

Relevance of log crib research, renovation and development in Estonia and the world

Douglass C. Reed

Abstract

In 1972 I was apprenticed to an elderly mountain man steeped in the traditions of log crib construction. Cyrus Paul Lewis taught me the skills of 18th and 19th century rough and finish carpentry as it pertained to folk architecture. The craft training of log construction added on top of several years experience as a modern day carpenter enabled me to build a company that restored houses and other log buildings all over the United States from 1974 to 2006. In 1978 I continued my formal education in anthropology and preservation specializing in log structures at George Washington University in Washington, D.C. Having read all the authoritative works on log buildings and compared them to what I was learning in the field, it was obvious there were many gaps in the collective body of knowledge concerning the development and dissemination of log crib structures.

During a brief first trip to Europe, it was easy to see that the log crib buildings in Alpine and northern Europe in no way resembled the American log cribs erected for three centuries by the settlers arriving on the American shores and those pushing west to establish their farms and build their houses. It became clear American scholarship had a long way to go in understanding the log crib, its development, technology and dissemination throughout the world much less in America. In 2009 a quest to fill in some of the gaps was begun.

After four years of intense research with field trips to Turkey, southern Europe and ranging all the way north to the Scandinavian and Baltic countries ringing the Baltic Sea two findings became very clear. First, no one person can possibly conduct the massive research needed to fully understand origins, technology and dissemination of the world's log cribs. Secondly, it was apparent, contrary to what had been declared in former publications, that Europeans did not transfer their log crib technologies intact to the eastern shores of the US. Rather only a small number of scattered details mixed with a few processes of material manufacturing and building commonly used in Europe were configured into what was to become an American log crib style almost from the first settlements.

These discoveries bore witness to the fallacy of single or two person research efforts that resulted in broad, sweeping declarations of origins and disseminations concerning log crib technologies. Most authors were not familiar with the professional training needed to fully understand the hands-on traditions of building with logs and have largely missed the facts concerning the developmental history of log buildings in a specific country and the world. Far more collaborative research between the multiple disciplines and experienced master craftsmen is needed.

Even in Estonia further studies are needed to determine how the dual-purpose barn-dwelling developed and where it originated. With seven centuries of multiple foreign occupations responsible for bringing in many different types of technologies from their occupiers' homelands, Estonia is a perfect research area for studying and tracking details of development within the country and tracing them back to their origins.

Estonia is not the only country where a rich tradition of log construction needs further research. Further Continental and world-wide log crib studies are needed on a global basis. National surveys must be completed and all resulting data shared to a central data base and collated for developmental research to take place. This work is vital to the understanding of the origins, development and disseminations of log crib technologies throughout the world much less the US and the European Continent.

The results of multiple global log crib research efforts will have far reaching effects in craft training, log crib technology training, and in reintroducing relative millennia's old technologies in a modern day world rife with toxic fixes that do not work very well in new construction. New restoration techniques of wooden buildings will be learned and culled from the research. Environmental considerations that reduce CO₂ levels, green house effects and increase local community cohesiveness all will benefit from global in-depth research efforts to fill in the missing information gaps in log crib development and technologies.

In order for all this research to be coordinated, collated and disseminated, a single global organization dedicated to the study of log crib development must be formed. A new organization focused solely on ferreting out log construction histories, developing techniques of restoration, forest management and timber conservation is necessary in part to provide continued introductory and higher level job training for a log crib work force. The research and training is imperative if the world is to maintain and develop additional higher paying jobs, lower taxes, maintain existing log structures, wisely use limited natural resources in an efficient manner and better living conditions for millions of people.

Keywords: log crib building, log crib research, technologies, tradition, vocational training, sustainability

Introduction

During one of those twists and turns life throws at us, a career path chose me instead of me choosing a career path. I was unintentionally thrust into the world of preservation, restoration and sensitively renovating older buildings. My respect for and love of old buildings grew to the point where the older the house and the worse its condition, the more I enjoyed the work. I was challenged with saving the buildings which everyone else said to tear down. My team and I loved doing what other people thought of as impossible. Early in my career I sought to learn all I could about log crib construction in order to be the best restoration craftsman possible. As a result, for forty-four years I have been studying, among other things, all aspects of traditional log crib construction. My focus was not in the floor plans, building shapes and decorative architectural features of a particular style or period that everyone else was studying forty years ago and continue to study to this day. My deepest interest was in the *how*. What kind of trees did the early builders select for particular jobs, how did the early builders prepare the trees, how did they build the walls, stabilize the openings, make their log houses warm and, as important as anything else, how did they take care of and repair the log houses they built a few years after initial construction or 20, or 50 or 200 years later? There were thousands of questions for which I sought and am still seeking answers.

