REFLECTIONS IN STONE TOOLS: A LIFE STORY OF DON E. CRABTREE

A Thesis

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by

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ABSTRACT

Dr. Don E. Crabtree, as one of the pioneers of academic flintknapping, developed an experimental approach in lithic studies during 1960s and 1970s. His diverse replication studies left a great impact on the field of archaeology not only in the Pacific Northwest, but also throughout the United States, Canada, and other countries. His story outside of publications, however, has been known by a very few people. Since his life had always been intertwined with academic flintknapping, learning his life stories allows us to better understand the importance and potential of experimental approach in archaeology. With his numerous professional and personal data collection at the Alfred W. Bowers Laboratory of Anthropology, this paper revisits the life of Crabtree and explores the contributions and influences he left in the field. It intends to help lithic students and scholars appreciate what Crabtree and his hands-on method really mean to us.

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I would like to recognize Mr. David Quinn, my flintknapping instructor and mentor, for his support. I cannot thank you enough for your encouragement as well as bringing me

numerous articles and books to look at for this project. His passion for hands-on experience and teaching lithic students is a treasure to the University of Idaho Department of Sociology and Anthropology.

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DEDICATION

This work is dedicated to my sincere and loving husband, fellow graduate student, best friend, and knapping pal, Bryce Danner. This work literally would not exist if he had not invited me to the U of I Lithic Technology class. I am grateful for your talent for giving me silly nicknames, which always kept me smiling even during the last chaotic days of graduate school.

To my amazing father, Norihiko Yamasaki, for giving me so many wonderful opportunities of learning. He has been my role model for my entire life. His love and support are beyond measure that even when he was diagnosed with kidney and later brain and lung cancer, he kept telling me, “Your top priority must be your education and the baby in your womb.” You are forever loved and respected. Now, let’s focus on your health. Get well soon!

Finally, to Mer, my exotic longhair feline sister, for unwillingly flying from Japan to Idaho with me. She always knows when to give me snuggles; she just doesn’t usually choose the best time to do so. You always make my day fur-ntastic!

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CHAPTER 1: INTRODUCTION

Throughout his life, Dr. Donald Eugene Crabtree, famously known as Don E. Crabtree, lived out his childhood passion (Figure 1.1). Today, his legend as one of the pioneers of academic flintknapping is well-known among archaeologists and flintknappers. However, his life outside publications and official appearances at schools and conferences has been kept rather private. As an archaeology student, I believe that to know a method, we need to understand the background of its mechanism. In this case, we must understand who

Figure 1.1: Don E. Crabtree. (Courtesy Alfred W. Bowers Laboratory of Anthropology)

pioneered its idea, how it was developed, and how it works, before we become truly capable of appreciating the method.

First, we need to understand how he became who he was. It can be learned from bibliographical notes and articles archived at the Alfred W. Bowers Laboratory of Anthropology (AWBLA). Then, we should learn what he did in the field. This might come first to those who have been interested in the lithic technology since some of Crabtree's publications are considered as gateways to the field of study. Finally, we must walk through his path just as he did to understand ancient technology. Consequently, this work consists of a scholarly journal collection, biographical information, and interviews with his friends and students. In addition, my own experimental study, which was conducted in order to *feel* the importance of hands-on approach, is introduced in Appendix D.

Although I learned anthropology during my undergraduate studies at Eastern New Mexico University (ENMU) in Portales, New Mexico, which is right next to the famous Blackwater Draw Clovis site, my focus then was not archaeology nor was I fascinated by stone tools (even though my professor, Dr. David Kilby, showed the class casts of Clovis and Folsom points numerous times!). Until I attended the University of Idaho (U of I) in Moscow, Idaho, and my fellow graduate student (now my husband) invited me to Lithic Technology class (directed study course) held in a small basement room of Phinney Hall, I did not even think about the significance of stone tools other than they are very old. I was very fortunate to meet Mr. David Quinn (Dave), an assistant instructor of our Lithic Technology class, who showed unconditional encouragement toward lithic technology students.

I am still a novice flintknapper. On the first day of my flintknapping experience, I was given a piece of obsidian and a hammer stone. Dave is a man who patiently lets students experiment with stones until they find out a proper way by their own. It took a couple weeks until Dave finally let me use a pressure flaker when I figured out how the reduction process works. He taught me that it is important to understand how the whole process works through percussion flaking rather than recklessly trying out different tools and techniques. In a few months, I became generally successful in producing bifaces. After two years of experience, I now can say comfortably that I am capable of making projectile points with a specific plan of the final shape. However, my skill has not exceeded the level of flintknapping that my control on method and technique is not developed enough to conduct a replication study of lithic artifacts.

A few weeks after my very first semester at U of I started, Dr. Leah Evans-Janke and a fellow flintknapper, Dakota Wallen (working at AWBLA), let us Lithic Technology class students observe a part of their Crabtree Collection, and that resulted in the turning point in my graduate school life. The Crabtree Collection was just magnificent and flawless. Looking at such artifacts left me with two different impressions: fizzing encouragement and total defeat. It might be because of my Japanese heritage to react this way, but I felt the *spirit* of craftsmanship in those tools stimulating my passion toward flintknapping; at the same time, the appearance of the perfect stone tools made me feel ashamed, on some degree, that I, a novice flintknapper, saying "I have been flintknapping." Although what I did fell into the same category of flintknapping, the level of the outcome was very different. Indeed, at that point, I was just breaking rocks into hundreds of futile pieces. I cannot forget when Dakota told everyone that Don Crabtree was not perfect either showing us a nearly perfect biface

about 30 centimeters, which was broken into two pieces. In my head, (and I am sure in others' too) replied, "Yeah, you are right, but what about the process of making that divine biface in the first place?"

After that day, I started studying about Don Crabtree particularly because I was probably the only one in that room who had never heard of him. This short research fascinated me so much that I decided to change my thesis project. What fascinated me the most, however, was the mystery of Don Crabtree. If you search lithic studies, his name would appear either as an author or in references in almost any paper you look at. After reading his papers, scholars might think that they know Crabtree reasonably well. The most significant problem in understanding him, however, could be expressed in a simple question: who was Don Crabtree, really? Living in the field of archaeology, we hear fragments of Crabtree legends; however, we do not know his whole story. Who was he as a scholar, as a flint knapper, and simply, as a person? Dave and Dakota suggested I visit AWBLA to look at the Crabtree Collection, and I was convinced that understanding his life story is beneficial to future archaeology students and scholars.

Research Questions

Through this project reviewing his work as a scholar, walking through the untold and not widely shared stories of his life outside the professional world, listening to his friends and students, and experiencing the process of becoming an experimental archaeologist, I attempt to answer the following questions.

1. What brought Don E. Crabtree to become a flintworker?
2. How did he become a master flintworker?
3. What was he like outside the flintknapping world?

4. What was the most significant influence he left on the field of lithic studies?
5. What were his hopes for the future of academic flintknapping?

Chapter Overviews

Chapter 1 of this thesis provides the general background of this project. Chapter 2 touches the earliest memories of Don Crabtree becoming a novice flintknapper and growing into a semi-professional. It shows how his passion developed and how he taught himself flintknapping as a child. Chapter 3 discusses his life from the age 27 until he retired at age of 50. Chapter 4 addresses his life as a full-time flintknapper. It was when he finally started what he had been hoping to achieve in his career as a long-time experimenter. Chapter 5 presents the after-effects of "the Crabtree Period." It discusses the memories and living influences told by Crabtree's friends and students. Chapter 6 briefly goes over a selected list of published articles with a few inside stories behind the preparation of each work. Chapter 7 revisits the research questions and concludes this work. Appendix A shows a list of Crabtree's publications in chronological order. Appendix B is a list of Crabtree's field school students. Appendix C presents several sample questions I asked during a series of interviews. Appendix D concisely goes over my first experimental study. It provides my insights on hands-on approach and what students would acquire from experiments. Finally, Appendix E provides contact information of AWBLA for those who want further information about the Crabtree Collection.

CHAPTER 2: HOW HE BECAME A FLINTWORKER

A ten-year-old boy was having a particularly successful day hunting for arrowheads and Native American campsites. Usually, he is careful not to miss the setting sun since he would receive a harsh punishment from his father if he did not get home before dusk. However, the day flew by with deep concentration on the ground, and the sun was already setting when he finally looked up to check the time. He was in the heart of the Snake River Canyon. Immediately, he stopped his exploration and dashed home hoping he would make it back before dark, although he knew he would not if he took the usual route. Then, he decided to take a shortcut. He climbed up the giant metal structure, the Perrine Memorial Bridge (Figure 2.1), and barely made it home on time.

Figure 2.1: The Perrine Memorial Bridge in Twin Falls, Idaho. (Courtesy Idaho Tourism—visitidaho.org)

It was quite well-known among the neighbors how concerned Don's parents were about his behavior and how hard they spanked him as punishment. On that day, a neighbor was looking for him to make sure he got home safely before dusk, and he witnessed all the acrobatics on the bridge. Don would have received a severe punishment if the neighbor told his parents about it, but he did not. Indeed, he kept this secret from Don's parents until Don turned 21 (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1). This story depicts the tenacity of Don Crabtree. His life was full of adventure with obstacles.

Starting at age three, his enthusiasm never ran out, despite incessant punishments and failures. The following is a series of short stories from Crabtree's childhood to becoming a well-established flintknapper. His stories also show that there was always someone who admired and encouraged his yearning toward stone tools.

A Curious Boy in Salmon, Idaho

Donald Eugene Crabtree was born to Ellis E. and Mabel Morgan Crabtree as their second child on June 8, 1912, in Heyburn, Idaho. In 1915, the Crabtrees moved to Salmon, Idaho, due to Ellis' transfer. Don's father started working as a pastor at the Salmon Methodist Church and a postmaster for the town. At that time, the town still had a large population of Native Americans. When the young boy saw them making stone tools on the street, he was immediately fascinated by them. Don enjoyed hanging around them sitting flat on the sidewalk; he jumped over their legs and talked to them, which his mother did not approve as an advisable behavior and always scolded him for doing so. However, there was another person who continually fed Don's curiosity. Every time Don was asked to run an errand, his next-door neighbor gave him an arrowhead that her husband had collected as a reward. His artifact collection started at that time, and the young boy soon realized that

arrowheads come in so many different shapes and materials. Don's inquiring mind never stopped from that day until passing away on November 17, 1980.

Don learned from his neighbor that there are hundreds of stone tools waiting to be found around the desert and valley, so he started looking for artifacts around town whenever he found time between chores for the next few years. All those different stone tools made the young boy excited to find out more about the artifacts and Native Americans. He certainly asked those people who were sitting on the street making arrowheads, but, as Don remembers, the true art of stone working was long lost then. He did not give up studying though. At this early stage of life, he already started wondering how those tools were made and why there were different shapes and sizes. He experienced a few moves to Richfield and Filer, Idaho, due to his father's transfer, but it did not stop him from pursuing his treasure hunt for arrowheads (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

Desert Country and Snake River Canyon: Playgrounds

In 1918, Don's father became ill and gave up the ministry. The family then moved to Twin Falls. This desert country fed Don's needs for treasure hunting places very well. This six-year-old boy spent most of his time exploring the desert to find artifacts and Native American campsites. At this point, he had already learned that he could study artifacts a lot better from campsites where the Native Americans had crafted those tools. He was not only fascinated by arrowheads but also by flakes left on the ground from which he could imagine the process of making stone tools. As he later emphasizes in his studies, flake (debitage) analysis is a very important way to understand the early and intermediate process of stone working (Crabtree 1972:1). During these years, he collected hundreds of stone tools through his expeditions, but his desire to "understand" those tools and the people who made them

had not been satisfied yet (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

When he was eight, the family purchased a larger tract of land within Twin Falls and moved right next to the Snake River Canyon. It also happened to be a great place to hunt arrowheads. The canyon had many campsites and caves that had been occupied by the Native Americans, and Don's collection of stone tools grew bigger and bigger. Then his study reached a new level. He first encountered raw materials of those tools when the road in front of his house was graveled. Don found damaged artifacts among the gravel, and the pile of gravel contained small pieces of obsidian. He collected the obsidian pieces and started self-teaching flintknapping with them at age 10. The initial attempts were full of failures and little success. Nonetheless, it made him explore the canyon even more frequently than ever, and those trips caught his father's attention (Robert W. Dana, biographical draft, AWBLA, Ce.24.5.21).

Hundred Dollars or Stone Tools

Don's passion for Native American tools was not well received by his parents. Ellis, his father, was concerned about how often Don was away from home, breaking the rules by not coming home by dusk, making cuts on his hands, and having blood-stains on his clothes. His father tried to correct his son by spanking. It obviously did not work very well. After many attempts to *cure* Don's behavior, his father decided to persuade Don not to go around the canyon collecting stone tools anymore in exchange of a bait of one hundred dollars. Don was 10 years old, and he wanted a bicycle and gun desperately. His parents raised him to have a good heart, so he did not just receive the money and continue his expedition secretly. Rather, he took a while to consider this offer, yet the passion for the artifacts exceeded the

desire for a bicycle and gun. Don honestly explained to his father that he would not give up studying arrowheads and refused to take the money (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

The Beginning of a Little Flintknapper

By 1922, he had been practicing stone working for two years. However, Don did not have a great success with his attempts at reproducing artifacts. He did have a little success with flaked tools, but he knew that they were imitations, not duplications. Not being around the people who could teach him how to knap, Don had to figure it out by himself. He later thought back on those days as reliving the struggles of the ancient people, and he cherished those memories (Sunday Penson, biographical draft, 13 May 1979, AWBLA, Ce.24.8.1.1-2). The fact that a pre-teen boy did not give up the practice without much success accompanied with numerous cuts and punishments is impressive enough, but his imagination in working on stones deserves great praise.

At the age of 12, he started experimenting with heat treatment of raw materials after hundreds of knapping experiences that showed poor results. Don later said that the decision to try thermal modification was not based on two years of studying arrowheads or scholarship of any kind. Indeed, he could not explain why he tried it. He tried the heat treatment with agates and jasper and after a few trials, found a great difference in his knapping result. His first experiment started in the ground figuring out "the native way." Then, his focus shifted to temperature and time. That was when he brought his experiments home. Don figured that he would be able to control those aspects better if he used his mother's kitchen. Therefore, he brought sand and rocks home, and filled cooking pans with them to experiment on heat alteration. In those days, his mother remembered finding her

kitchen covered with pans filled by sand and rocks and they were in her coal range as well. At this point, Don had already earned his mother's approval and encouragement toward his passion. She let him use her kitchen for his study and excused the flakes piling everywhere on the property, including their living room (just for rainy days). One day, she even found him boiling a deer head which Don had shot with his hand-made obsidian tools to experiment the penetration of arrows, and she still tolerated the bizarre incidents that resulted from Don's practices.

With his mother's permission, Don was able to practice flintknapping literally rain or shine. After dinner, Don often brought an old blanket out in front of their fireplace and practiced flintknapping. Naturally, fine flakes were left behind wherever he was. His father often found those flakes in his socks to his discomfort (Phillip H. Shelley, interview, 16 October 2017). If one has experienced stepping on those sharp flakes before, he/she would understand how terrible it is. No wonder his father wanted to stop Don's practice so desperately. Through his continued expedition, flintknapping, and experiments, Don started developing further interests in geology, paleontology, and archaeology (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1; Silvia McLaren, Flintknapper-Extraordinary, AWBLA, Ce.17.3.4).

