JENNA ALDERTON'S

INTERVIEW WITH TSU-MING HAN

[redacted]

me: This is Jenna Alderton, it's December 7, 1993. I'm interviewing TSU-MING HAN, this is an auto-biographical interview and this is taking place at Mr. Han's House.

me: When and where were you born, and can you tell me something about your family?

MR. H: I WAS BORN IN A VERY REMOTE MOUNTAINOUS AREA IN THE WESTERN PART OF THE HENAN PROVINCE, NOT FAR AWAY FROM THE YELLOW RIVER. YOU PROBABLY ALREADY LEARNED THAT MOST OF CHINESE HAD A LARGE FAMILY BEFORE THE COMMUNIST TAKE OVER. EACH FAMILY MAY CONSIST OF MORE THAN TWENTY MEMBERS, ~~AT ONE TIME~~ INCLUDING UNCLES, AUNTS, GRANDFATHER AND HIS BROTHERS. MY OWN FAMILY HAD EIGHTEEN MEMBERS AT ONE TIME. NONE OF THEM WERE EDUCATED UNTIL MY FATHER, WHO HAD A HIGHSCHOOL EDUCATION AND LATER BECOME A GREAT (5th grade) SCHOOL PRINCIPAL AND THEN A DISTRICT MAYOR. HE ESTABLISHED A HIGHSCHOOL NAMED YAOLIN HIGHSCHOOL IN THE DISTRICT.

MY MOTHER WAS A HOUSE WIFE WHO WAS IN CHARGE OF OUR FAMILY AND RAISED EIGHT CHILDREN, THREE WERE DEAD AT AN EARLY AGE. CURRENTLY, I HAVE TWO

MR. H: (cont.) Brothers and two sisters, I am the oldest. They are all in China except the brother next to me and his family are in Taiwan. My mother is now living with my younger sister in Lanhou, Gansu, China. Who is a 99 year old.
I graduated from a Northwest University in China and came to the United States for advanced education sponsored by the Nationalist Government in 1948. It was a slow journey by boat, 22 days from Shanghai through Hong-kong & MANILA to San Fransisco, it was a certainly a slow boat to United States. ☺ (There's a saying - a slow boat to china)
I currently married. My wife's name is Joy. We have three children. Their names are Dennis, Tim, and Lisa. They all graduated from Ishpeming HIGHSCHOOL, HAD THEIR COLLEGE Education at the University of Michigan and Married. Any else you like to know?

ME: Yeah, do you visit your relatives in China?

Mr. H: YES

ME: On a regular basis?

Mr H: Oh, no. Just occasional, couple years ago, Oh, last

Mr H: (cont.) year I was there. I been there about 3, 4 times already.

ME: DO you have any nieces or nephews or anything?

Mr H: yes, since I have sisters, brothers still in China, yes, I ——?

ME: How long have you been working in the iron industry?

MR H: ah, almost 30 years and 7½ months.

ME: ~~HOW~~ WHY ~~long~~ DID ~~have~~ you ~~been~~ choose ~~working~~ to work in the iron industry?

Mr. H: ~~ah, almost 30 years and 7½ months~~ AS IT WAS

Because I was a major in Geology. My field was Economic Geology and I was very much interested in studying ore deposits. Iron ore is a part of my field.

If you ask why I came to U.P. I was a graduate student at the University of Minnesota in 1952. at that time, my financial support was totally cutoff by the Chinese Communist Government. I could not get any financial aid as the other Science students did from the U.S.

Mr. H (cont.) State Department. It was because that the person who in charge of the program insisted that Geology is not a science. So I accepted a summer job from Mr. Burt Boyum, at that time he was assistant Chief Geologist of the Cleveland Cliffs, throug the reccomendation of my supervisor, professor G.M. Schwartz. I was asked back as the permanent employee at the end of that summer, so I did.

ME: what are the names of the various buildings that you've worked in?

Mr H: ~~At~~ I ~~B~~een at work in any other building except research Laboratory

ME: over the years, what kinds of duties have you performed for CCI?

