growth duration (about forty-five days), has a small genome size (only five chromosomes) and can produce up to five thousand seeds for study. However, the most important research factor is that all of the genes in the Arabidopsis plant have been pinpointed. Since the genes are known, scientists can design a primer/PCR (Polymorous Chain Reaction) to isolate the gene and then clone it.

That is where I come into the picture. While I assisted the graduate students in many things, it was very difficult for them to communicate to me exactly what we were doing. Often, after a few failed attempts, they simply smiled, shrugged, and went back to their work, leaving me to wonder what exactly I just poured into that beaker. Everything I did fascinated me, and

the students made sure to involve me in steps that produced a visible reaction. I often saw things happening right before my eyes that made me think, “Hey, we could be saving lives by doing this.” Yet while there were times when I was completely clueless as to what I was doing, most of the time I was confident in my ability to perform PCRs. After three weeks in the lab, I mastered the procedure of the PCR (Polymorous Chain Reaction), which is the first step in cloning a gene. That means that performing a PCR was something that constantly needed to be done, and therefore I always had something to help the graduate students out with! I soon received compliments from my fellow scientists in the forms of a smile, thumbs-up, or a “Good!”-one of the few English words that many of them knew. So, essentially, my project was to conduct PCR experiments. And that was a never-ending project! There was always something to do, more DNA to extract, more agarose gel to mix.

### **Project Goals**

The goals of my performing all of the PCR experiments were to use tDNA to create a mutant collection of Arabidopsis genes. Easily transferable, tDNA would be transferred to a plant where the bacteria would infect a genome. The plant would then mutate and scientists can easily study which functions are lost, gained, enhanced, or decreased. After observation, DNA is extracted to determine exactly which genome was affected and how. If certain traits are gained or enhanced that would benefit rice, the DNA extraction can then reveal the genome affected, which can then lead scientists to try the same approach with rice plants. In the end, hypothetically speaking, rice can be mutated to not only withstand harsh conditions, but yield more and have greater nutritional value.

### **Backgrounds of Fellow Scientists**



As you can probably guess, I often needed help and clarification while experimenting. That is where the wonderful Dr. Dingming Kang was most helpful. Dr. Kang has traveled all over the world learning and teaching about rice mutation. His knowledge of biotechnology is greater than mine of the 1970s glam-rock movement (in other words, a lot). Among the places he's taught are Harvard and various schools in England. Obviously, his English is very good and I found myself being so comforted when I heard him say, "Good morning, Moe" every day when I came to the lab. While he is a very busy man, Dr. Kang made sure to answer all of my questions and help me in any way he could when he had the chance. His patience and expertise made working in the lab a very enjoyable experience.

Another person who greatly helped me during my two-month stay at Peking University was a graduate student whom everyone called Xiao Han (pronounced "Shee-ow Han). A very friendly and dedicated student, this girl made sure that I understood what she was doing whenever I helped her. Her English was also very good, among the best in the lab, which made it easy for us to become friends. Every day she made sure I ate lunch, and even insisted that I come with her, something that I doubted anyone would want. We talked about school, friends, fashion, and the differences between America and China. Throughout my internship, Xiao Han was always willing to take me out on the weekends to various markets and sights in Beijing. With her, I learned to bargain, a technique that is essential to any non-Asian looking shopper. She tried to make sure that I always had something to do in the lab, and if I didn't, she sat and talked with me. We laughed over similar things and when we couldn't understand one another, we just smiled and laughed some more. I can't help but think that if I had not made such a great friend as Xiao Han, I wouldn't have enjoyed my lab experience so much. She was always there

with a kind, encouraging word, and advice for when I was utterly frustrated with everything.

My supervisor during my internship at Peking University was Dr. Hongya Gu. It's very hard for me to adequately describe Dr. Gu because never have I met anyone so caring. She made sure that I was comfortable and had things to do in the lab, along with seeing the things that Beijing has to offer. While Dr. Kang was the person who often took me to various wonders such as the Forbidden City and the Great Wall of China, it was Dr. Gu who arranged for them to happen and allowed me such grand adventures. She is a miraculous woman with endless intelligence that I admire greatly. She has a daughter who looks very much like her, and I have no doubt that Dr. Gu will help her become a very sophisticated, smart woman someday. After two months around Dr. Gu, I felt more intelligent. I can't imagine what years would do!

### **My Responsibilities/Contributions**

My responsibilities throughout the internship mainly consisted of helping graduate students, which I came to find out, was of the utmost importance. At first I didn't realize exactly how much work they have to do and how stressful it can be. Nor did I take into account how helpful it is to have someone there (me) to do the tedious PCR experiments while they went on to bigger, better, and way more confusing things that I could not even begin to understand. PCR experiments are the very beginning to mutating rice, which will hopefully someday feed the entire country.

### **Results of the Project**

It will most likely take a while for anyone to find a way to mutate genes so that rice can grow in the very far corners of China, but the students at the National Laboratory of Protein Engineering and Plant Genetic Engineering are sure working hard on it. If the lab hypothesis is correct, mutated rice will someday be able to feed everyone in China. That is no small feat.