The Path of a Well-Established High School Flintknapper

For the next five years, Don continued reproducing artifacts and experiments. By his continued effort, he reached a sophisticated level of stone working and became a locally well-known amateur archaeologist and paleontologist by the time he was in high school. The school, of course, took up an increasing amount of his daily free-time compared to his childhood, but his flintknapping practices and experiments made him a more efficient

scholar. He was no longer working on figuring out how to flake stones. Rather, his focal point moved on to how to create better replicas of artifacts (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

He was even invited to speak about and give a demonstration of flintknapping at the noon luncheon meeting of the Kiwanis Club. His performance fascinated the audience, and this event further contributed to developing his reputation as a flintknapper. It seemed like the upcoming journey was going on to a college to further developing his knowledge and technique. However, his life as a flintknapper and his dream had to take a break after graduating high school. His father was running a pickling company, called Twin Falls Pickle Company, and the Great Depression severely struck his business, which resulted in Don working for his father (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

Outside the flintknapping life, young Crabtree had been cultivating another talent: shooting. Although he missed a chance to get a gun when he was 10 years old, he eventually bought it and soon got a handle on it. As the story of him shooting a deer head with his hand-made arrow suggests, his aim was already good, so he became a prominent rifleman. While helping his father at the pickling company, Don was also enrolled as a member of the National Guard. He had a chance to compete with riflemen from across Idaho, and he won the second prize. Then he was sent to the National Rifle Matches at Camp Perry in Ohio and ranked 17th place (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

Although the working schedule was not as flexible as that of a student, he managed to continue knapping as well. His skill had been considerably improving, and he extended the area of exploration from the deserts and Snake River Canyon to the Chamberlain Basin and the Stanley River country. The larger area of artifact search allowed him to learn a wider

variety of stone tools and debitage. At this point, Don concentrated on reproducing not only the similarly shaped artifacts but also flake scars of the tools (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

Despite the fact that he was required to support his family business during the Great Depression, he had not given up on higher education yet. Don also has been corresponding with universities and museums across the country. He kept himself busy working three different occupations: a pickling company worker, a National Guardsman, and an amateur archaeologist/paleontologist. After meeting with some curators of museums and zoos in Chicago and New York, Don worked for them as a fossil collector and animal captor. He sometimes worked as a research assistant to Richard P. Irwin of the Idaho State Museum in Boise and to C.P. Singleton for the Smithsonian Institution and Amherst University projects. Although his academic life did not come right after high school graduation, Don kept himself as close to archaeology and paleontology as possible, dreaming of the day he would go to a college and learn more about geology, paleontology, and archaeology (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

When he turned 22, his life in academia finally started moving forward. Don had been saving money to go to college since he graduated from high school, and decided to go to Long Beach Junior College in Long Beach, California, beginning his formal education in archaeology. His savings were not enough to cover the expense, so he started a part-time job at the Lang Transportation Company. His college life, however, had to end at the end of his freshman year. Due to a severe throat infection, he had to take care of his hospital bills, which made it impossible to continue his education. He decided to go back to Twin Falls and

work for the Idaho Power Company, where he was engaged in constructing hydro-electric power plants (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

A Case of an Excessive Interest

Although Don's education in archaeology was yet again interrupted, he did not stop knapping. His interest in archaeology added a new focus: Native American burial sites. This, of course, does not lead to a good story. One day, Don and a friend were hunting for Native American human remains in Hansen, Idaho. They found a site where a possible burial was located. When local Sheriff Prater and old frontiersman Charles S. Wolgamott found the two young men disturbing the burial site, Don and his friend had already dug up two complete skeletons. However, this burial site was not Native Americans' at all. It was, in fact, a pioneer period burial site. The visual deeply upset the officer and frontiersman, especially Wolgamott since the people buried there were his friends. Don and his friend could have been arrested for this incident; however, Wolgamott told them that he knew those people buried there and instead gave them a stern lesson about why it is wrong to hunt for and dig up human remains. Don and his friend regretted what they did to Wolgamott's friends. They ended up reburying the skeletons and promising not to hunt for or disturb any burial site again (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

Second Chance in Academia

In the mid-1930s, Crabtree was still in touch with scholars, and it led him to donate a collection of Paleo artifacts to the Los Angeles County Museum by the request of Dr. W. A. Bryan. His second chance in academia came to him quite soon. When he was 26 years old, he decided to go to San Francisco to find a job, and, fortunately, met Dr. Charles Camp and Dr. Ruben Stirton of the University of California at Berkeley, which resulted in Don

receiving a position at the Vertebrate and Invertebrate Laboratories at their university as a supervisor. He also worked as Stirton's assistant during summer field work in California and Nevada (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

While Crabtree worked at the University of California at Berkeley, he also met Dr. Alfred L. Kroeber and Dr. Edward Winslow Gifford, who were both professors of anthropology at that time. These scholars were very much impressed with Crabtree's flintknapping skill, and suggested he publish the result in the near future. Until then, Crabtree's stone tool manufacturing process was self-taught, and he had not met anyone who practiced the skill as intensely as he did. Therefore, Crabtree gained confidence when Kroeber, known for the study with Ishi, told him that Crabtree's techniques were exactly like those of indigenous people (Robert W. Dana, biographical draft, AWBLA, Ce.24.5.2.1). It was only one year of working in California, but Crabtree was eager to learn from those scholars as much as the time allowed. Before he became sick in the summer of 1939 and left the position, he met another well-established flintknapper, Joseph Barberi, through an introduction by Dr. Frederick W. Hodge at the Southwest Museum of the American Indian in Los Angeles. Crabtree compared stone working techniques with him, which was beneficial to his practices (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1; Silvia McLaren, Flintknapper-Extraordinary, AWBLA, Ce.17.3.4).

Steady Efforts Made an Artisan

Even though Crabtree had a talent for becoming a master stone worker, self-teaching the art of flintknapping did not happen overnight. Indeed, without any guidance, he took longer than the average flintknappers would take today. Perhaps his true yearning to understand the technology of stone tool production always kept him practicing the skill and

seeking opportunities. Crabtree faced numerous difficulties, yet never gave up his education. Even in his young age, his focus was more on the process than just the final products. It was why his curiosity was not satisfied by being a mere collector, but ascended to learn the manufacturing process and understanding flakes.

His life stories contain some behaviors that are now illegal or considered unethical. Collecting surface artifacts is now categorized as looting; it is a crime to disturb any archaeological site without an official permit; and any burial site must be left untouched and respected. The Antiquities Act, which prohibits excavations of antiquities from public lands without a permit, was passed in 1906 (King 2008:16). However, it was not as specific as the Archaeological Resources Protection Act passed in 1979, which prohibits disturbing archaeological sites (including collecting surface artifacts) on federal and Native American lands, or the Native American Graves Protection and Repatriation Act passed in 1990, which protects Native American burials and cultural items as well as initiates the repatriation of remains and such items to the rightful tribes (King 2008:23, 27). Before further restrictions were applied, the practice of collecting artifacts and excavating archaeological sites was a common activity for recreation. The ethical standard and processes of archaeological research have changed through time. Students, scholars, and public are discouraged to follow those behaviors today.

Although young Don's activities contain disturbing facts and shocking details, the most important lesson underlies all of those practices. The lessons from his younger days are clear and simple: 1) do not give up when you face a challenge because there should be a solution and 2) let your passion lead your way of learning a new technique. There were always people or events that tried to keep Don away from flintknapping and formal

archaeological training. For most people, it is nearly impossible these days to have more troubles and obstacles in our life than what Don Crabtree faced. However, his passion certainly brought him opportunities again and again to feed his educational needs, and everything he learned by then formed the foundation of his later academic career.

CHAPTER 3: AS AN AMATEUR-PROFESSIONAL

After his sudden health failure in 1939, Crabtree went back to Twin Falls, Idaho, to see his friend and doctor Dr. Harwood Stowe. He was diagnosed with cancer, and it was spreading fast. His condition required immediate hospitalization and surgery to remove the tumor. Concerned about the spread, Stowe suggested he get further treatment at a larger hospital in Boise, Idaho. There, Crabtree was given a full body X-ray, which was quite new and advanced technology at that time. However, his body, eroded by cancer, was unable to tolerate such an intense procedure. Even though the X-ray removed cancer from his body, the treatment made him rather ill. He was sent back to Twin Falls and hospitalized under the care of Stowe for recovery. For eight months, he lived in his sickbed without being able to properly eat or drink. At the end of this treatment, he weighed only 72 pounds. Stowe explained to Don's parents that there was nothing they could do but to pray. One time, he was even pronounced dead by an intern doctor and carried out with a cart. If Stowe had not coincidentally walked into this situation and immediately given him a direct heart injection, Don's life could have been ended (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

Don's mother asked the doctor if she could bring him her special home-made grape juice, understanding this could be the last opportunity to take care of her only son. Without any hope, Stowe let her do so, and Don took a sip. Although it was only a spoonful at a time, his body accepted the juice. His mother made and brought gallons of grape juice to Don, and it was not only keeping him alive, but also restoring his health. The man who was gradually dying from starvation a week earlier was now quickly recovering. In a month, he was able to eat and drink like he used to. With amazing speed, he regained his health and left the

hospital to go back to his parents' home. Crabtree still weighed only 80 pounds then and was unable to walk due to a phlebitis in his left leg; however, he left the hospital full of hope (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

After nine months of being bedridden and narrowly escaping death, he returned to his old hobby to help himself recover. Using a cane, Crabtree dragged himself to the barn and pressure flaked stones all day long. It helped him forget the pain and rest his body. He spent almost a year doing so, and he tremendously improved his pressure flaking technique. By the time his body was fully recovered, he could duplicate all the artifacts he knew *except* Folsom points (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1). His life would encounter another series of advancement and interruption. However, it was always flintknapping, which kept him motivated and helped him to move forward.

Getting Back to Work

Crabtree started working again in the spring of 1941. He was invited to perform a flintknapping demonstration at an annual meeting of the American Association of Museums in Columbus, Ohio. At the event, Crabtree was reunited with Gifford for the first time since he had left the position at the University of California at Berkeley due to his illness. Gifford was yet again impressed by the demonstration and encouraged him to continue working on it. Because of this meeting, Crabtree was employed by the Ohio State Museum's newly established Lithic Laboratory to duplicate many types of artifacts from the eastern United States. There, he worked with H. Holmes Ellis and Dr. Henry C. Shetrone, who were captivated by Crabtree's skill and encouraged him to keep records of his experiments for future publications (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

Although the employment lasted only several months due to the Lithic Laboratory being discontinued after the declaration of war in 1941, Crabtree received a number of opportunities to further develop his flintknapping skills. One was at the University of Pennsylvania, where he was requested to be an advisor in lithic studies. Crabtree, in association with Dr. Edgar B. Howard, studied the Clovis type sites and other Blackwater Draw (a site in Clovis, New Mexico) artifacts. When he visited the American Museum of Natural History in New York, he met Dr. N. V. Nelson. Then he was introduced to Dr. Frank H. H. Roberts of the Smithsonian Institution by Nelson. This encounter gave Crabtree an opportunity to study artifacts from the Lindenmeier Folsom site. These were the first *face-to-face* experiences Crabtree had with Clovis and Folsom artifacts. The closer look at the fluted projectile points helped him to experiment further and better. He finally succeeded in duplication, rather than imitation, of the techniques he had been fascinated by and obsessed with for a long time: Folsom and Clovis points (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1; Knudson 1982:337).

World War II

On December 11, 1941, the United States entered World War II, and it ended Crabtree's career at the Lithic Laboratory at Ohio State University. Although he was much healthier at that point, his record of cancer and phlebitis left Crabtree out from being enlisted in the military. As a result, Crabtree again moved to Long Beach to join the war effort. He became a coordinating engineer for the Bethlehem Steel Company, building ships for the Pacific effort. While in there, he met a local girl, Evelyn Josephine Meadows (Figure 3.1), who was a Southern California divisional manager for Investory Syndicate. They fell in

love, got married, built a house there in 1943, and continued working throughout the war (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1; Knudson 1982:337).

Figure 3.1: Evelyn Josephine Meadows. (Courtesy Alfred W. Bowers Laboratory of Anthropology, Ce.77.6)

World War II was not the only battle they fought together. Evelyn lost her lung due to tuberculosis when she was young, and she was also diagnosed with cancer in her later years. Don suffered a series of sicknesses and injuries throughout his life as well. Their health conditions were severe, but their relationship grew stronger as they supported each other (Knudson 1982:337). Dr. Ruthann Knudson (1982:337), Crabtree's student and friend, described that even though they did not have a child, they were blessed with *adopted* children, by which she meant Don's students whom always "flocked around" them like their family.

Another Beginning

When World War II was over, Evelyn and Don moved to Twin Falls and purchased a large family home from his parents in 1946. Since they needed a job, they managed the property as a motel. From this experience, they became real estate sales agents: Don as a salesperson and Evelyn as a financial manager. They became quite successful with the increasing post-war market (Knudson 1982:337-338). During those days, Don also worked at the Crown Manufacturing Company as a part-time jewelry repairperson. While at the job, the company owner Bob Summerfield was impressed by Don's work and sent him to a school in Salt Lake City to learn diamond setting and jewelry design. While finishing the course, he continued working at the company, and Don later became a manager. Having a few different jobs at a time, Crabtree could only conduct his studies at night, but newly learned techniques of diamond setting introduced him to different hand positions, and as a result, improved his flintknapping skills (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

When the Standard Oil Company purchased his property in 1953, Don and Evelyn purchased a small house in Kimberly, the country-side east of Twin Falls. After moving, they also decided to take a vacation that they had postponed for a long time. Evelyn and Don spent days upon days exploring, finding prehistoric campsites, working on flintknapping skills, and organizing notes from his past experiments (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1). Although Don had been working on flintknapping throughout the last decade they spent together, this vacation basically introduced the life of young Don to Evelyn. To be precise, "the life of young Don" in this sense was through Don's ideal point of view, as Don made sure to create flintknapping spaces at their new

home, including but not limited to a shop, yard, and of course, in their living room (Figure 3.2).

Figure 3.2: House guests: Dr. François Bordes on the left and an unidentifiable person in the center, working on flintknapping in the living room while Evelyn watches them at Crabtree's in Kimberly, Idaho, in 1967. (Courtesy Alfred W. Bowers Laboratory of Anthropology)

Quarry Visits

Another childhood tradition that he shared and expanded with Evelyn was to visit a number of prehistoric quarries. Although Don later found good friends who sent or brought him tons of raw materials and merchants who sold various stones at reasonable prices, he very much enjoyed visiting those places and finding quality material by himself. One of the famous places he repeatedly visited was Glass Buttes in central Oregon (Figure 3.3, 3.4).

Figure 3.3: Glass Buttes—entrance. (Picture taken by author)

It has always been a popular place among flintknappers to obtain different colored obsidian. As shown in the pictures below, the area has deeply rutted roads with desert bushes in the middle and around. There are piles of exposed obsidians with test flaking scars lying on the ground, which show us how many people have visited this place.

Crabtree later shot a film on quarrying here. As discussed in his film and earlier publications, quarrying is hard work. One needs to not only dig up or discover loads of stones without damaging them, but it also requires identifying better quality pieces among the pile. However, Crabtree never neglected exploring and trying new spots. With his effort, he often found a new site with joy. As shown in his letter to James Ayres of the University of Arizona, Crabtree shared the quarry information with his friends.

Figure 3.4: Glass Buttes—inside car route and a bushy hill. (Picture taken by author)

> We just returned from ten days in Oregon—Glass Butte to gather obsidian and preform (sic). Was lucky this time and located the original quarry site and it is all red obsidian. Those boys (prehistoric flintknappers) were really masters at percussion but found no sign of pressure work [24 September 1969, AWBLA, Ce.1.2.78].

Putting Down Their Roots in Idaho

Don started another career in 1954 when he got a job at the Agricultural Stabilization and Conservation Service (ASCS) of the U.S. Department of Agriculture. His job was to

interpret aerial photos for estimating soil conservation issues (Knudson 1982:338). Because of this occupation, he became quite knowledgeable about local plants and animals (Jim Woods, interview, 16 Augusts 2017). Crabtree later became a county supervisor for Twin Falls County. In his spare time, he continued practicing flintknapping, jewelry designing, smith working, and bead working (all of which he made his hobby from past experiences and occupations). When the time allowed, he also went on private expeditions to investigate the prehistory of Southern Idaho. Crabtree never neglected to read archaeological publications to catch up with recent finds and studies, and occasionally he received opportunities for flintknapping demonstrations at local schools and youth group meetings (Knudson 1982:338).