Mr H: Before I tell you my duty at the research lab of CCI, I would like you to know two things related to my duty. One is the iron ore itself. And the other is the organization of the research laboratory. The iron ore varies widely in texture, composition, quantity of ore minerals and other physical and chemical properties. Consequently, it behaves differently under the same processing

Mr H: (cont.) conditions. Each of the mine have different ore types. Consequently, we have the plant often has operating problems due to such variations. Secondly, the research laboratory consists of mineralogical section, flotation section, chemical department Agglomeration group, and an instrumentation division. We work together as a team. Each of the plant at the Marquette range was through many, many years of research and a tested by us, so that we can have our Empire, Tilden, Republic, Humbold, so forth, in operation. As to my duty, I was in charge of the mineralogical section, My duty involves the following: 1) the routine work. Such as, the evalution of crude ores from different land-offers, and out side explorations. The evaluation of individual projects, such as Humbold, Republic, Empire, Tilden, and so forth. To study the efficiency of the concentration process by examing the concentrator products. To study the effect of textural and mineralogical transformation of pellets during the pelletizing process on the quality of final product. Secondly is unroutine work.

all important

Mr H:(cont.) The unroutine work covers the investigation of plant operating and product quality problems. In this connection, each problem involves what? why? and How? The plant operators recognize the problem, such as a poor ____? on ore mineral separation this they find the problem so the what. My duty is to identify the cause of the problem, such as due to the presence of interferencing mineral in the ore. The Metallurgist's responsibility is to discover a reagent to reject the montimorillonite without the loss of iron mineral to the tailings. So far, the cause of most of the problems had occured at the plants have been identified. I found that some can not be solved because of the intimate association of minerals, such as TiO_2 or part of the ____ in some of the ore minerals. Some are very difficult to solve economically because of the ultrafined ore mineral texture, mostly finer than five microns. Still some are currently not solved because of the mineral physical and chemical properties which needed to be changed or destroyed.

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ask Mr. Kruger to help write terms

quote scientific data

ME: Did this job require any special training or higher education, if so could you please describe it?

MRH: Um, yes. "The job which I held needs require special training or higher education. I, myself had four years in college and four years in postgraduate studies at the University of Cincinnati and University of Minnesota. I still feel that I have a lot to learn in the field of mineralogy and metallurgy." quite

ME: Please describe any special machinery or equipment that you used on the job.

MRH: yes, the equipment used on my job were ___ ___ as follows: 1) for mineral identification we have to use x-ray differation, electron microscope, differential thermal analysis, and light microscopes. For determine the physical and thermal properties of minerals and pellets, we need high temperature furnaces, differential thermal analysis, generally referred as DTA, thermal Gravimetrical analysis, generally refferred as TGA. Third, for minerals and their textural relationships, all most

mr H: (cont.) you need a light microscope. In order to identify the ore minerals we use reflect light & identify the _____ minerals we use a transmitted light. In addition to the microscope, the size analysis is also required. We do not have the electron microscope. However, we have sent samples to Michigan Technological University, University of Michigan and Standford University for the electromicroscopical work.

me: What was, or is the most challenging or difficult part of you job?

mr H: Every unroutine job or project which I recieved was challenging. It is my experience that any problem can not be solved were all landed on my shoulder. Hence, the most difficult part of my job was to create ideas toward the investigation of the problem. My most challenging duty was to find the cause of the poor separation between the ore minerals and the waste occurring at Tilden during the 1970's. It was a very serious problem which had caused panic throughout the CCI management. By my investigation, I found that the cause of the poor metallurgical separation was due to the presence of small amounts of montimorillonitic clay in one part of the ore body. This clay is not visible to the naked eye. However, it can be detected by a method which I invented,

mrH: (cont.) so-called "shake test" and chemical analysis for MgO which I suggested. This part of the ore body currently remains unmined. Research work is definitely needed for processing this ore.

me: Over the years, what did you enjoy most about your job?

mrH: My job title was senior research scientist. I enjoyed my independant research on different mineralogical problems and products. "Curiosity was and still is the driving force for me to conduct my research."

me: What are the biggest responsibilites on your job?

mrH: My biggest responsibility was how to improve the physical and chemical quality of the final pellet product, and how to find the cause of metallurgical problems, occasionally occurred at the plant through visual and microscopic examination and try to search for a solution on the basis of reasonable sound interpretations. I think, nowadays, people trust and emphasize the numbers too much and overlook the observation and examination. In order to know the cause of the problem, you should to examine the products just like doctor want to know the patient's discomfort, he has to know the chemistry of the blood.