My early research focused only on the United States. Any book, magazine, article or author located was read if the core subject pertained to log structures. Parallel to the readings, multi-thousand building surveys of counties and states were performed. A great deal of time was spent in taking apart derelict log buildings to better understand their construction. Many conferences were attended on a wide range of subjects such as native craft traditions, tools, vernacular architecture and preservation. While many stories, facts and findings have been shared with trusted colleagues over the years, it was always the older Catoctin Mountain folk who were consulted because they knew the “inside story” of how to build the American log houses and out-buildings that sheltered their lives.

More than any other source, living history directly pertaining to vernacular log architecture, 18th and 19th eastern mountain culture, tool technology, and forestry as practiced in Maryland’s Catoctin Mountains was learned from one of those mountain men who achieved a third grade education before he was forced to leave school and go to work. He and his people, many of whom at times lived in utter poverty, were isolated from the greater world by living in a rugged patch of heavily forested mountains located only sixty-five miles from Washington, D.C. By working with



Photo 1. In this 1973 photo Paul Lewis sharpens his ax while Doug Reed finishes hewing the side of a log. Demonstration for the public at the Catoctin Mountain National Park, near Thurmont, Maryland, US. *Photo by Patricia Reed Murray.*

him and interviewing the oldest members of the remaining mountain culture, much of what was learned during the college years was either directly refuted or fleshed out in ways that cannot be learned only from books, filmed stories and university professors no matter how well-intended and researched they may have been.

It all started in 1972 while visiting the Catoctin Mountain National Park Round Meadow Camp near Thurmont, MD. Old abandoned double truck garages had been fitted with stage sets depicting typical 18th and 19th century mountain craft traditions. There was a blacksmith, a potter, leather worker, weaver, broom maker and even a full blown kitchen with a wood fired cook stove where an old woman born in 1907 baked authentic sourdough bread. For the spell-binding wonder of all those people demonstrating their crafts, it was in the last of these 19th century vignettes where my life took a dramatic turn. A traditional carpentry shop had been created as one of the vignettes. There was a riving break, shaving horse, axes, piles of oak wood billets, finished wood shingles and stacks of thin wood shavings that emitted their mesmerizing tangy oak aroma.

Sitting on the shaving horse using a draw knife to make an old style wood shingle was a painfully shy man of sixty-nine years. Never before had I seen antique tools. The master of those tools was Cyrus Paul Lewis, Paul to his

friends, born in a small, two-room log house on Old Mink Farm Road seven miles west of Thurmont, MD.¹

Over the next two and one half years I hardly left that man's side. Paul Lewis taught me how to properly use the historic carpentry tools. I would purchase derelict, rusted, broken handled, beat up old tools. It was all I could afford since I was fresh out of military service, out of work and out of money. He patiently showed me how to repair and make the old tools useful again. He demonstrated how to make handles, mount the heads and sharpen blades. Paul explained why wooden handles for tools such as axes and hammers were better than fiberglass or metal shanks, he showed me how to listen for a good sounding saw, and he demonstrated the proper working height for me when working next to or on a saw horse or work bench. There were hundreds of other hands-on traditions and tricks-of-the-trades he taught me as well. His was the best, practical education I ever had on any subject.

We spent countless hours walking the forests. He carefully pointed out the different trees teaching me how to identify them by shape, leaves, bark and wood grain. I learned how to "read" the bark for the qualities of the wood hidden within and how to estimate and roughly measure a standing tree for the number of board feet of lumber it might produce. He made sure I knew where to look for a "stick" of wood that would have certain properties such as a special shape for a handle, the smooth split quality needed for a "shingle" tree, where tough knurled wood with twisted grain could be found by explaining winter and summer slopes on the mountains, the differences



Photo 2. Paul Lewis, 1903–1992, taught Doug Reed traditional 18th and 19th century carpentry skills. *Photo by Gary Finster, courtesy of Herald Mail Co.*

1 Lewis, Cyrus Paul, 17 December 1903 – 22 August 1992, born in the Catoctin Mountains, attained only a third grade education before his father injured himself. Paul was forced to go to work for his family at the young age of thirteen years. His injured father's employer was good enough to give him his father's job and wage since Paul had a very good hand at felling trees and hewing logs. Innately talented, Paul went on to be a master of several crafts: carpentry, timbering, lumbering, blacksmithing, leather working. He was also an accomplished hunter, trapper and built a few traditional log houses for his family and others. He was thoroughly trained and considered by his peers an expert craftsman in 18th and 19th century carpentry methods. He was the mentor who trained the author in the early construction methods of settlement era America.

between a wet and dry locations and protected areas as opposed to windy areas for tree growth. He made me split many cords of firewood before he taught me how to hew a log. And hew logs we did. Paul showed me how to select, fell and limb up a tree. We hewed trunks into beams, made mortises, tenons, wooden pegs and many other components common to log and other wooden buildings.