In 1958, Don and Evelyn spent two months in Mexico trying to learn Mayan flaked blade techniques and polyhedral cores that had been fascinating Don for a while. This trip got him quite interested into Mesoamerican artworks and he later reproduced Mayan engravings as a crafting hobby (AWBLA, Ce.77.4). In the same year, Crabtree met Dr. Earl H. Swanson of Idaho State University in Pocatello, Idaho. Swanson had just started a major archaeological program in Idaho with a hope to establish a new educational program to better understand the prehistory of that region. Soon Swanson heard of a man who was proficient at flintknapping and quite famous for his artifact collection from locals, and he decided to introduce himself to Crabtree. This encounter later changed both of their careers: Crabtree received numerous opportunities to publish his experiments thanks to Swanson's support and talent for fundraising while Swanson gained a strong support for his newly established Idaho prehistoric archaeology program (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1; Knudson 1982:337; Johnson 1978:351).

Don went back to Mexico the next year and attended the Congress of Archaeologists in Mexico City with Swanson's help. In 1961, Don and Evelyn stayed in Mexico again for a month. While visiting Uxmal, Chitzen-Itza, Cozumel and the Pyramid of the Sun during this sojourn, they also collected specimens of polyhedral cores for further study. Because of these trips studying and collecting specimens, Don was able to duplicate the Mayan flaked blades and polyhedral cores (Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

Sudden Retirement

When the First Conference for Western Archaeologists on Problems of Point Typology was held in Pocatello in early 1962, Swanson, Dr. Alex D. Krieger, and Dr. Richard D. Daugherty suggested that Crabtree demonstrate his stone working skill at the event. This opportunity gave birth to a newly established nationally-known figure, Don Crabtree: a master flintknapper from Idaho (Knudson 1982: 338, Jim Woods, obituary, AWBLA, Ce.24.11.1.1). Moreover, it strengthened the bond between Swanson and Crabtree, as Swanson wrote,

> I did want to say especially how much I appreciated your coming down to take part in the conference, and what an important part you played in making it a success. I think that the tone and temper of the whole program was set by your excellent talk and by your demonstration of the techniques of manufacture. All of this was of consequence in attempting to work out typology. All too often, much of American Archaeology (sic) has been working with typology as if it were matter of simple geometric form. Both Bob (B. Robert Butler of the Idaho

> State University) and I were convinced that you could do much to set the conference on the right track and in our judgment, you certainly did [to D. E. Crabtree, letter, 26 March 1962, AWBLA, Ce.10.3.3].

Their correspondence became more frequent after this event, and Swanson already started planning Crabtree's next appearance at another conference a few months later (E. H. Swanson to D. E. Crabtree, letter, 29 May 1962, AWBLA, Ce.10.3.4).

On Memorial Day of 1962, Don, Evelyn, and their friend were collecting flintworking materials at a prehistoric quarry outside of Arco, Idaho. Without warning, Don was stricken by a heart attack. They immediately drove to the closest hospital in Arco, but it was 22 miles away from the quarry. Don was quickly treated with oxygen and medication, and his life was saved again; however, his heart suffered permanent damage (coronary occlusion) due to the lack of oxygen caused by the long drive. He was then hospitalized for four months, but the condition could not be fully cured. Don still tried to go back to work after he was released from the hospital, but was unable to continue. As a result, he retired from the ASCS on disability at the age of 50. Swanson and Butler paid a visit to Don right after he came home. Crabtree kept up to date on archaeological studies by reading journals even in his poor health. Moreover, he often had discussions over recently published articles with Swanson and Butler while on his sickbed and recovery at home (E. H. Swanson and D. E. Crabtree, correspondence, 7 to 26 December 1962, AWBLA, Ce.10.3.7-10.3.9.1).

One Career Ends and Another Starts

Crabtree's life stories from this chapter remind us of the importance of face-to-face and hands-on opportunities. Even with his extra enthusiastic attitude towards lithics, some artifacts required more than just time to properly understand their techniques. Crabtree was not able to replicate Folsom and Clovis point and Mayan blade-core techniques without looking at the actual artifacts regardless of years of attempts at duplication.

Throughout his life, Don went back to his life-time hobby every time he found himself on his down side. Indeed, flintknapping had always been a form of therapy for Don both physically and mentally. Sharing the flintknapping activities with Evelyn also brought his life to another stage during those days. It was when he was 50 and he was no longer required to balance his work, health, and experiments, that his life finally opened to wider opportunities in academia. With the help of Swanson and Butler, the new yet anticipated career of Don Crabtree as a professional flintworker began.

CHAPTER 4: FULL-TIME FLINTKNAPPER

While Evelyn and Don spent much of their time improving Don's health after his retirement, this also gave Don plenty of opportunities to work on improving flintknapping skills, revisiting his past work, and making notes and voice recordings of experiments. After Don's health improved, Swanson and Butler suggested that Don take a position as a research associate at their museum, and he accepted the position in 1964 (Crabtree's resume, AWBLA, Ce.29.10.2.1). It was an unpaid position, but this affiliation allowed him to work on replication skills, provide occasional demonstrations, attend conferences, and finally organize and prepare his past work for publication. Crabtree could attend typology meetings in Portland and Eugene, Oregon; Reno, Nevada; and Pullman, Washington, with Swanson and Butler's continual support and encouragement. He was also invited to the Les Eyzies Conference on Lithic Technology in Paris, France, in 1964 as a featured discussant and demonstrator with two internationally-known French scholars: Dr. François Bordes and Dr. Jacques Tixier. This event granted Crabtree world-wide recognition. In addition, it was the year his publications marked a real start (Knudson 1982: 339; Jim Woods, obituary, AWBLA, Ce.24.11.1.1; Flintknapper's Exchange, biographical draft, AWBLA, Ce.24.4.1).

An Expanding List of Friends and Acquaintances

Crabtree had been corresponding with numerous scholars, whom he met through his demonstrations and short term academic associations and affiliations, even before he became internationally known. However, his list of correspondents had dramatically grown since 1964. After observing his demonstrations and discussions, people started referring to Crabtree whenever they had students and other scholars interested in stone tools. Crabtree got letters not only from all over the United States, but also from Canada, England,

Australia, Czechoslovakia, Brazil, Japan, Peru, Panama, and France. People wrote letters to Crabtree for a variety of reasons ranging from questioning how they should learn flintknapping technology and asking information about quarry sites, to requesting demonstrations or replicas. Crabtree always wrote back to those who were interested in academic flintknapping even when he had more than twenty people to write to as well as preparing for his publication, demonstration, experimentation, and/or field school at the same time. In fact, many of those new people sending him questions and reports of their study later became regular correspondents with Crabtree. He always had a passion for spreading the method and technique he had been self-teaching and learning from the experiences of his correspondents.

A Master Flintworking Teacher Established

While Crabtree was preparing for his article on the Lindenmeier Folsom replication, he had an interview with a Flintknapper's Exchange reporter. During this interview, he mentioned that he hoped to publish all his past experiments and what he learned of flint and flake technology. He also said that he wanted to produce a handbook of stone working based on his forty years of experience, which would be available to all universities (biographical draft, AWBLA, Ce.24.4.1). Not only did he achieve all of these wishes, but he also received opportunities in which he could train future scholars.

Although Crabtree kept himself quite busy with publication from the mid-1960s to mid-1970s, the year 1969 marked another beginning of his career with the establishment of Idaho State University Flintworking Field School funded by the National Science Foundation (NSF). The school was held during the summer for six years in Twin Falls. With the NSF's financial support for Crabtree, the field school held four to seven students each

year to spend one month camping out at a city park surrounding the Dierkes Lake and Shoshone Falls (Figure 4.1, 4.2). The field school was also generously supported by the local city park service since the area originally did not allow overnight stays for any occasion. Because of this rule, the field school provided a quiet, focused month with selective visits by other scholars (D. E. Crabtree to B. R. Butler, letter, 21 May 1973, Ce.1.4.110).

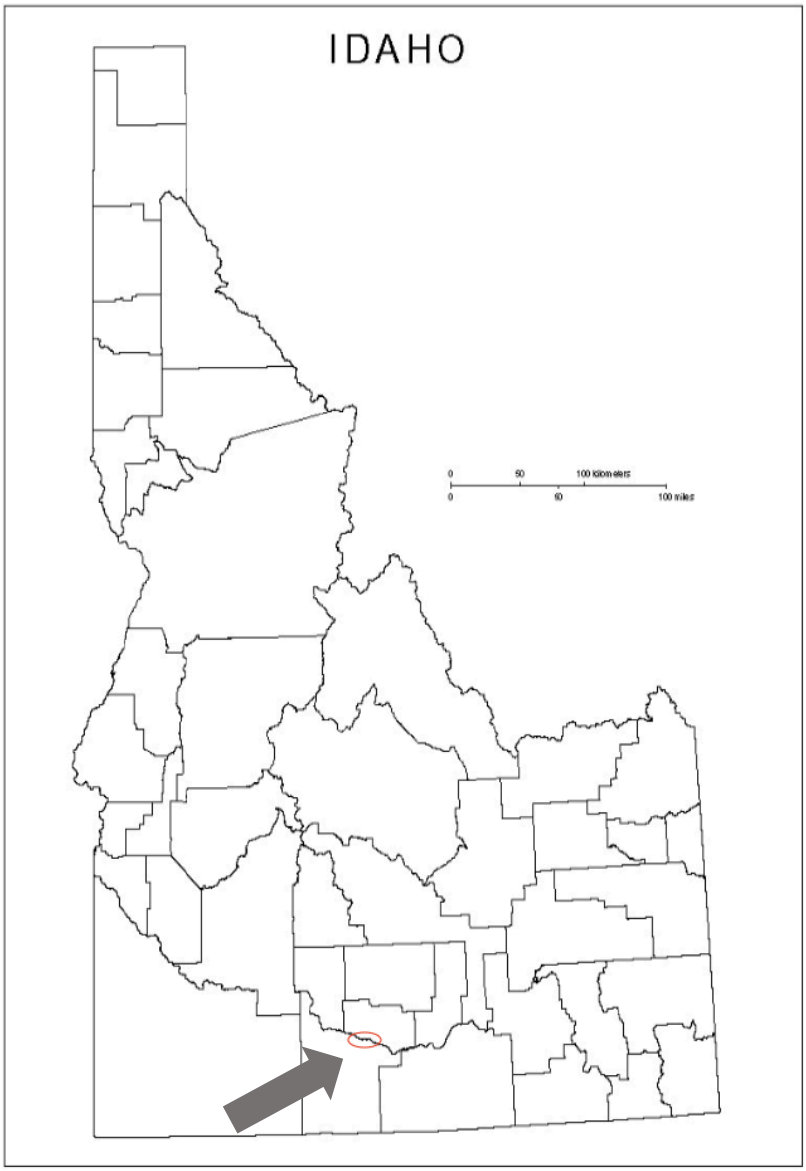

Figure 4.1: A map of Idaho with the area of the Dierkes Lake Park and Shoshone Falls Park circled in red.

Figure 4.2: A camp ground at the Dierkes Lake Park—the Crabtree's field school was held around the tree on the left. (Courtesy Dr. Ruthann Knudson)

Crabtree taught a total of 33 students over the six years (See Appendix B), and many of them became very enthusiastic correspondents with Crabtree, consulting with him and trying to learn more from the master flintworker (Figure 4.3). Some of Crabtree's *children* continued to conduct lithic studies and/or experimental archaeology, while others chose to utilize different approaches with hands-on knowledge as support. Although the degree of his influence on his students' later studies varied, many students, if not all, cherish the time they spent with Don Crabtree in chorus.

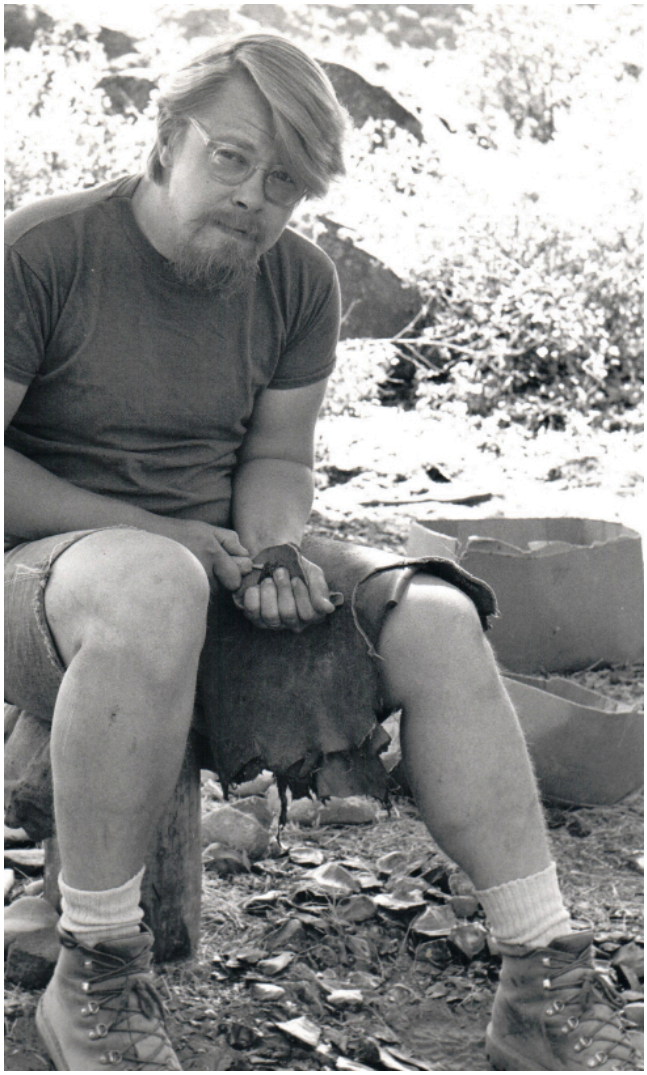

Figure 4.3: Peter Bleed, Crabtree's field school student in 1972, working on flaking an obsidian piece at the field school. (Courtesy Alfred W. Bowers Laboratory of Anthropology, Ce.76.14)

Soon after the establishment of the field school, Evelyn was diagnosed with lung cancer, and her health failed rapidly affecting her mobility in her everyday life. However, both being survivors of severe health conditions, Don and Evelyn kept their hopes high. Don worked as hard as usual while Evelyn underwent therapies in Salt Lake City, Utah (D. E. Crabtree to A. and R. Bryan, letter, 7 October 1970, Ce.2.3.30). Fortunately, Evelyn's condition improved over the year. For a few more years, the Crabtrees had a merry life with

their increasing number of “adopted children” around and repeated visits by fellow knappers, such as Bordes, Tixier, Gene Titmus and Jim Woods.

Craftsman Through and Through

As Don showed through his “deer skull penetration test” with arrows he made in his childhood, he never missed an opportunity to go beyond duplication of artifacts. It is impossible to truly understand material culture without experiencing the use of them after all. He was a person with a wide interest, and each technique he learned (whether it is about flintknapping or not), he could not help but to explore further and eventually, master them as his long-time friend explains,

> I have some playing cards with the heart or club or spade shot out. He was an excellent marksman… He also carved funky little faces out of avocado seeds. I have a bunch of these, too. I also have many personal items he gave me over the years… I have a huge silver ring he made that I wear on special occasions, it is very, very unusual. All of that is a fundamental reminder of who he was to me personally, what he meant to my family, and what he did professionally [Jim Woods, interview, 16 August 2017].