JOB RESPONSIBILITIES

me: Could you describe to me the most unique or perhaps humorous situations you could've seen over the years?

mrH: I am not a storyteller and also have a short memory, except one of humorous situations which I still remember. There was a group of HIGH SCHOOL students visiting the research lab. Our chief Technician demonstrated a mineral separation process by heavy liquid. He used a piece of quartz as waste and a piece of Republic Ore as ore. The quartz has a specific gravity of 2.65, which was suppost to be a float product on the surface of the heavy liquid, where the Republic Ore was suppost to be a sink product, which should have lied on the bottom of container. Unfortunately the gravity of the heavy liquid was lighter than the quartz, so both the quartz and the ore were sink in the bottom, you can imagine the situation was at that time.

me: During your career were you involved in any special projects or have you implemented any new programs?

mrH: yes, I was a member of three attended confidential project to Canada for evaluating an ore deposit and to decide whether it was favorable for CCI to manage it and Dofasco to own it. The mission was quick and covered a large area within two days including travel, and we had a many interesting stories to tell but not here.

me: Have you ever won any awards or have you been recognized in any way for your job performance?

mr H: yes, the awards which I won were resulted from the length of my service, such as watch, diamond pin, so forth. There were nothing proud of. However, I did gain my colleges respect and management recognition in my job performance.

me: At any time have you felt like changing jobs or careers?

mr H: no. It was because I am very much interested in my job. I like the nature of my work, and the people who I was working with.

me: Can you describe in complete detail the day you found the oldest fossils on earth?

mr H: Well, the fossils ake found at Empire mine was in 1990. And this was beginning with in 1974 I was working with doctor ___ from the United States geological survey and I tried to ___ a professional paper, at that time I found a piece of rock which consists of the fossil liking material. But, I did not believe that was a fossil because it was the iron formation too early for any reavings things. However, in 1984 Mr. Bob Burklin was fifth super intendant at Empire he found a piece of rock which consists of ___ material.

Mr H (cont) and he gave it to Mr. _____. And a which knows and I, and I was very much interested to study this kind of geological features. So after I look at I said, boy these things are found in 1974, was a fossil. From there on I concentrate to look for this material in place. Therefore everytime I go into the pit, in addition to my regular work I always on this material. So in 1990, in the fall, on Saturday about 1:30 I was tired when I went back from the pits I found a light area on the eastern wall so I stopped the truck and I went in there to examine it. And I found where the fossil is located.

Me: Um, does the fossil have a paticcular name?

Mr H: yes, the fossil, you see this fossil has been reported from Montana, China, and India, but this fossil was much older. The other fossil was about 700 million years ~~to~~ 1,000 million years younger than the fossil we have found at the Empire. The fossil we called the Krypania that the name is kind of a algae, so that's the fossil's name so far.

Me: How old is the fossil?

Mr H: the fossil, through the identification of the ore formation how old the ore formation at the empire and in Minnesota and in the Lake Superior district asked me about 2.1 billion years old. Wow. Gunte

Me: What do you think the future will hold for the tilden and Empire?

Mr H: I think both Tilden and Empire have their own problems.

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mr H: (cont.) Empire will face the beneficiation of the more harder and fine-grained ore types. Higher cost for treating this ore is expected. Tilden has wide variations of ore types. Extensive research is definitely needed for processing some of these ore types. They may become a waste if no research work is undertaken. In short, I believe that both the Tilden and the Empire will continue in operation for many years to come. However, the operating cost will increase despite of the atQP program is now in actron. include

me: what does the future look like for the Iron and steel Industry in general?

mr H: I am a technical person and know very little about steel making. I am not in position to forecast the future of the iron and steel industry. However, we do know that the iron ore and steel industry is not as good as it used to be, since the steel has partially replaced by other material for making cars and building constructions. leave out

me: What do you feel must be done in the future for CCI to remain competitive? order for

mr H: Well, CCI is the manager of different mines owned by CCI and many steel companies. Therefore, mostly of the product produced is directly shipped to these respective companies. However, the product shipped must meet the chemical and physical quality requirements that these companies demand. Hence, in order to satisfy the customer's demand, high technology research must be constantly conduct at the research laboratory, such as the evaluation of the physical quality of pellets by tumple and compression, and the chemical and physical quality under the reducing conditions by

Mr H: (cont.) testing at different reducing environments, such as low temperature breakdown, reducibility, high temperature melting, and so forth. In short, the technology for steelmaking advances. The quality of the raw material applied by CCI has to be improved through research accordingly. Pellets could be replaced by metallic iron produced by a direct reduction process in the near future.