Right now rice is the main source of nutrition for people in China, but sadly, not everyone can afford or grow it. Some people simply do not have access to rice as a result of the environment in which they live. While the lab has yet to see any results, I am positive that someday they will make a breakthrough that will literally feed the country. And who knows, perhaps that breakthrough will come from one of the many PCR experiments that I executed.

### **How did all of this affect me?**

After all was said and done, all of my souvenirs bought, pictures taken, and sights seen, I found myself on a plane ride home after two months of living in a country quite different from America. Who could sleep when you've not seen your family, eaten American food, and smelled that oh-so-fertilized Iowan air for over two months? Aside from chatting endlessly with fellow intern Sarah Simpson (whom I became very close friends with as we were only a five minute taxi ride apart from one another), I reflected upon my stay in Beijing. I did, tasted, smelled and saw so much. After a mere five minutes of thinking back on all of this, I started to get dizzy with recollections of everything I had experienced. How was I going to tell everyone back at home about my stay in China? There was so much to tell. There still is so much to tell. I don't know that I'll ever be able to tell any single person everything that amazed, disgusted, surprised, and comforted me about my internship.

Obviously, I have a much more sensitive attitude toward the issue of food security. After staying in China for two months, I saw firsthand the hunger and starvation that all too many people have to face on a daily basis. On a visit to Xi'an, a child ran up to me, grasped my hand, and began kissing it in an attempt to get me to give him some money. People are hungry and poor and are often unable to do much about it. While I stayed in Beijing, a colorful, brilliantly

lighted and populated place, I often saw beggars on the streets. Sometimes they proudly displayed their injuries, such as broken legs or ugly gashes all over their bodies in an attempt to elicit sympathy from passers-by. I was warned early in my stay that I shouldn't give beggars money because more would come out trying to get my money. Of course, being the sympathetic person I am, I didn't listen to that advice and found out the very hard way that it was true. Most will do anything to get money for food and clothes. As clichéd as it may sound, seeing these people do desperate things for food makes me want to give it to them. I want to do anything and everything I can to give these people some nourishment, some way to keep on going, to have hope for the future.

The one thing that I always make sure to tell people who ask, "So how was China?" (a question that I get at least once a week), is about my roommate. The first night I arrived, I was a little flustered and overwhelmed. Dr. Kang saw my fatigue and led me to my room, a welcome journey. I was exhausted. When he knocked on the door, I was a little confused. Up until that point, I had no idea that I would have a roommate. I'm pretty sure that my jaw dropped when they started speaking in rapid Chinese as I stood there clutching my luggage. I didn't know what to make of the situation. How was I supposed to share a room with a girl who didn't even speak the same language as me?

Quite easily, as I came to find out.

My roommate's name was Liu Chang and she is currently studying law at Peking University. Her family lives thirteen hours away and she has a boyfriend who currently studies at Peking University's rival school. And, as time went on, I realized that her English is wonderful! We had many great conversations about politics, relationships, and the differences

between America and China. She enlightened me on the life of an average Chinese citizen, something that made me come to appreciate my lifestyle much more. She taught me to write Chinese characters with a water brush and ink, an art that I was overjoyed to learn, especially from someone so talented at it as she. Liu Chang took me out shopping to a Chinese shopping mall and helped me buy gifts for my friends and family back home. She and her boyfriend even took Sarah and Me to Tiananmen Square one weekend. As thanks, I took Liu Chang and her boyfriend out for pizza one night (which proved to be a new and delightful experience for the two of them), because they had never eaten pizza before. Liu Chang helped me buy phone cards to call my family and I helped her learn more English. She listened to me reminisce about what home life would be like at the time and I listened to her troubles deciding whether or not to stick with her job and put off her studies to get into law school versus quitting and studying very hard, but not having much money to live on. We listened to each other, and even though we grew up continents away, we both found similarities in the other that made us fast friends. It was with tears that I left her on August third.

As a person, I feel much more worldly than I did back in June. Perhaps that's because I'm a year older (I turned eighteen while I was in China and my wonderful supervisor and fellow students threw a party for me), but I have a strong feeling that it's because of the two months I spent in China. While China and America are very similar in many ways, they're also quite different. Of course, there's the issue of communism versus democracy, but I took more notice of the culture and interaction between people. People took notice of me, too. Everywhere I went I felt eyes on me, watching my every move. The people of China are fascinated by citizens of other countries because they aren't really allowed to know much about any place but China. While I was there, I rarely heard or read stories about any place other than China. People would

often ask me what my life was like at home, and I was shocked to find out how in the dark they were about life outside of China. On that same note, I was very much surprised by much I learned about China. I was in the dark as well. This was a major factor in the growing I did while in China. I realized that there is more to life than being comfortable here in Iowa. There's a whole world out there that needs to be explored by those of us who can and want to help, because believe it or not, it only takes one person to start something that will make a difference for someone, somewhere.