As far as the experimentation goes, however, flintknapping was second to none in Crabtree's studies. Throughout his entire life, going on road trips to visit museums and archaeological sites was one of his favorite activities from which he met with and learned from many scholars and their collections. When there was a chance to incorporate his flintknapping skills and tools, that trip would become rather special. During the summer of 1966, Evelyn and Don had a long road trip to Arizona and stopped by at the Grasshopper site in Cibecue. While they were there, the nearby campsite had an uninvited wondering black bear, and after the campers succeeded in killing the bear, Crabtree offered his newly made stone tools to a professional animal skinner, which he was making for the students at the site (Figure 4.4). The skinner then told Don, "the stone tools saved him (me) at least an hour and a half over the steel knives (D. E. Crabtree to J. B. Bird, letter, 29 July 1966, AWBLA, Ce.1.5.4)."

Figure 4.4: A professional skinner using a stone tool that Don Crabtree made to skin the black bear. (Courtesy Alfred W. Bowers Laboratory of Anthropology)

Sudden Losses

The end of Don's cheerful days came abruptly. Swanson died in March of 1975 from a heart attack. After this sudden incident, the NSF funds for their lithic field school were canceled without a person to take over Swanson's position, although it was planned to renew within a few months. Because of the discontinuation of field school funds and the absence of a person to take charge of Crabtree's research, Crabtree had to leave the position in July of 1975. Mournful news continued with a suicide of the cameraman who shot all of their films. In addition, his friend Dr. Richard Stockton "Scotty" MacNeish suffered a heart attack that resulted in open-heart surgery. MacNeish had been treated by Crabtree's nephew, Dr. John Intravatola, and later he luckily recovered. Before Crabtree healed over his emotional wounds, he also lost Evelyn in the following year. Her health suddenly failed after their last trip together to Belize. When Dr. Richard A. Gould and his wife wrote him a condolence letter, Don replied with, "You and Betsy were much like Evelyn and I, you did everything together. I am so glad we did as one can think back over the good times and delightful experience we had (letter, 29 November 1976, Ce.4.4.60)." Crabtree took months to get back to his regular correspondence after those events of deep sorrow.

A Series of Surgeries

In 1965, a newspaper reporter, Kent Biffle, interviewed Crabtree during his demonstration visit for the Texas Archaeological Society at the Southern Methodist University. "Obsidian can be made sharper than a stainless steel razor blade or a doctor's scalpel," Crabtree explained. "Splitting a hair with it is easy. If you drop one, it will go right through your foot, shoe, and all." Biffle then asked him, "Why don't surgeons use them?" "They are being used by researchers to split amoebas," Crabtree continued, "I may have to

be the first. If I ever have any appendages I need to lose, I'd like to have them try obsidian (*the Dallas Morning News*, 8 November 1965, 5D, AWBLA, Ce.17.3.2-3)." And so he did (Figure 4.5).

Figure 4.5: Don Crabtree's right side a few days after surgery. (Courtesy Alfred W. Bowers Laboratory of Anthropology, Ce.19.4.3)

Health concerns always followed Crabtree. Don snapped a disc in his spine during the field school of 1972, got hematoma in his right arm in 1973, and got the flu later that year. Especially after the losses of his close ones, his health condition worsened dramatically. He had to get surgery to continue what he did, although the schedule of surgery always postponed his plans.

In mid 1975, he became so sick that he was even unable to sit down comfortably, so he decided to receive repeated procedures. As mentioned above, he always suggested the excellence of obsidian blades and their potential use in surgery. Ten years after the

newspaper interview, he got more than one unfortunate chance of using obsidian blades in his own surgery because of his malfunctioning arteries. The first one was a chest surgery and later one was abdominal. Dr. Bruce Buck, a surgeon who operated on Crabtree with the obsidian blades, later answered a newspaper reporter,

> I used the obsidian blades in Mr. Crabtree's surgeries to satisfy his and my curiosity. Of course, there was no doubt with either of us that they would be perfectly safe for a standard surgical inclusion… Perhaps the fact that they are so sharp could be a definite advantage especially in micro surgery—superfine surgery with a microscope. And it is true that the less tissue damage made in surgery, the faster the healing process. [*Times-News*, 21 February 1978:7, AWBLA, Ce.17.3.14]

Although it was necessary for Crabtree to go through the surgeries to continue his journey in lithic studies, those experiences were not easy to undergo. Even though the obsidian blade experiments in his own surgery proved what he had been saying, Crabtree became sick of being ill after a while. He wrote to Gould, "after the chest surgery I'm getting a little tired of this kind of experimental archaeology. Looks like there is only one experiment left and that is to remove the still beating heart (letter, 29 November 1976, AWBLA, Ce.4.4.60)." Indeed, Crabtree received 11 surgeries from the end of 1977 to May of 1979 (Sunday Penson, biographical draft, 13 May 1979, AWBLA, Ce.24.8.1.1-9). These years, along with the loss of the people he loved, significantly eroded Don's health.

A New Career at the University of Idaho

With Dr. Ruthann Knudson working at U of I, Don accepted a research associate position at their Laboratory of Anthropology in 1976 (Crabtree's resume, AWBLA, Ce.29.10.2.1). In his later career, his focus became more of an advisor than the lead investigator although his passion for stone working was still there to stimulate his flintknapper's blood. Before Evelyn's health declined, Don had visited Belize with her to attend a Mayan lithics conference. At this conference, he became very interested in the Colha site study by Dr. Thomas R. Hester and Dr. Norman Hammond and eagerly participated in the discussion (Knudson 1982:341). They appreciated Crabtree's evaluations of artifacts from the site and invited Don to Belize as a consultant in 1979 (Figure 4.6). It was meant to be a series of visits, but with his worsening health condition, he could not make another trip.

Figure 4.6: Don Crabtree with Glenn Goode working on replication during his consulting visit in Colha, Belize. (Courtesy Alfred W. Bowers Laboratory of Anthropology)

Although he became less active on experimentation, Crabtree still enjoyed participating in a "knap-in" club where he would gather with his fellow knappers to work on flintknapping and sometimes tackle knapping problems brought up by its members (Knudson 1982:341-342). Crabtree never stopped conducting his own experimentations nor encouraging students and fellow scholars in lithic technology to experiment until the day he passed away.

> I am still continuing on with my experiments and have recently received four beautiful specimens of Grand-Pressingny flint in the form of beautiful cores. To replicate them will indeed be a challenge [D. E. Crabtree to R. A. Gould, letter, 14 May 1980, AWBLA, Ce.4.4.71].

While he was affiliated with U of I, Crabtree was occasionally invited to give lectures at Washington State University (WSU) in Pullman, Washington, where some of Crabtree's close students were affiliated. There, he also helped the development of the flintworking school. Dr. J. Jeffrey Flenniken, an alumnus of the 1973 lithic field school, became one of the first-generation master flintworking professors. Crabtree supported Flenniken's application to a position at WSU, and Flenniken started working there in 1975. With Flenniken in the department, Crabtree intended for future lithic studies students to have a better educational environment (Knudson 1982:341-342).

> Now, Evelyn tells me that I am to take your place in the field of lithic technology. Don, no one person can take over what you have started. Hopefully

> we can continue your work, but I can't do it without you. Don't forget you have 40 to 50 years experience on me --- that kind of experience one doesn't get in a mere 5 or 6 years. Please understand that I appreciate your letter to WSU and I will try to live up to your expectations, but I can't do it alone. To me, your (sic) the master, I'm the apprentice, and that's the way it is in my mind and that's the way it will stay no matter what you or Evelyn say. So don't think for one minute that you can drop out of the picture while I'm around [J. J. Flenniken to D. E. Crabtree, letter, 11 August 1975, AWBLA, Ce.4.2.22].

Even though Flenniken talked modestly about his ability in expanding the experimental approach in lithic technology, this program at WSU indeed produced second-generation flintworkers who have been enthusiastically pursuing the hands-on approach in their lithic studies. Dr. R. Lee Sappington is one of the earlier students of this program, and he also studied under the guidance of Knudson. Sappington later became a professor at U of I and he also took over Crabtree's teachings. Although U of I did not establish a specific program of lithic technology nor did WSU continue its program after a while, Crabtree's passion in lithic studies still lives through those who kept experimenting. Dave Quinn, Sappington's student, is now assisting lithic technology courses at U of I and directed studies for lithic studies students. This is where I was introduced to Crabtree's hands-on approach in archaeology, and became a fourth-generation student.

Another Flenniken student, Terry Ozbun, also succeeded from Crabtree's teachings. He and Dr. John L. Fagan, an alumnus of the lithic field school of 1973, have been teaching their colleagues Crabtree's approach as an important means of understanding artifacts. The

spread of the approach may seem slow and small-scaled compared to the time of Crabtree; however, *what Crabtree had started* has been pursued through generations and making steady progress.

Long-Deserving Academic Degree

Knudson and Crabtree's long-time friend and fellow scholars Dr. Thomas J. Green, Dr. L. Lewis Johnson, Dr. Cynthia Irwin-Williams, and Dr. François Bordes nominated Don Crabtree for an honorary doctoral degree in 1978 (Honorary degree documents, AWBLA, Ce.79.23.1.2-8). His long-deserving academic degree was conferred by U of I on May 19, 1979. With a number of celebration letters from his friends, students, and fellow knappers, Crabtree received the highest recognition in his career (Figure 4.7). Dr. Marie Wormington, Dr. Junius Bird, Dr. David Rice, and Dr. Ruthann Knudson shared this special moment with

Figure 4.7: At the conferment of Crabtree's honorary degree on May 19, 1979 with Dr. Ruthann Knudson on his left and Dr. David Rice on his right. (Courtesy Dr. David Rice)

Crabtree. Only 18 months after this newest chapter of his life started, he left this world on November 16, 1980.

His Journey Never Ends

Crabtree's life was filled with new beginnings and sudden ends, yet his love for flintknapping continued through it all. Even after his death, the journey he began six decades ago thrived with his knowledge being passed down to later generations. The stories from his later life demonstrate the importance of continual effort on experiments. He was obviously a true investigator who continued to learn from decades of experiments as well as other scholars' work. Because of his own experiences, his hope in raising the next generation of academic knappers was quite high. It is apparent that he genuinely cherished and was proud of the time spent with his *adopted children* through the correspondence between his students and him.

Not only his methods and techniques but also his passion towards lithic technology were passed down to his students. For instance, Knudson with support of Guy Muto founded the *Newsletter of Lithic Technology* after participating in the Crabtree field school in 1972. It has been continued as *Lithic Technology* published through Taylor and Francis. In addition, she established the Society for American Archaeology's Crabtree Award in 1984, while she was an executive committee member. In one point of view, the end of his life did not put an end to his journey in lithic studies, as it was inherited by his students and fellow knappers.

CHAPTER 5: PASSION THAT LIVES THROUGH OTHERS

Crabtree was a very responsible scholar. Whenever he took a student, he made sure that he would teach him/her as much as he knew about lithic technology. Crabtree always endeavored to provide something new for those who kept in touch with him after a field school, demonstration, or lecture to learn. In addition, he was eager to learn from his students' experiences and questions at the same time. His philosophy of teaching, however, faced a few difficulties after he retired from taking new students because there were still hundreds of people who wanted him to teach them.

> Several times when I was with Don at his home, people would drop in to meet him. One student from California really wanted Crabtree to teach him to knap. The student had a small camper and wanted to stay at Crabtree's home. By this time, Don had retired and had no interest in starting someone new. He tried several times to tell the student "no," the student just didn't get it and insisted he would stay at Don's place and not be a nuisance. Finally, Don told the kid there were great camping spots in the mountains by Sun Valley (100 miles to the north) [Jim Woods, interview, 16 August 2017].

Hopefully, this student found another way into the world of flintknapping. This chapter discusses the life of Crabtree that cannot be found in his articles. It is based on the memories of those people who were lucky enough to be taught by or share their private time with Crabtree. A series of interviews was conducted during the summer and fall of 2017 via emails. Even though it would have been ideal if I visited each person and discussed with

them along with a flintknapping session together, Crabtree's friends and students are literally all over the world, so I decided to use more practical way to contact them. After the IRB was approved by U of I and my interviewees signed their Informed Consent Forms, I sent them a list of questions (see Appendix C) that were designed for each interviewee. Some took more than a few sessions, and each interviewee provided me with a lot of interesting stories about Don Crabtree. A few stories I learned during the interviews that fit better in the previous chapters were already introduced. This chapter focuses more on the stories related to his scholarly life and addresses the future of experimental studies that Crabtree's *family* seeks.

Interviewees and Other Informants Introduced

Before going into Crabtree's personality outside his articles, I would like to briefly introduce the eight generous scholars who spent time and shared stories with me through the series of interviews. In addition, two of my thesis committee members introduced me to other scholars and guided me through the massive archival data of Crabtree. They are also Crabtree-influenced scholars and introduced in here as well.

Mr. James C. Woods is a celebrated archaeologist from Twin Falls, Idaho, and long-time friend with Crabtree. He met Crabtree when he was a high school student. While he attended a local community college majoring in art he worked at a local museum when there was a display change. It was much later when they became close, but Woods remembers Crabtree as a very formal and polite person from the beginning.

Dr. John L. Fagan is an alumnus of the lithic technology field school of 1973. He already had 15 years of flintknapping experience and a doctoral degree when he attended the field school, but he recalls that 30 days with Crabtree was a completely different learning experience from any course he had taken. He currently runs a cultural resource management

company, Archaeological Investigations Northwest, Inc., in Portland, Oregon. With Ozbun, he teaches his colleagues Crabtree's approach and organizes an annual week-long lithic technology study session at his company.

Dr. Barbara A. Purdy is an alumna of the lithic technology field school of 1969. After she received her master's degree in anthropology from WSU, she decided to continue onto a doctoral program at University of Florida. When she found out that there would be a field school by Crabtree, she immediately asked her professor for a recommendation letter, and became one of his first-year field school alumni. What she learned at the field school and from Crabtree's thermal alteration study greatly influenced her later career.

Dr. Bruce Bradley is an alumnus of the lithic technology field school of 1971. He was already an experienced flintknapper when he attended the field school. Previously, he met Bordes, and started corresponding with Crabtree in 1969. While missing a few years of opportunity to attend the field school due to its seating capacity and his work schedule, he had been developing his flintknapping skill on his own and through an opportunity of working with Bordes. In this sense, he is more of a master flintworker produced by the pioneers than just the guidance of Crabtree.

Dr. Phillip H. Shelley is an alumnus of the lithic technology field school of 1974. He is a professor emeritus of ENMU who taught Kilby, my professor at ENMU. As a southwest archaeologist, he started his experiments with pottery, and soon he realized the need to practice flintknapping to understand lithic artifacts. He had several years of self-teaching before attending the field school. He is also one of those field school students who decided to continue practicing the approach and teach the skill in their teachings.

Dr. David Rice is a celebrated Pacific Northwest archaeologist and a long-time friend of Crabtree. Swanson and Butler introduced him to Crabtree during the conference in 1962. He did not share flintknapping sessions with Crabtree, but rather attended demonstrations by Crabtree to increase his knowledge of the artifacts, which Rice was studying at that time.

Mr. Terry Ozbun is a second-generation experimental archaeologist taught by Flenniken at WSU. He is currently working with Fagan at Archaeological Investigations Northwest, Inc. Crabtree's influence on him can be seen in many of his studies and projects. During the 70th annual Northwest Anthropological Conference, his presentation, co-authored with Fagan, mentioned the influence of Crabtree shown in their approach.

Dr. R. Lee Sappington is a second-generation experimental archaeologist taught by Flenniken at WSU. When he was in the lithics program, Crabtree was still around to support its development. As mentioned earlier, he later became a professor at U of I and endeavored to spread the teachings of Crabtree.

Dr. Ruthann Knudson is an alumna of the third annual lithic technology field school. She had met Crabtree in July of 1968, while she worked for Dr. Marie Wormington and Dr. Joe Ben Wheat at the Jurgens site on the Kersey Terrace east of Greeley, Colorado. She had been one of the most frequent correspondents of Crabtree after the course. When Crabtree left the Idaho State University position, she suggested Crabtree have a research associate position at U of I and later nominated him for an honorary degree. She later established the Crabtree Award, while she was an executive committee member of the Society for American Archaeology.