ME: What do you think has been the key to the success of CCI where other companies have failed?

Mr H: It seems to me that the success of CCI is attributed to the following: 1) CCI is the only iron ore merchant where the others are mostly owned by steel companies. Secondly, CCI is not only a partial owner but also a manager of the operating mines. Three, CCI has had a strong management and a group of technical staff dedicate to the iron ore mining. Four, CCI owns a lot of ore reserves in the Marquette district.

ME: looking far into the future how do you think history will remember the Cleveland Cliffs Iron ore Company and its workers?

Mr H: I think that people in the area will remember that CCI and it's workers well in the development of the local economy and one of the large contributors to the U.S. steel industry.

ME: what skills do the young people of today need to develop if they plan to work for CCI someday?

Mr H: It seems to me that skills should be achieved through careful learning and constant practice during job training. In school, they should learn the basics and fundamentals which you are interested in.

me: In a related question, what advice could you give to the students of today?

mr H: as a student, I would suggest that you should understand the principle of your learning, the fundamentals, and you should try your best ability to achieve an advanced degree in education. So that you may work with your head instead your hands. You should not center on your own interest but you have to think about your future's job and income, so forth. And try to, regardless what company you work with you try to get along with people that's the most important of all. As a profession, if you are a profession now, in order to accomplish your project you should follow three steps. One, your observation, two interpretation, and three, you search for solution. And for instance, if you wanted to work in the iron ore industry you should eventually ____ ____ of the industry you are interested in. Just like you want to build a car, you should know how wide the highway outside is. In order to get ahead of your profession I have such suggestions: you should try to create opportunities rather than wait for looking for opportunity, that's all.

me: Can you describe what you enjoy doing in your spare time?

mr H: Well, I spend my spare time in the following order. one, my own research projects, such as investigating the origin of iron ore deposits throughout the world, the mode occurance of the 2.1 billion years old fossil at Empire, and other technical papers writing for publication, so forth

mr H: (cont.) second, Company's related projects, such as reporting, data interpretation. I am retired at the present but I still continue do some work for the company, and do some research for myself. Third, I watch T.V. News and Sports. Such as the sport like Green Bay Packers, Detroit Tigers, Detroit Pistons, and the University of Michigan basketballs and football. Fourth, I visited my children and friends as well as relatives. Fifth, I like do fishing, but rarely have time do so.

me: If you had to do it all over again, would you make the same career choice?

mr H: Well, I think no. When I took my college entrance examination, my first choice was medical school and my second choice was chemistry, but I was only qualified for geology. _____ the examination. At that time, I didn't even know what geology was. My field was, my basic training in economic geology I still prefer field with rocks and minerals rather than patients because a rock and minerals don't have any feeling, where patient hurts when you put a needle on him.

me: Looking back over the years, what impressions stand out most in your mind concerning your association with CCI?

mr H: My association with CCI is a good one and an unusual one. I worked at the research Lab for almost fourty years, there were seven administration changes.

mr H: (cont.) In other words, seven Chief metallurgists, I feel that the management and collegues treated me as a friend and a guest though I am a regular employee and a co-worker there.

me: Can you describe the journey from China to the americas? What was it like for you?

mr H: I had just briefly told you in advance. It was a right, just shortly before the communist take over. and my father took care of all the passport, the other things, when I was working. At that time I just graduated from a University. And he took me to Shanghai, and he watch me when I take the boat, the boat name was General Gordon. First day we toot along the China coast to Hong Kong. We stay there about one day. Then we our journey to Manila and stay there for another day. And from Manila, direct sailing to San Fransisco. Totally take about 27days in the ocean. And that was in the wintertime, in December. The waves just high like a mountains, boat just a rocking the suitcases from one side of boat to the other side. Anyway, after we get to San Fransisco, I had a language trouble. And I didn't know how to order food or anything else so while my ____. So we use our finger talking for ourselves. Just go to way to Cafeteria, point, finger point.