The Primary Source of His Energy

Don Crabtree's energy is best described as that of the Snake River. A mountain full of huge rocks was in his way, yet he always found the right way through the obstacles without stopping. Indeed, the obstacles he faced in his life were numerous: The Great Depression, cancer, World War II, a heart attack, and malfunctioning arteries to name major ones, yet he never stopped doing stone working. He never neglected his study of archaeology. He never gave up on understanding the ancient people through experiments. One may ask, "Where did his endless energy come from?" Fundamentally, it was his curiosity which has been developed since the first time he laid his eyes on an arrowhead; however, his curiosity had always been fed by the people around him.

While he gave his close friends much of his art collections, properties, and implements, his belongings with the focus on scholarship were donated to the AWBLA. The amount of correspondence (a little more than 3,400 letters to be precise and they are still missing parts) and the collection of countless archaeological and scientific periodicals show not only how devoted he was to the study of archaeology, but also how his peers and students kept his curiosity well fed at all time. Many of his field school students sent him updates of their studies, shared experiences in their flintknapping practices, and often asked him for advice on their projects.

A Humble Scholar

"Polite, respectful, and humble" were the most frequent remarks I received during the interviews about the personality of Don Crabtree. Crabtree always treated other people with equal respect whether they were senior scholars or high school students. During this research, I met and talked with people not only Crabtree's friends and students, later

generations of academic flintknappers who indirectly received his influences. Even those who never met him appreciate Crabtree's contributions to the field.

Everywhere he visited, he made new friends, and they kept in touch exchanging their experimental studies and archaeological finds regardless of the distance between him and his friends. It was always the case with his field school students as well. One of his first field school students and a frequent correspondent of Don's, Dr. Barbara A. Purdy remembers that she was always "picking Don's brain for more and more exciting information (interview, 17 August 2017)." Although he had been flintknapping for more than five decades when his field school started, there was never arrogance in Crabtree's relationship; whether a person is a novice or master flintknapper, he always had sincere attitude toward people.

Indeed, Crabtree received hundreds of letters from his students, peer flintknappers, and even strangers asking him questions about techniques. Often, he was busy demonstrating at universities, preparing for a conference, or working on his articles that his response was not as quick as when he had time to spend writing to them. However, he never gave answers to his correspondents that were mere assumptions. Those letters of questions, after all, were chances of further, more diverse education to Crabtree himself. Therefore, whenever he got questions about techniques that he had not yet well experimented, he tried to find answers in his experiments first, then suggested the correspondents what he had learned so far. It is probably why he "always had something new to teach (Phillip H. Shelley, interview, 16 October 2017)" and "always provided examples in his explanation (David Rice, interview, 25 August 2017)."

A Man of Action

As Knudson (1982:336) explained, Don Crabtree was "an action person." He was never a person who sat and waited until an opportunity was brought to him. His teachings and even informal discussions always had a hands-on aspect because this was what he believed in. It is obvious from his life stories, and it was also true in his teaching. Most interviewees described *An Introduction to Flintworking* (1972) as what represents Don Crabtree to them, yet they also mentioned that the most important things they learned from him was not always explained in printed words.

> During Crabtree field school, I often asked Don questions about various types of tools and how they were produced. One afternoon I asked how burins were made. Don picked up a flake from the pile of flakes on the ground, hit it with a hammerstone to create a bending break and proceeded to strike the flake with the hammerstone and then held the flake and hit it against the hammerstone and in the process of a few minutes created several types of burins using a variety of techniques and methods [John Fagan, interview, 30 August 2017].

> Don was not a person to talk about stone artifacts without concurrently showing how they are made… Later that summer (in 1962) Rob Bonnichsen (then an ISC student) and I (UW student) visited the site of the Fairfield Clovis cache on the lower Camas Prairie to examine first-hand the range of Clovis artifacts in the assemblage, and see how they appeared, as well as the exotic stone they were made from. Back at the ISC (Idaho State College) Museum we

> took our questions to Don. He simply picked up his knapping tools and some stone, and produced a Clovis point preform before our eyes! Then he discussed the complexity of how the fluting procedure and finishing touches were done. Of course, he had seen the Fairfield Clovis specimens, too [David Rice, interview, 25 August, 2017].

A question to Don Crabtree was almost always answered in a *beyond words* style. It seemed like Crabtree had a teaching policy to provide examples in a form of action, drawing, or replicas to his students so that they will be able to *feel* what he was saying. Although the stories above show the times Crabtree was present on site, his hands-on teaching style was not limited to in-person interactions. His letters contained drawings, materials, and sometimes even duplicated artifacts to supplement his thoughtful response, suggestion, and argument. As Crabtree often mentioned the importance of hands-on experiments in his publications, he was well-aware of the limitation of words in sharing his experience without visual aids.

It was perhaps whom he trained himself into over decades that made him a modern-day master craftsman who shares his techniques with his apprentices and peer craftspeople. Most of the interviewees remember him flintknapping without suspending conversation as though flintknapping is the same as breathing to him (although some found a flicker of extreme focus in his eyes). Crabtree often explained the struggles in his earlier experiments as re-living the prehistoric man's discovery and development of flintknapping technology. Over decades, he had been self-teaching flintworking techniques with a few interactions with other self-taught knapping scholars. The "knap-in" style is very likely to be the way the

past cultures developed and shared the craftsmanship, which Crabtree unconsciously lived through. In that sense, Crabtree was truly re-living the ancient man's life through demonstrations and lectures.

To the Future of Academic Flintknapping

Don Crabtree left numbers of messages to future archaeologists and students encouraging them to experiment through his publications, demonstrations, films, and such. Among those, one of the most important means that he worked on was to entrust his friends and students with spreading the idea. He knew from his experience that the importance and potential of experiments can only be truly understood by hands-on experiences. It cannot be a brief session, but focused and repeated practices. Nonetheless, to figure out what he meant on our own is not easy; it is also a difficult task to convince students and scholars what experiments can offer in archaeological study without an actual experience.

During the interviews, some scholars mentioned the difference between academic flintknapping in Crabtree's time and the present, and it is true that the development of experimental archaeology with lithic studies since the 1980s was not what Crabtree sought. Compared to the time Crabtree, Bordes, Tixier, and other master flintknappers were most active, methods like replication have been somewhat avoided by scholars partially because such methods require literally thousands of hours of practice before one can accurately utilize it (Jim Woods, interview, 16 August 2017). The voices that were concerned with the future of experimental archaeology were heard during the interview regardless of their complete faith in the importance of hands-on experiences. Nonetheless, all of Crabtree's friends and students have always cherished not only what he taught them but also what he

demonstrated to them as a scholar. They believe that academic flintknapping is a unique learning process that allows a scholar to look at artifacts through the eyes of ancient people.

Figure 5.1: Don Crabtree and students from the 1969 Summer Flintknapping School—from left to right: Paul Sneed, Lucy Lewis, Max G. Pavesic, (a frequent visitor) Jeffry Maugher, Barbara Purdy, and Don Crabtree (Courtesy Alfred W. Bowers Laboratory of Anthropology)

> As a result of this opportunity to work with Mr. Crabtree many of my difficulties have been resolved and should be overcome with practice. In addition, many factors which had not seemed important to me or which had not occurred to me were discussed this, in my opinion, was a major contribution of the school. If we don't even know enough about technology to ask questions, we certainly can't solve the problems [Barbara A. Purdy, field school report, 1969] (Figure 5.1).

> I am not sure if you realize it, but the most valuable thing I (and, I think, every other student) learned this summer was to think like a flintknapper---to comprehend and intuitively feel what I wanted to do with a piece of stone, and how I could go about getting that thing that was resting inside the rough nodule … and I hope I am reflecting your influence to some little degree [R. Knudson to D. Crabtree, letter, 14 January 1972, AWBLA, Ce. 6.3.10.1].
>
> The value of the school is almost beyond measure. Through it the students were given an awareness of the potential of lithic technology as a tool in interpreting archaeological remains. It exposed the theory of stone working as well as its practical application. It is my opinion that only through such a program is it possible for one to obtain a substantial base of knowledge of lithic technology upon which to base future experimentation and interpretation [Bruce Bradley, field school report, 1971].

Crabtree After-Effect

As mentioned in the previous chapter, Crabtree's death did not stop his approach from spreading. Rather, it seems that these people who knew him tried to enhance what Crabtree developed within the field. A couple of years later after Crabtree's death, scholars published books that celebrates his contributions and influences (Ericson and Purdy 1984; Plew et al. 1985). The articles were mainly by friends, students, and colleagues of Don Crabtree, and they strongly indicated how much he meant to the field of study.

Among the 33 students of the Crabtree's field schools, not all of them continued their study in lithic studies or experimental archaeology. Knudson (1982:341) indicated that he seemed to hope that the number of resulting master flintknappers from his career was higher. However, it does not mean that his teachings are fading from today's archaeology. Flenniken later published an article that re-differentiates replication from flintknapping and addresses the significance of the approach (1984:199-200), and his and other scholars' effort indeed produced students of experimental lithic studies. All the people who interacted with Don Crabtree emphasize the potential of the hands-on method and technique not just as a tool that familiarizes themselves to the manufacturing process, but also a tool that connects themselves with the prehistoric behaviors and ultimately understand ancient cultures.

In addition, a few people who are considered as second-generation students of Don Crabtree confirmed that his teachings are still in effect even though most of them have never met him in person (Terry Ozbun, interview, 28 August 2017; R. Lee Sappington, personal conversation, 2016, David Quinn, personal conversation, 2016). His publications and legends are the most common way to know Don Crabtree for scholars and students who entered into this field after the 1980s. However, listening to those who knew Crabtree allows us to learn beyond what has been written. He demonstrated with detailed explanations, but at the same time, he did not necessarily correct his students to behave in his way. Rather, his flexible, technology specific approaches in replication helped his students realize and fix their habits on their own and led them to become better flintknappers and educators. His influence continues to be spread by the people who knew him not just by lectures, but also by memories shared through friendship, and it will be continued for generations to come.

CHAPTER 6: DON E. CRABTREE THROUGH SCHOLARLY ARTICLES

Professional, amateur, or academic—regardless of how you categorize your flintknapping style, you would not flintknap without hearing Crabtree's name. His fame began as a young amateur flintknapper, and his status as a legend grew without any academic bona fides until finally receiving his honorary doctorate degree a year before he passed away. A collection of his publications is still accessible and widely cited. Crabtree discusses his work in detail in each of his articles and it is impossible to create an index without cutting out something important. Therefore, instead of summarizing his works, this chapter focuses on inside stories from the days Crabtree prepared those articles. By learning how much effort he put in each work, one can understand the importance of continuous effort in experimental archaeology, his methodology, and, perhaps, the spirit of staying positive throughout the tough process of the approach as Crabtree once wrote, "I do lose a lot of blood while I make artifacts and now I have a use for it—writing!" (D. E. Crabtree to J. B. Bird, letter, 30 December 1966, AWBLA, Ce.1.5.8).

Notes on Experiments in Flint Knapping Series

His 40 years of experience in flintknapping finally saw the light of day with Swanson and Butler's help. They learned that Crabtree has been making notes and voice recordings, which Evelyn transcribed during vacations and his rehabilitation, and suggested they publish them. The series was printed in *Tebiwa*: The Journal of The Idaho State University Museum. It is the major source of Crabtree publications due to his affiliation to the museum as a research associate from 1964 to 1975 and a long-time friendship with Swanson since 1958.

1: Heat Treatment of Silica Minerals (1964). As a start, Butler co-authored with Crabtree, and the article was published in *Tebiwa* Vol. 7 No. 1. Thermal modification of raw materials was, after all, the technique that represents Don Crabtree's legacy. He was one of a few self-taught flintknapping scholars who experimented with heat application, and reached a successful duplication of altered material texture.

Although this work focuses on silica minerals, Crabtree's experiment was not limited to this specific type of mineral. In his earlier day, he even tried to modify obsidian. Although it usually does not require modification, his philosophy encouraged him to experiment anyway. As heat treatment became well-accepted as an ancient technology in lithics to the public, bizarre stories about the technology had been told although they seemed rather mythical.

> We find, even in the Boy Scout manual, the statement that water dropped on heated stones would produce an arrowpoint. There are many different explanations and methods published by persons on this subject regarding various thermal methods used and, in fact, some of these writers vouched that they have seen the Indians use this method. Some have stated that the Indian rubbed a bow string up and down against the piece of flint to create friction heat, dipping it in water during this process, and thereby causing a piece of flint to pop off the edge of the working stone. They claim that by repeating this process, that primitive man would eventually flake and shape a point. Others claim that he used a piece of wet buckskin or pine needles against a hot stone in order to make an artifact. Yet, I doubt very much if any point was ever made

> by using these methods. A close study of the surface of any artifact will quickly reveal that pressure and percussion—and not a thermal fracture—was used to remove the flakes and shape a point [D. E. Crabtree, typed note, Alfred W. Bowers Laboratory of Anthropology, Ce. 31.8.1.1].

With publishing his repeated experimentations, Crabtree sought to correct the misunderstandings of thermal treatment, and thus how stone tools were made through this article.

2: A Stoneworker's Approach to Analyzing and Replicating the Lindenmeier Folsom (1966). Although the title does not specifically indicate it, this is the second article of the series, which was published in *Tebiwa* Vol. 9 No. 1. As discussed previously, Crabtree was quite excited about successfully duplicating Folsom points, which you could feel with him beginning the article with "Folsom!" Crabtree, like numerous other flintknappers, had an early obsession with fluted projectile points (Figure 6.1). Even without satisfactory result, he spent years duplicating these artifacts until the day he met Edgar B. Howard with his collection of Clovis and Folsom artifacts.

> Before a flintknapper can attempt to replicate a technique, he must analyze the artifact and his analysis must include an examination of the flake scars and a mental reconstruction of the processes and techniques involved to produce a flake that would fit each particular scar… [8]

Figure 6.1: Folsom points made by Don Crabtree. (Courtesy Alfred W. Bowers Laboratory of Anthropology, Ce.76.10.4)

3: The Flintknapper's Raw Materials (1967). Quarrying—the most fundamental step in flintknapping is addressed in *Tebiwa* Vol. 10 No. 1. As Crabtree states, "a basic step in determining and interpreting working techniques of artifact manufacture is an understanding of the proper stone for toolmaking and reconciling the relationship of techniques to material (45)." Understanding the raw material to both a flintknapper and archaeologist is crucial (Figure 6.2). Indeed, he was required to supply materials to work on since he was just a little kid. Even when he finds a quarry, he then needs to identify better materials out of thousands of rocks buried underneath or piles of rock before him. In order to produce quality artifacts, one needs to know characters of a variety of raw material.

Figure 6.2: Crabtree collecting raw material at a prehistoric quarry outside of Arco, Idaho, in 1962. (Courtesy Alfred W. Bowers Laboratory of Anthropology)

4: Tools Used for Making Flaked Stone Artifacts (1967). Through his career, Crabtree experienced a variety of tool types and materials. This article, does not include all of those since it was before some major experiments discussed later in this chapter, yet it discusses the basic tools and techniques regarding stone flaking technology in *Tebiwa* Vol. 10 No. 1.

Experimental Manufacture of Wooden Implements with Tools of Flaked Stone (1968)

This relatively short article was published in *Science* Vol. 159 No. 3813 and co-authored with Dr. E. L. Davis. In the letter from Davis to Crabtree on July 17th in 1963, she attempted to become his first female student suggesting she visit Kimberly in the upcoming winter or spring (Ce.3.4.1). I could not confirm if she accomplished that mission since the correspondence collection is missing from then to June 1st in 1967; however, she visited

Crabtree and Evelyn and Don visited her wherever she worked. Crabtree taught her pressure flaking when she visited Kimberly and Davis consulted Crabtree analyzing artifacts when he visited her (E. L. Davis and D. E. Crabtree, correspondence, 17 July 1963 to at least 1978 due to later undated letters, AWBLA, Ce.3.4.1-65).

Seemingly, this study was conducted when Davis visited Crabtree in late August of 1967 (E. L. Davis and D. E. Crabtree, correspondence, 2 August 1967 and 4 August 1967, AWBLA, Ce.3.4.20-21). From the collection of correspondence between scholars and Crabtree, it is apparent that they are excited to work with him. However, no one exceeded the excitement of Davis for this work. The joy of finishing an article and being accepted by *Science* thrilled Davis so much that she ordered 200 copies to divide between her and Crabtree (E. L. Davis to R. V. Ormes, letter, 20 February 1968, AWBLA, Ce.3.4.26).

> Today there is increasing interest in the many technologies for shaping stone, and several archaeologists are becoming competent knappers who use percussion, pressure, and other methods for copying artifacts. But here the inquiry ends. It occurs to us that the time is ripe for asking further questions: What can you do with such equipment? How would you make a lithic tool kit for a particular job on a do-it-yourself basis [1]?

Mesoamerican Polyhedral Core and Prismatic Blades (1968)

Crabtree became fascinated and focused with polyhedral core and blade technology during his three visits to Mexico from 1958 to 1961. During his final visit, he even obtained a few specimens for further experiments, yet he spent years to succeed in replication (446).

This article was published in *American Antiquity* Vol. 33 No. 4. Because of its wider audience than *Tebiwa*, this study became even more so widely-known among scholars internationally.

Even before the paper was published, Crabtree's fellow scholars became aware of his blade technology experiments (Figure 6.3). For instance, Tixier consulted Crabtree about some artifacts, which Crabtree identified as polyhedral cores and explained the characteristics to look for in identifying the core type from blades (D. E. Crabtree to J. Tixier, letter, 23 February 1965, AWBLA, Ce.11.2.5.1). Dr. Junius B. Bird, a curator of South American archaeology at the American Museum of Natural History, wrote to Crabtree requesting some polyhedral cores with removed blades made from the obsidian Bird sent, to add to his (and eventually to his museum's) collection (J. B. Bird to D. E. Crabtree, letter, AWBLA, Ce.1.5.5).

> An attempt to replicate these blades and cores will make one appreciate the required skill and control necessary to duplicate the cores and blades of the aborigine. No amount of theorizing by merely examining a flake or blade scar will give a true picture of these techniques; only by replicating can we change theory to fact [477].

Figure 6.3: Polyhedral core and blades made by Don Crabtree. (Courtesy Alfred W. Bowers Anthropology Laboratory, Ce.76.12.15)

The Corbiac Blade Technique and Other Experiments (1969)

This work is a result of a two-week experimental session in September 1967 by Bordes and Crabtree at Crabtree's in Kimberly, published in *Tebiwa* Vol. 12 No. 2. These scholars had been in touch for several years prior, always exchanging findings and experiments with pictures, drawings, and sometimes raw materials (F. Bordes and D. E. Crabtree, correspondence, 20 May 1962 to 15 September 1967, AWBLA, Ce.2.1.1-43). They also had a few flintknapping sessions teaching each other percussion and pressure flaking techniques. However, their exercise created results that they felt needed to be published.

This event was so influential on their friendship that they continued their long-distance correspondence and occasional visits until Crabtree died in 1980.

Although the article mostly focuses on Perigordian artifacts that had been studied and excavated by Bordes for several summers in France, their experimental subjects were quite wide thanks to the variety of materials hoarded by Crabtree. Since he had a few projects to work on of his own (see the following two sections), Crabtree was required to collect quality materials for those experiments, and he decided to put aside some of them in expectation of Bordes' visit. When he received 1,500 pounds of Iceland obsidian from Bird, Crabtree was delighted to find there were two pieces each weighing about 230 pounds, and immediately thought about working on them with Bordes (D. E. Crabtree to J. B. Bird, letter, 5 December 1966, AWBLA, Ce.1.5.6.1; Figure 6.4, 6.5). Crabtree also made a series of artifacts to send to Bird as a gesture of appreciation: totaling 32 specimens, some were made of Iceland obsidian, with artifacts made of different raw materials, which with Crabtree's approval, Bird donated to the American Museum of Natural History for more people to be able to study (J. B. Bird and D. E. Crabtree, correspondence, 5 December 1966 to 30 December 1966, AWBLA, Ce.1.5.6.1-Ce.1.5.8)

Bordes spent a couple of weeks flying into different cities meeting other people, but later wrote a thank you letter to the session and gifts for his family when he got back to France.

> Denise and Cecile have been delighted by the rings, and my young (15) niece also. Unhappily, I lost (!) the small opal you gave me for Cécile. So I bought an opale (sic) ring in Los Diablos. Arnaud is very happy with the stones. And

> Denise wants to thank very specially Evelyn for the wool shoes, that she wears every evening [F. Bordes to D. E. Crabtree, letter, 7 November 1967, AWBLA, Ce.2.1.44.2]!

Figure 6.4: François Bordes working on a massive piece of Iceland obsidian. (Courtesy Alfred W. Bowers Laboratory of Anthropology)

This paper took a while to publish due to their continuous experiments and discussions after the two-week session accompanied with personal occurrences, such as Bordes' novel writing and Crabtree's loss of his father. Nonetheless, they were quite satisfied by the final product being a truly collaborative work (F. Bordes and D. E. Crabtree, correspondence, 7 November 1967 to 17 June 1968, AWBLA, Ce.2.1.44.1-Ce.2.1.63).

Figure 6.5: A giant obsidian biface manufactured by François Bordes. (Courtesy Alfred W. Bowers Laboratory of Anthropology)

Flaking Stone with Wooden Implements (1970)

It all started with Bird asking Crabtree if he were familiar with using wooden tools in flaking stones in the mid 1960s, and with a lot of struggles and nearly giving up several times, Crabtree finally published in *Science* Vol. 169 No. 3941. Bird had been a great friend of Crabtree for a long time, and he always wrote what he found during his fieldwork and often sent materials to Crabtree encouraging experiments. When Bird first mentioned to Crabtree about wooden implements in flintknapping, Crabtree responded to Bird that with a variety of material, hard wood is not easy to obtain for a detailed experiment and was not ideal even compared to nutshell and marine shell due to its tendency of becoming "fiber-ous" with a little use (D. E. Crabtree to J. B. Bird, letter, 24 April 1966, AWBLA, Ce.1.5.1).

However, Bird did not give up the idea so easily, and with subsequent and exciting findings from Chile, he made sure Crabtree knew about them and continued his experiments with wooden flakers by asking his colleague to reconfirm the information he sent Crabtree earlier.

> Junius just got back from Tierra del Fuego. He has probably told you what he found, but he asked me to tell you that he has some basalt for you from there along with some wooden flakers he has made for you to try out. He will send these to you anon. By the way, did you know that the Kimberley District Aborigines do bifacial pressure-flaking with wooden flakers? We have one of these flakers in our collection [R. A. Gould to D. E. Crabtree, letter, 19 December 1968, AWBLA, Ce.4.4.1].

Fortunately for Bird, Crabtree resumed his experiments with the materials he received following a letter on February 4, 1969 (J. B. Bird to D. E. Crabtree, letter, AWBLA, Ce.1.5.17).

Wooden flakers, though Crabtree had been researching and practicing intensively at least for a few years, did not bring positive results within four samples that were sent by Bird. Therefore, Crabtree collected some more hardwood materials in Arizona. Crabtree also found that the sample basalt pieces received from Bird were coarser than the materials of artifacts from Chile, which was eventually solved with thermal modification (Crabtree to J. B. Bird, letter, 10 February1969, AWBLA, Ce.1.5.19; Crabtree to J. B. Bird, letter, 10 March 1969, AWBLA, Ce.1.5.19).

Just before he was to give up on this subject, Crabtree was finally able to replicate flake scars after a month of trial learning from Kimberley aborigine techniques that Gould mentioned. With this success, he decided to replicate flake scars rather than every single characteristic of artifacts in the article. The article was peer reviewed by Bird. Knowing how much trouble Crabtree had undergone, Bird declined Crabtree's offer for joint authorship probably during the two weeks they spent together with Gould at Crabtree's in Kimberly (D. E. Crabtree to J. B. Bird, letter, 9 April 1969, AWBLA, Ce.1.5.20). Crabtree states in the article that, "Efforts to replicate the techniques of manufacture and the form of prehistoric stone tools have increased the value of archaeological objects as an instrument for interpreting human history (146)." This experiment gave him quite a challenge, but with a philosophical reward.

Man's Oldest Craft Revisited (1970)

This article was co-authored with Gould, and published in *Curator* Vol. 13 No. 3. However, the primary form of presentation was in an exhibition at the American Museum of Natural History in New York. Crabtree received a letter from Gould which was to verify his interest in the idea of a "flint-chipping" presentation discussed by the chairman earlier that year (R. A. Gould to D. E. Crabtree, letter, 19 December 1968, AWBLA, Ce.4.4.1.1).

The Museum assigned four scholars: Dr. Harry L. Shapiro, Dr. Gordon F. Ekholm, Bird, and Gould, to plan the project. Gould was the one who wrote and presented the outline to the representatives of the Museum's Exhibition and Public Relations departments, and reported to Crabtree that it was well-received (R. A. Gould to D. E. Crabtree, letter, 19 December 1968, AWBLA, Ce.4.4.1.1). It was initially scheduled from September to November in 1969; however, Gould and other organizers were convinced that it required a

better venue than a small hall during the preparation, so it was rescheduled to early 1970 with a larger room (R. A. Gould to D. E. Crabtree, letter, 30 December 1968, AWBLA, Ce.4.4.3).

Crabtree and the Idaho State University Museum were responsible for the material preparation, and Crabtree was asked to demonstrate flintknapping for the media, scholars, and the public at the beginning of the exhibition. Due to year-long field work, Gould had to depart the United States and travel to Australia in the summer of 1969, so Crabtree made and sent all the materials to the museum before Gould left so he could have enough time to arrange the collection. Gould, Bird, and Crabtree were keen to collect quality raw materials as well as to have materials in a variety of stages for the "flint-chipping" exhibition, so they had a two-week flintknapping session at Crabtree's in Kimberly in the May of 1969 (Figure 6.6). Gould seemed to be quite new to flintworking at that point, and Crabtree later wrote to Bird how impressed he was to see how quickly Gould learned pressure flaking (21 May 1969, AWBLA, Ce.1.5.21).

Figure 6.6: A polyhedral core and blades made by Crabtree in the spring of 1969. (Courtesy Alfred W. Bowers Laboratory of Anthropology)

Promoting experimental archaeology, the exhibition was held from February to September in 1970, longer than initially planned. At the exhibition, the materials (a majority of which were newly manufactured for this event by Crabtree) were displayed with pictures of Crabtree making them and organized in order of manufacturing processes (Figure 6.7). They also premiered the films of Don Crabtree's lithic experiments produced by the Idaho State University from 1968 to 1969. The demonstration received so much attention of reporters and journalists that it was broadcasted on TV, and newspaper articles were written (R. A. Gould to D. E. Crabtree, letter, 19 December 1968, AWBLA, Ce.4.4.8).

Figure 6.7: A series of slides presented at the Man's Oldest Craft Revisited exhibition. (Courtesy Alfred W. Bowers Laboratory of Anthropology)

An Introduction to Flintworking (1972 and 1982)

"There is nothing as potent as experiment for verifying lithic techniques (2)." One of the entries of Crabtree's bucket list was to produce a detailed guidance in stone working technology that would be accessible at every university, and here it is first published in 1972 and republished in 1982 as an occasional paper through the Idaho Museum of Natural History (R. W. Dana, biographical draft, AWBLA, Ce.24.5). While keeping himself busy in giving demonstrations at universities and conferences (Figure 6.8), Crabtree's hope for spreading experimental archaeology and replication as an approach in lithic technology took shape with assistance from his students Guy Muto and Christine Lovgren, Earl H. Swanson, and Mary Keeler.

Figure 6.8: Crabtree demonstrating the chest crutch technique in 1972. (Courtesy Alfred W. Bowers Laboratory of Anthropology)

Experiments in Replicating Hohokam Points (1973)

Crabtree had been working on replicating Hohokam points and one day heard about a collection of them at the University of Arizona. He sent a letter to Dr. Raymond H. Thompson for a request to study the collection in 1968. Dr. Emil W. Haury, another faculty member who had been working on the Snaketown site, was informed about the letter by Thompson, and he sent out a letter suggesting that Crabtree schedule a meeting (E. W. Haury to D. E. Crabtree, correspondence, 4 April to 21 May1968, AWBLA, Ce.5.1.35-36). Crabtree was already planning to visit Arizona that year, so they had an analysis session in June. Haury was grateful to consult with Crabtree since the stoneworker's point of view added a new insight for the artifact analysis. Crabtree promised Haury to prepare a brief paper on his experimental study of Hohokam points (Figure 6.9), and it later turned into an in-depth article published in *Tebiwa* Vol. 16 No. 1. Although it took a while to shape a form of an article (Crabtree initially planned to write a short one within three weeks since the meeting with Haury), this study was very much appreciated in understanding Hohokam artifacts as Haury wrote, "Congratulations on getting into print your paper of replicating Hohokam points. I was delighted to use the precise reference in my bibliography (E. W. Haury to D. E. Crabtree, letter, 2 August 1973, AWBLA, Ce.5.1.41)."

> It is not my intention to make a flintknapper of every student and anthropologist, but it is hoped that these manufacturing steps will be read and studied in detail and even tried, to some extent, by those concerned with lithic technology. Just observing the final series of flake scars and the form of the artifact, or reading the description of manufacturing techniques is not enough

for complete understanding because an integral part of fabrication is by "feel." There is no substitute for actual experiment [11].

Figure 6.9: Replicated Hohokam points by Don Crabtree. (Courtesy Alfred W. Bowers Laboratory of Anthropology, Ce.76.9)

Comments on Lithic Technology and Experimental Archaeology (1975)

This year marked the last year of his flintknapping field school, but his encouragement toward young scholars to experiment with their own hands had been increasing. "Through experiment, we will not only be more capable of defining techniques, but will also be able to evaluate the many stages necessary to finish the product, and to consider the significance of broken, malformed, and reworked tools (106)." As one of his later papers, he focuses on sharing what he learned from decades of experiments rather than a specific replication study. This article was published as a chapter in the book *Lithic Technology: Making and Using Stone Tools* edited by his long-time friend and colleague, Earl Herbert Swanson.

> It is certainly not my intention to make a flintknapper out of every student, but even making a stab at it will give you a 'feel' for controlling fracture, and will help clarify the mechanical problems involved in making stone tools. So for those who are seriously interested in lithic technology, I recommend at least try it [113].

Lessons Left in His Work

The list of his work mentioned above does not include local newspapers, magazine stories, school reports, and scholarly articles unrelated to replication experiments, yet they are enough to represent Crabtree's passion and devotion to experimental archaeology and understanding his method and technique. Through his replication studies, we can learn that experimentation does not prove the way certain tools are made although it allows us to experience the struggles and devices of ancient crafts. Repeated experimentations bring us to better hypotheses, but it will never be the same as consulted and confirmed information. Another aspect that was strongly emphasized in his work is encouragement toward students in lithic studies and archaeology to experiment. He was aware that replication is not the approach everyone is capable of; however, hands-on experiences would open any person's eyes to *feel* the artifacts, which is far different from just *observing* them. Those lessons were, perhaps, what Crabtree himself learned through his life.

CHAPTER 7: CONCLUSION

The importance of the method and technique of learning artifacts that Don Crabtree obtained through decades of his life study simply cannot be explained in writing. Neither can we see what exactly he could see through his study until we reach the level of the legendary flintworker. However, each story in his life indicates that experimentation gives us different insights into the artifacts than numbers and calculations.

> He (Don Crabtree) doesn't simply set out to make a copy of the final form of an attractive or especially interesting object, but examines the array of flakes and cores associated with such specimens at archaeological sites. He then sets out to produce a sequence of manufacturing steps and a duplicate of the archaeological specimen [E. H. Swanson, comments on a museum periodical, AWBLA, Ce.17.3.1.31].