mrH: (cont.) I want this, I want that. So mainly from San Fransisco, went throug Los Angeles to Missourri, ____ Missourri, that's where my friend, his school was, University of Missourri. Then I continued to travel by myself to the university on Cincinnatti, Ohio. I didn't know anyone, and I had a language trouble. Fortunately, I find a Chinese on Campus I asked him. He was very nice. He took me to his room, Say what, nobody stay with us, you know. Next stop is, I have to go to the geology department to report the head of geology that I'm here. So then I have to take this friend of mine as an interpreter, it was a surprise, but anyway I got there, finally we take some examinations cause the head of department thought I have some language troubles, but in a technical side, geology side I know pretty well so, I was qualified for ____ graduate school. That's it.

me: What was life like for you and your family when you lived in China?

mrH: Well, you see here, I was an United States regular for two years when I go back to China. Then the communism take over. So, I almost become a prisoner of the United States. The U.S. government didn't let us get out either to Mexico, or to Canada. So, we had to stay within the United States. And meantime in China, we had lost complete connection between

mr H: (cont.) my family and myself. So, almost thirty some years, no not thirty years, Oh, from 1980, from 1950, 1948 to 1980 we just totally lost connection. So after Korea war, I think United States and Korea, the dealing with prisoners. So now Korea return to China the American airlines(?) of America return the Chinese students. But the United States said that, write us a letter, told us that at your own choice if you want to stay you can stay & if you wanta go back to China, you can go back to China. That time, I just get married and have a first child so I decided to stay. See, in 1980 I went back for meeting. At the first meeting that China hold, held in Bejing, Uh no in _____. And ah we, they treated us as guests all the interneational people, all get together in Japan airport, Nureta airport so the Chinese Goverment send their airplane to pick us up without through the customs. So we have meeting. Nice _____ in Beijing and meeting in _____. Which is aresort area that Nixon first time ~~visited~~ visited to China he was there meeting with the chinese government officials. So then for some reason, I think a friend of mine got connection with my family so after we reach the guesthouse someone come to visit, said Who could that be? I came out, I see a white guy and one lady. They introduce themselves, said oh, I'm your sister. Here is your sister. Well, (19)

mr H: (cont.) when I left them they just ababy, now they are married, they have their families. So how can I recognize them. Anyway, you have a good visit, then I know, from there I know where my mother is, who are living, who are dead, and so forth.

ME: Is it hard for you to live all that time without your family?

mr H: what you can do about it? So then they all right after the meeting, I know where my mother is, And I found my father passed away. My uncles passed away. My aunts all remarried and my own brother and sisters are still alive. So that's the happy part of my reunion.

ME: About how old were you when you left?

mr H: I think I was just about 22 or SOMETHING, oh 25, I forgot the exact.

ME: would you say the finding of the oldest fossil, was that one of your most successful research projects, er?

mr H: No. because as you know, I am not a palentologist, which is an emphasis on the early life, and so forth. I'm an ___ mineralologist and a geologist. My important study is the origin of the iron ore of magnitite. Through

mr H: (cont.) the world which including Canada, Africa, Australia, so forth. I believe the precean observed and interpreted that these magnatites from Minnesota, Labradore, Canada all originally was hematite before. ~~These~~ this the one I'm proud of. not of the fossil. Most of the people, they are interested in, but the new one interest — the magnatite, but ah, your original magnatite.

ms: all right. Thank you very much.

mr. H: yeah, you're welcome.

Ww - what an interview - Can be a tremendus story!

TOPICS

EARLY LIFE BLUE
TYPES OF INSTRUMENTS USED GREEN
WHAT HIS JOB IS & ITS IMPORTANCE - PURPLE
THE FOSSILS HE DISCOVERED & OUTSTANDINGS PERFORMANCE
ORANGE
EDUCATION-RED
FUTURE OF MINES - ~~ORANGE~~ YELLOW
last
FOR STUDENTS - BROWN last
TRIPS PARE TIME - BLACK
last