The initial purpose of this project was to bring the achievements and contributions of Don E. Crabtree in the field of experimental archaeology together so that future scholars could learn more about the development of academic flintknapping. This idea was designed prior to learning that there was only a little growth in experimental lithic studies after his time, and thus the goal of this paper shifted to the promotion of hands-on approaches that Crabtree's life stories emphasized. As they show, experimental study certainly is not limited to lithics. As a part of this project, I conducted an experimental study of Klamath fishing tools (Appendix D). This experience indeed brought me to a deeper understanding of Crabtree's teachings. Any material culture could be addressed with the eyes of craftspeople.

With the use of modern technologies, numbers in research data may suggest tendencies or patterns; however, staring at such data does not let us *feel* the process, technique, or technology of ancient peoples.

Research Questions Revisited

Throughout the previous chapters, the research questions were addressed.

(1) What brought Don E. Crabtree to become a flintworker?

The initial meeting with Native Americans in Salmon, Idaho, and the "payments" by his next-door neighbor for errands when he was three years old were what stimulated Crabtree's inquiring mind to later become one of the greatest stone workers in the world.

(2) How did he become a master flintworker?

Although he has been known as a master flintknapper, it took him decades to perfect his techniques. An astonishing fact was that through the development of his skill, he remained flexible with styles, such as holding positions, flaker application, and material selection, that ultimately allowed him to increase objectivity in his studies. It was the long-time yearning to understand Native American tools and cultures that kept him going through all the obstacles in his life, and his humble attitude towards experiments, skill, and knowledge grew until the day he died.

(3) What was he like outside the flintknapping world?

Through learning of his life and interviews with his friends, this study reached the conclusion that there was no Don Crabtree *outside* the flintknapping world. From the introduction to Native American arrowheads when he was a little boy until the day he left this world, there was no time he was not employing the skill

he learned outside of flintknapping toward it. He was a modest and caring person; for as much time he spent devoting himself to flintknapping, he spent equal time for his family, friends, and students, yet there was not even a moment when Crabtree was something else but a craftsman.

(4) What was the most significant influence he left on the field of lithic studies?

The most significant contribution to lithic studies Don Crabtree left was probably the establishment of a detailed handbook that has been used as a teaching reference for lithic students and scholars. It ensured that later generations of archaeologists have something to go back to when they study stone tools. What he had done through his life was truly extraordinary, as Bordes once said, "If Crabtree had lived thousands of years ago, he could have taught ancient man a thing or two about tool making (Sunday Penson, biographical draft, 13 May 1979, AWBLA, Ce.24.8.1.7)."

However, the most important contribution he had left to archaeology, seemed to have resulted from the series of demonstrations, lectures, and field schools. Crabtree was capable of letting people see and feel how his methods and techniques can help them understand the technology of artifacts. Of course, nobody could inherit his decades of practice by a month of study with him or years of experience. As Flenniken said, Crabtree was the master of this art (J. J. Flenniken to D. E. Crabtree, letter, 11 August 1975, AWBLA, Ce.4.2.22). Nonetheless, Crabtree could show people what he had experienced and learned through decades of experiments. As a result of his interactions with those who are passionate about archaeology, Crabtree even initiated the expansion of the field of study after his time.

(5) What were his hopes for the future of academic flintknapping?

The answer to this question was not found in a single piece of his work, but in all his publications, demonstrations, lectures, and his life itself. He was always aware of the varying degree in flintknapping skills of people, yet believed in the significance of experiments in lithic or any processual study of artifacts. Although he was rather disappointed at the fact that his effort produced only a few master flintworkers, he seeded the passion for stone working in amateurs and professionals alike.

Reflections in Stone Tools

If you were a flintknapper, your reflection in stone tools would show your artisan side. As a born scientific inquirer, I believe the reflection of Don Crabtree rather showed his stories as re-living ancient technologies than just a part of his talents. Although flintknapping was just one part of the numerous skills he mastered, it represented the central part of his life. Experimental archaeology in lithic studies was Don Crabtree's life story, and his story still encourages archaeologists to see artifacts through the eyes of ancient people rather than just to observe what they left or imagine how they lived. Devoting his life to flintknapping was to show his respect in understanding, or at least interpreting, the ancient ones. Archaeology is not just about numbers and observations analyzing lost cultures. It is about understanding human beings who lived before us from the materials left behind. By revisiting Crabtree's life with learning and sharing beyond who he was in scholarship, my hope is that this work allows everyone to reconsider and embrace the possibilities of hands-on experiments to archaeologists.

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APPENDIX A: A LIST OF CRABTREE'S PUBLICATIONS

1939

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1964

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1966

A Stoneworker's Approach to Analyzing and Replicating the Lindenmeier Folsom. *Tebiwa* 9(1):60- 73.

1967

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1968 continued

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The Alchemy of Time.

Ancient Projectile Points.

The Hunter's Edge.

The Flint Worker.

The Shadow of Man.

1973

Experiments in Replicating Hohokam Points. *Tebiwa* 16(1):10-45.

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1974

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APPENDIX B: CRABTREE'S FIELD SCHOOL STUDENTS

1969

Paul Sneed

Jeffry Maugher

Lucy Lewis

Barbara A. Purdy

1970

Karen S. Stockman

Carl Phagan

Guy Muto

Irwin Rovner

1971

Christabel Lacy

Ruthann Knudson

Bruce Bradley

Hiroaki Kobayashi

Paul R. Katz

Susanna R. Katz

Payson D. Sheets

1972

William Statham

Peter Bleed

Alaric Faulkner

Albert Goodyear

Joel Gunn

Chris Lovgren

1973

J. Jeffrey Flenniken

John L. Fagan

Are Tsirk

Elenor J. Rosenthal

Andrew Stewart

Quentin Bass II

1974

Harriet Blitzer

Terry Alldritt

Phillip Shelley

Alice Benefer

David Overstreet

Dowinique Grorive

APPENDIX C: THE IRB AND PRIMARY INTERVIEW QUESTIONS

The Institutional Review Board (IRB) process ensures a researcher to provide ethical protocol and confidentiality rights to participants and protect their welfare. This project was certified as exempt by the IRB at the University of Idaho on April 18, 2017. The project process and purpose were explained to participants with an Informed Consent Form. This form and transcribed interviews are securely managed and stored by the researcher.

Question 1: Through your interactions with Dr. Don Crabtree…

Question 1-a: How do you describe him as a teacher?

Question 1-b: How do you describe him as a person?

Question 1-c: What was the best lesson you learned from him or his work?

Question 1-d: How do you describe him during flintknapping? Was there any remarkable change in his character, posture, etc.?

Question 2: There are numerous publications by him…

Question 2-a: Which work does the best represent him to you?

Question 2-b: From which work have you been influenced the most?

Question 3: Do you sometimes find yourself strongly connected to those pioneer-time academic flintworkers' will (passion, volition, ambition, etc.)?

Question 4: What is the best story about Crabtree that makes you feel "that's so him!" you recall?

Question 5: What made you decide to participate in his lithic technology field school?

Question 6: Why did you choose to incorporate the experimental approach in your work?

Question 7: What do you emphasize in your teaching?

Question 8: What do you seek in the future academic flintknapping?

APPENDIX D: BEING TAUGHT HOW TO FISH—AN EXPERIMENTAL STUDY

To better understand Don Crabtree, I conducted a brief study on making bone fishing tools with an improvised lithic toolkit. Rather than the majority of Crabtree's work on replication of flaked stone tools and analysis on techniques, my experiment resembles the aspects of *Experimental Manufacture of Wooden Implements with Tools of Flaked Stone* article. This project was performed in order to *feel* the experimental process that Crabtree emphasized, not to achieve perfection in flintknapping nor to conclude the Klamath fishing tool manufacturing process. It was my first attempt of replication and designed for a class project in ANTH 543: Plateau Prehistory under the instruction of Dr. R. Lee Sappington and presented as a poster at the 70th Annual Northwest Anthropological Conference. All flintknapping practices I had been doing for two years were imitation of those known-to-be-the-final-stage products, not the duplication of processes. In this study, however, I attempted to duplicate the manufacturing process of bone fishing tools using the technology of the Klamath people.

Study Procedure

The basic process of hands-on approach toward artifacts should be clarified Before discussing my personal insight. Crabtree's study often started with gaining information about specific artifacts. Exceptions to this standard are *Notes of Flintknapper's Experiments* series and other flintworking introductory works, which started with his pure curiosity.

In the polyhedral core and prismatic blade study, for example, he has heard of the artifacts that stimulated his curiosity and visited Mexico to learn more about them. While he tried to make their duplication in his experiments, he also researched on the characteristics

and process. In this case, he found articles that addresses the observations of the native people and early experimental studies. Those accounts described what the local craftspeople used and what technique they performed in the process. Instead of just following the depiction, Crabtree conscientiously analyzed the data with his own experiments if everything described in the accounts sounds logical. After some adjustments, his actual replication study begins. In many cases, however, he tested the techniques that were theoretically eliminated so that the experiments would produce a holistic view of the matter. As a research process, he prepared raw materials first, then chose a suitable toolkit. Through repeated trials and recording every outcome, he would figure out the most rational procedure. After examining the consistency of the test result, he would analyze the artifacts with the manufacturing process he found the best, and discusses what his experiments suggest and what would be desirable to be addressed further.

This study aimed to better understand the traditional lifeways of the Klamath people of southcentral Oregon. In *Handbook of Native American Indians Vol. 12*, some of the Klamath fishing tools were described as "unique" among the Northwestern cultures, but none of the early ethnographies or archaeological records showed much understanding on those tools (Howe 1968; Spier 1976; Stern 1966, 1998a). Through my initial research, only a few collections of fishing tools appeared different from the Plateau standard. However, there was only a little consideration over each type of fishing tool, and it did not provide further explanations for Klamath lifeways, such as the origin, manufacture, and specific use of those tools. Although barbed hook and gorge represent only a small part of their seasonal activities, a deeper appreciation for cultural details leads us to better understand the ancient ones.

Cultural Background

The Klamath, often recognized as one of the Plateau tribes, traditionally lived near water year-round (Barrett 1910:242-243). Their culture shows repeated influences from various adjacent traditions, yet it developed into a somewhat unique culture (Howe 1968; Spier 1976; Stern 1966, 1998a). They moved around and beyond their territory to gather plants, hunt animals, and fish. Observing the variety of the Klamath fishing tools, it seems that much of them resembles the Plateau tradition; a large quantity of salmon and trout were caught with nets in season (Hewes 1998:620-622). However, studying minor fishing tools help us understand details of their seasonal activities and lifeways.

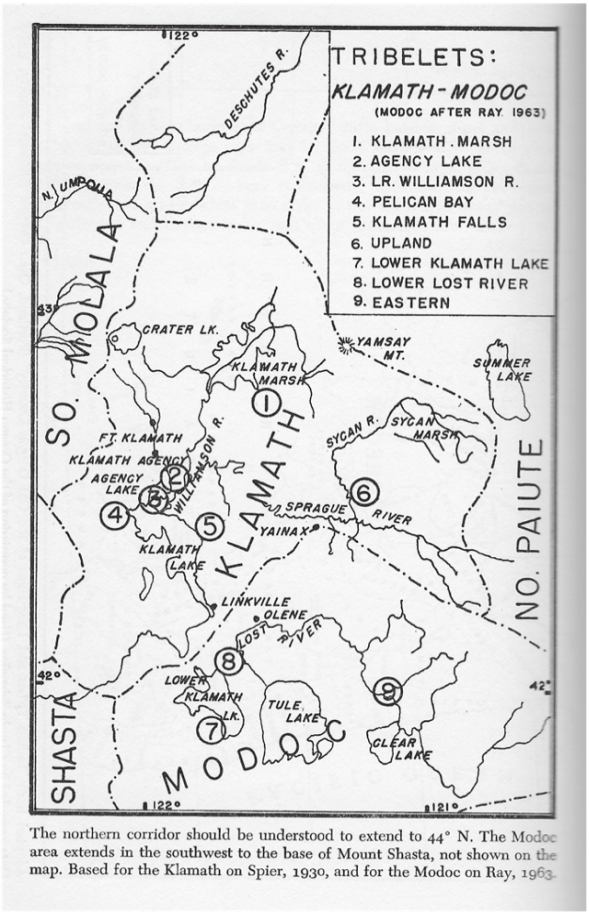

Figure D.1: Klamath Tribal division (Stern 1966:280)

The Klamath traditional territory is in southcentral Oregon spreading north near the headwaters of the Deschutes River within the Cascade Range, east toward Summer Lake, south toward Oregon-California border, and west toward the Cascade Range (Spier 1976:8-10; Figure D.1). The Modoc tribal traditional territory was adjacent to the Klamath's at the southernmost tip of the Klamath Lake into California, and these two peoples somewhat shared cultural and political aspects although they show different influences: the Klamath from the Plateau and Northwest Coast and the Modoc from the Great Basin and California (Stern 1998a:446-447). The region is generally on an elevated plateau on the east side of the Cascade Mountains with an abundance of vegetation and various fauna (Spier 1976:8). A shortcoming of the location was that its high elevation resulted in heavy snowfalls and long winters; the inhospitable winter locked people up in their villages for about four to five months per year, which constantly drove the people into starvation (Stern 1998a:447).

Preparation for the Project

The Klamath people traditionally used a wide range of fishing tools due to the high dependency on all-season fishing (Stern 1998a:448). As mentioned earlier, the Klamath culture generally shows influences from the Plateau, Northwest Coast, and California traditions (Spier 1976:224-238). While fishing nets resemble much of surrounding traditions in the Plateau, gorge and double-barbed hook can be best related to the Northwest Coast traditions (Figure D.2). The material, however, cannot be learned from the Northwest Coast since its environmental setting does not match the Klamath territory's.

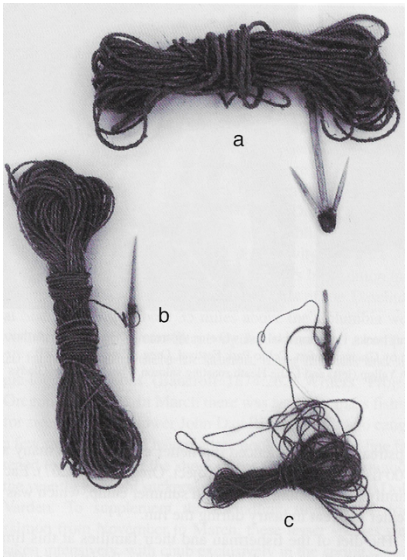

Figure D.2: The Klamath double-barbed hooks (a, c) and gorge (b) (Hewes 1998: 623)

The Klamath Seasonal Round (Fishing and Hunting). The most abundant season of the Klamath was summer; fishing continued from spring, plants got ready for harvest, and hunting season started. Summer hunting game: antelope, mule deer, and mountain sheep, were caught using bows and arrows with dogs (Barrett 1910:246, Howe 1968:36-37). Continuing from spring, plenty of salmon and sucker were caught with nets, and mullet and other bottom-swimming fish were caught with spears (Spier 1976:150-151).

Their short fall season was spent preparing for the long winter. As in summer, gathering wide range of plants, fishing, and hunting took place. When fall arrived around September, a deer drive took place (Stern 1966:14). While some women participated in the drive, many moved on to berry, camas, and plum gathering. Waterfowl and small animal hunting were also done by some men until the first frost (Stern 1966:14). Some parts of the Klamath territory had salmon run until mid-fall, and men fished salmon, smaller fish, and chub with nets (Spier 1976:147-148). In mid-October, each group moved back to their winter villages preparing for the long winter (Stern 1966:15).

As heavy snowfall trapped them in their winter villages, the people's hope was to occasionally catch fish so that their provisions for winter would not run out until spring came (Stern 1966:6). Winter fishing is different from other seasons. The seasonal fishing implements include hooks, lines, traps, spears, and clubs (Spier 1976:149-154). With those tools, the Klamath mainly fished minnows, mullets, and little whitefish (Spier 1976:148). At the end of winter, suckers and trout brought spring to the Klamath (Howe 1968:134-135).

Once winter met the end around March, sucker, salmon, and trout season started along the Williamson and Sprague rivers (Stern 1966:11). Fishing tools varied from dip nets, gill net baskets, two-pronged harpoons, to multi-barbed spears (Stern 1966:12). The spring fishing was a whole village work; men went out to fish and women cleaned fish for drying and cooking (Stern 1966:12). While trout fishing continued throughout spring, some people moved on to root digging and waterfowl egg gathering in mid-spring (Stern 1966:12).

In order to pass the harsh winter days, near-water seasonal movement was crucial to much of the Klamath divisions. Most of their winter villages were located along the Williamson River because it allowed people to catch fish during the mostly-snowed-in winter (Spier 1976:147-148). The bone gorge and double-barbed hook were for fishing in winter as a hand-held fishing line and night-time sinking trap for other seasons (Spier 1976:154). For daytime fishing in winter, people held a line tied to a gorge or hook to fish; for night time use, they set those on a sinker under water and used a club or spear on the fish caught on them in the morning (Spier 1976:154). There would be no other resource than fish they could gather, so occasional fishing was their last resort.

Considering Gorge and Hook Traditions Outside the Klamath. Since I am not an expert on fishing implements, studying the uniqueness of those tools started with looking for

similar traditions outside Klamath territory. Klamath gorge and double-barbed hook are, perhaps, the most apparent examples of connection to the Northwest Coast tradition among the Klamath fishing tools. The exact same type of gorge, called “throat gorge” among the Kwagiutl (Kwakiutl), was used to catch bottom-feeding fish (Stewart 1977:45). Each gorge is knotted to a line made of hemp or linen thread, and several gorge lines are tied to a thick main line that has a sinker at the end (Stewart 1977:45). Among the Klamath, each sinking line had only one gorge attached, and in other occasions, they used gorge and hook as a hand-held line as well (Spier 1976:154). The Klamath lines were made of milkweed and nettle, believed to be stronger and less visible under water in their territory (Barrett 1910: 250-251). Barrett (1910:251, Plate 22) and Spier (1976:154) categorized gorge together with double-barbed hooks for fishing salmon and trout; however, gorge could have a different purpose from double-barbed hooks considering its usage among the Northwest Coast and the amount of mullet caught by the Klamath (Howe 1968:134-136).

The exact shape and material of a double-barbed hook, on the other hand, was not found within the Northwest Coast region, yet there were a few hooks that show resemblances to the Klamath hooks. The closest shape would be trap hooks among the Coast Salish and Makah. Although their hooks were made of wild crabapple thorns and the string materials differed, the shape of them looks very similar to those made by the Klamath. The other resemblance was found in a gaff hook tradition among the Tlingit. Their gaff hook with bone barb had only one barb and was relatively bigger (Stewart 1977:75); however, its shape and fixing technique reminds us of the Klamath double-barbed hooks. It is used mainly to catch salmon from a platform or a canoe among the Tlingit just as a group gaff fishing recorded at the Celilo Falls in 1931 (Hewes 1998:Figure 4). This tool worked well

both during daytime and nighttime and was effective even in unclear water since a fisherman can feel the movement of salmon through the shaft (Stewart 1977:75). A gaff technology, however, was not present within the Plateau area during traditional time (Howe 1998:622), yet a similar tool was present in the northern Plateau area (Hewes 1998:635, Figure 14).

Those tribes in the Northwest Coast utilized a club on the fish caught with gorge traps and hook/spear fishing just as the Klamath (Stewart 1977:54, 62-63). Hewes (1998: 622) reported some basic fishing methods, such as a gaff, canoe, and basket, popularly used among the Northwest Coast people, were absent in the Plateau area at an earlier time. Some of the articles that discuss traditional living among the Klamath reported a gorge and hook as additional tools to catch fish outside major activities (Spier 1976:154; Barrett 1910:250-251). None of the Klamath ethnographic record nor archaeological report, however, provides enough details of those minor tools to indicate specified use. The gorge and double-barbed hook seem to work for different occasions due to its shape and based on what the Northwest Coast tradition suggests.

While comparing the Klamath fishing tools to other tribes' tools suggested cultural relations among the Pacific Northwest, it also added some questions on the gorge and double-barbed hook usage. It seems that past research looked over gorge and double-barbed hook since their contribution to the annual fish was incomparably lower than the major methods. However, the Klamath life was supported by these trivial technologies. They were most actively used during winter with little to catch, but they supported the Klamath people to pass their most inhospitable season. The Klamath were truly a fishing people all year. Surely, the Plateau fishing tradition was present and the major seasonal activity for the Klamath. However, minor tools, such as gorge and double-barbed hook, should also be

considered as representative figures of people because the presence of these tools can make the culture distinct. The specific usage, however, requires further research to define in detail.

Replication

The Klamath material culture recorded by Howe (1968) consisted of stone, bone, and wood tools. Most fishing tools, except for net sinkers, lines, and traps, was made of animal bones. However, there was no specification on the bone material. Instead of following the traditional materials among the other tribes' similar tools mentioned earlier, this project weighs more on the traditional subsistence factors for material selection. Thus, I would experiment with various bone materials mentioned in their seasonal activities (hunted animals and birds).

Material. The gorge and double-barbed hook are relatively small and thin; a gorge is about five centimeters long, whereas a hook ranges from three to seven centimeters (Hewes 1998:Figure 3). Based on the availability and seasonal activity in the area, animals that the Klamath had an easy access were waterfowl, including large birds such as swan, crane, and goose, deer, and occasional elk (Spier 1976:156-157). Waterfowl bones are very thin and fragile compared to larger mammal bones, yet they require less work. Although larger bird bones are used to make whistles and beads (Howe 1968:210-211, 223), they did not appear in recorded fishing tool material. However, bird bones are more likely to break and decay, which results in them being lost from the archaeological record. To make sure of the merit and demerit of using bird bones, this project would make a few tools out of them. Elk bones are thick and tough; however, it requires considerably longer time to process even with bashing method (explained later). This project made a gorge and double-barbed hook from elk bone with sawing method (explained later) since the bashing method did not work out

well, but it seemed impractical. Deer bones are reasonably thin and durable. Among all parts of a deer, the metatarsus (also known as cannon bone) would be the best candidate for replication considering the size of those tools, durability, and practicality. In addition, Stewart (1977:36) mentioned deer and elk leg bone use among the Northwest Coast. Therefore, this project would try both methods using deer metatarsi.

The aspect of this project that had the most trouble getting information on was stone material. Barrett (1910:253) mentioned the use of obsidian and flint; however, there was no indication of quarries. Howe (1968) produced a very detailed account on the traditional material culture among the Klamath tribe including numerous pictures of artifacts; however, neither did he specify stone tool material except for obsidian. By the look of these pictures, it appears that much of flaked stone tools were obsidian, but there are a considerable amount of basalt and flint looking tools as well. Obsidian flakes, however, were too brittle to manufacture deer or elk metatarsi. Therefore, this project utilizes basalt and flint.

Manufacturing Processes. Replication starts with preparation of a toolkit. In this replication study, I used elk leather to protect my lap, a fist-sized ordinary river cobble as a hammer stone, flint unifaces, flint and basalt flakes, abrading stone slab, and a copper bopper and pressure flaker in stone working for convenience. Uniface flakes were replaced whenever they became too small to hold. The study by Stewart (1977:36) mentioned the use of a hafted saw, but this study used only expedient tools. As the main materials, this project used deer metatarsi, turkey wing bones, imitation sinew, and Douglas fir pitch. For lines, although nettle and milkweed threads were used among the Klamath (Barrett 1910:250-251), hemp cords substituted them because of their availability.

This project attempted two different methods to make preforms: bashing and sawing processes (Stewart 1977:36). Bashing method (Figure D.3), as the name indicates, utilizes a hammer stone to smash a bone into pieces. It can also be done by striking a bone against a hard surface, such as a stump and rock after making some cracks. This method claims little amount of ready-to-use preforms, but it takes only several strikes to make one. The bashed bones can result in big pieces that need further modification to become desirable-size preforms, and in that case, the sawing method follows to split those pieces. Interestingly, sawing the bashed pieces takes more time than the work on sawed pieces due to the irregular shape, which often causes minor injury as well. In this method, it takes five minutes to create a preform if you are in luck, but it takes about 60 minutes on average with a sawing retouch process. The preforms made through this method vary in size and shape, and the method itself is not promising. It can make five preforms in five minutes from one bone, but it can also make only imperfect pieces from five bones.

Figure D.3: Bashing Method—left: pieces require sawing retouch, center: successful pieces with waste, right: stages of post-selection and retouch.

Sawing method (Figure D.4), on the other hand, utilizes a uniface to create grooves on a bone to split it into pieces. The use of a uniface was decided based on prior practices. A biface was not sharp enough, and it created a broader groove instead of a deeper one. An unmodified flake was sharp enough to create shallow cut marks on the surface of bones but

too brittle to saw a groove. A uniface worked best. An unmodified side kept sharp edge to saw grooves and the flaked side prevented breaking.

Figure D.4: Sawing Method—left: removing tips, center: making plates, right: stages of plates to preforms.

To begin the sawing method, remove each end of a bone and make it into straight tube shape. Second, make grooves lengthwise on each side to split it into two plates. During this stage, it is important to work on both sides simultaneously to avoid undesirable fractures. Using a flake without modification, shave a rough surface of the plates so that each piece has a smooth, flat surface on both sides. It takes less time to flatten a surface by scraping than abrading (Flenniken 1978:63). Finally, section the plates and create grooves on these plates to create thin, small stick parts. It takes about 11 hours to finish one piece of bone. However, it can make about 14 preforms from one piece of bone, and thus each preform takes about 45 minutes. At a glance, sawing method takes longer than bashing method; however, sawing method saves materials and its result is predictable. Their size and shape are identical, and sawing method does not create inner fractures that bashing method results, which weaken the finished products.

Once a selection/preparation of preform is done, the method would be the same. With an abrading slab, shape each rectangular strip of bone into sharp pointed sticks like thick two-sided toothpicks. It took less time using an abrader than a flake at this point because one stroke removes more and equally with a flat abrader. Since fishing tools are not

expedient tools, it is important to keep them reasonably thick so that they would not break by one fish swallow. With this thought, a sample bird bone gorge made of turkey bone seems impractical; its thickness is only one millimeter (Figure D.5). In shaping preforms, bashed pieces also took almost twice as long than sawed pieces. Average sawed pieces took 30 minutes to an hour to shape. When each piece is shaped, optionally make shallow grooves to secure a line. A gorge should have grooves on its center, and a hook requires grooves on its tips. In addition, a center piece of a hook should have notches on both sides where the barb pieces would be fixed; it is very difficult to fix barbs without indentations on the center piece since the surface of shaped bone pieces are rounded.

Figure D.5: Bone gorge made of a turkey wing bone.

Fishing lines would be made with hemp cord. Although, fishing lines do not necessarily fall into the specific timeline here, I decided to include this stage to find out a more accurate time spent on the tool making. Hemp cord this project used were even and smooth that made it easier to twine into fishing lines. In an hour, from 130 to 170 centimeters of fishing lines were made. For the main string tied to a line sinker, three fishing

lines would be braided together. One gorge or hook sinking trap requires one main line and one fishing line fixed to the tools. Therefore, one would take about 3 to 4 hours to make a set of twined lines for a trap.

When all the parts are ready to assemble, imitation sinew and pitch were prepared. A real sinew could take hours to prepare, but imitated sinew was ready to use. Pitch, however, needed to be heated up. Gorges were tied with lines around their center grooves and fixed using pitch. Later, however, it became obvious that applying the pitch first and tie the fishing line on top would keep the gorge skinnier. For double-barbed hooks, hold parts together and bind them up with imitated sinew and fix the joints with pitch. They secure the hook parts together, and pitch makes tools durable under water (Barrett 1910: 250-251). This process took 5 minutes to make one line of gorge and 30 minutes to make one hook (Figure D.6). In addition, it took one to three night under cool temperature to solidify the pitch. When the pitch is boiled down, however, it took less time to solidify although it became less sticky.

Figure D.6: Assemblage—left: Assembled gorges and right: double-barbed hook before and after barb part assemblage.

Result

The two methods for making a preform seemed that both could be utilized depending on the occasions. While bone supply is limited every year, people's time for manufacturing

was also limited. Considering that the Klamath people prioritized fishing over hunting, there might be less bone material and a higher need for fishing tools. Since the replication process suggested that there was not much of a time difference between the bashing and sawing method (Table D.1), my preference at the end leaned toward the sawing method since it was assuring. However, the bashing method seemed more practical as an everyday work because sawing bones all day was tiring and, to note, more than three to four hours of bone shaping a day left blisters and cuts on my hand.

Table D.1: Process time of each method in minutes.

Process	Preform	Retouch	Shaping	Fishing line	Assemblage	Total
Bashing	5-7	0	60	180-270	5-10	250-347
Bashing + retouch	5-7	60-120	60	180-270	5-10	310-467
Sawing	45	0	60	180-270	5-10	290-385

Making a fishing gorge and hook is a multi-day activity. Through this replication study, it was obvious that making fishing tools requires dedication. While other fishing tools presumably would take the same amount of work, the expected fish caught by net fishing is incomparably higher than the fish caught by gorge and hook lines (Spier 1976:149-154). It simply shows how important having the *minor* fishing tools were to the Klamath. Comparing the process of the tools, a double-barbed hook took almost three times more than the time spent for making a gorge. If they were used for the same fish and worked in the same way, people probably would not make a double-barbed hook since they do not differ in the expected catch. By making these tools, this project concluded that the Klamath gorge and double-barbed hook must have reflected different needs of the Klamath traditional lifeway. For instance, they could have aimed for different fish just like Northwest Coast tools that were not specified in past studies.

Discussion

My study of the manufacturing process of bone fishing tools met with approval from many scholars at the 70th annual Northwest Anthropological Conference. However, this study could only provide assumptions on how the Klamath gorge and double-barbed hook were made with insufficient amount of recorded information on those tools. The replication process reinforced the idea that the two fishing tools studied in this project should be considered individually. The previous studies did not recognize a gorge and double-barbed hook as culturally significant, and they were simply categorized as the same tool. There were considerable differences in the work required to make each type, and those two categorized and analyzed within the same tool type seemed highly generalized. Thus, this study suggests to further analyze those fishing tools and their correlation to seasonal activities. Experiments to understand the function of those tools would be especially required to test their usage.

Reasons to Experiment

In two words, replication could be described as *persistent efforts*. It is not just about the patience considering how long the replication process requires, but also the patience to study traditions and artifacts before experiments, then to endure through failures and pains (from cuts, blisters, and such). If the process is so time-consuming and the result would take us to no further than hypotheses (though very educated ones), why do we do it? The answer to this question only comes clear after we really experience the whole process. There are, indeed, the aspects in material culture that only appears comprehensive from an emic point of view, and the ways to achieve this in an archaeological study are limited. Experimentation widens our perspectives on studying ancient cultures and brings our minds closer to their

artifacts. It was what Crabtree emphasized through his articles, field schools, and demonstrations.

APPENDIX E: CONTACT INFORMATION—ALFRED W. BOWERS LABORATORY OF ANTHROPOLOGY

For further information, the archival data and Crabtree-made stone tools are available at the Alfred W. Bowers Laboratory of Anthropology at the University of Idaho. The collection includes his correspondence with other scholars, drafts of his publication, pictures, periodicals he subscribed to, replicated artifacts, and his lithic artworks. The following is the contact information.

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University of Idaho webpage for AWBLA:

https://www.uidaho.edu/class/anthrolab

AWBLA webpage that goes in depth on its collections and people:

http://www.webpages.uidaho.edu/bowerslab/