Near the end of the first two years he was asked to build a small log cabin for a neighbor. He asked me to assist. The long quarter mile foot path down to the site was too narrow and rugged for any vehicle. There was no electrical power. The selected site for the cabin was on a twenty foot wide plateau next to a steep banked, deep stream bed. On the other side of the flat ground was a steeply rising hill. It was forested with oak trees in an area that had last been timbered over sixty years before. During the first site inspection, I finally had to ask my mentor how we were going to get tools and products to the site to build the house. He looked over at me, smiled and, without saying a word, walked back through the woods to his 1951 four-door Plymouth sedan. While we drove back to his shop, he was already thinking of what he needed.

The answer to my question was answered over the next four months. We walked out over the hill above the building site, cut the appropriate trees for the forty-four logs needed for the cabin walls, rafters and joists. We cut the limbs from the trunks and then cut the logs to length. Next he demonstrated the ease with which two men could move logs downhill and snake them to the site. The logs were stripped and readied for the raising. On one of the last days we worked on the cabin together and after we finished covering the roof with wood cedar shingles, he turned toward the low setting sun that had created the rather warm December 4th day and squatted to a sitting position. He began to talk about the mountains, the people and their ways. I guess he felt I was worthy enough to hear these stories.

I learned so much more from this man, his wife and their friends about the old mountain culture, life in the woods, their society, the tough times, the good times and, of great interest to me, how to use the old tools and build houses by hand. Even though the year was 1974, three-quarters of the way through the 20th century, I was fully aware of witnessing a rare and soon to disappear remnant of 19th century culture. The older people isolated in their mountains who were teaching me so many things about life had no modern conveniences for the first half of their lives. Born late in the 19th and others at the turn of the 20th centuries, they grew up with no hard roads, electricity, mail routes, telephones, automatic indoor heating furnaces or indoor plumbing until the early 1950s. Most had no more than an 8th grade education and many less than that. They did know how to read and write, but their world

was very small with most of these gracious and giving people rarely leaving their mountain homes. Paul Lewis was typical of his neighbors having died in 1992 at 89 never traveling more than 80 miles from home. As a community, the mountain people had no choice but to learn the old, hand-me-down traditions of a long established way of life among those rugged hills that began with the first settlers in 1710.

Because of my association with Paul Lewis, seen by the outside world as an old, grizzled mountain man and his young apprentice from the valley learning the old ways, a newspaper reporter wrote an article about the two of us. That newspaper article was syndicated by the Associated Press all over the US. We were instant national celebrities. People filmed Paul Lewis, took pictures and wrote about him. Everyone wanted to know how he did the things he made so well. I was asked to build log cabins and my career was off and running. I continued to ask Paul Lewis for help with answers when I needed him. Paul not only became my mentor, but after a short time, we became known as mountain father and adopted son. After the little cabin project had been completed, it was apparent I needed more formal education to round out my craft training concerning the field of preservation, anthropology and vernacular architecture. While Pappy taught me the work side and construction traditions of the 19th century, he could not inform me of where to get books about log houses; he could not place the log house in a cultural context, he could not teach me about historic preservation. There were many things he could not teach me.

Recognizing the need for more formal education, I went back to college to earn my Master's degree. Having completed all the course work, I moved on into the PhD program at George Washington University in Washington, D.C. I was a sponge soaking up anything I could find pertaining to log buildings. All the well known authors such as Robert Shurtleff,² Fred Kniffen,³

2 Shurtleff, Harold Robert, 1883–1938, studied architecture at Harvard University, Boston, Massachusetts and in Paris. An on again off again architect, he was engaged by John D. Rockefeller as a recorder for the architects leading “The Restoration” project of Williamsburg, Virginia. Shurtleff’s observations and insights were so keen he became the first head of the “Research Department” when it was first formed. At 51 years of age he left the project convinced he knew too little and returned to Harvard to pursue a degree in history. While he continued to work half time on the Williamsburg project, he discovered early on the strong local bias toward all buildings in the Williamsburg and Jamestown region being log structures. His careful research proved there were almost no log structures and he was determined to prove, factually through documentary research, the truth that most buildings were indeed timber frame. His interest in how the myth of log cabins arose and became the stubborn mindset of so many educated people he worked with on the project resulted in a book titled *The Log Cabin Myth* which was edited by his History Professor Samuel Eliot Morison at Harvard and published posthumously.

3 Kniffen, Fred, 1900–1993, professor of geography and anthropology at Louisiana State University, was considered a pioneer in the field of cultural geography. A prolific writer, one of his many notable publications was *Cultural Diffusion and Landscapes*.

Wilbur Zelinsky,⁴ C. A. Weslager⁵ and Terry Jordan⁶ to name a few were read. I became aware of the truth of Shurtleff's history professor, Samuel Eliott Morison, who actually finished Shurtleff's book when in the preface he stated, "Owing to the fact that the study of American history requires no obvious technique or skill, such as the knowledge of a foreign language, it is often undertaken by relatively uneducated people, sometimes with fairly respectable results, but more often not" (Shurtleff 1939: xv). As my career advanced frequent engagements to speak at national conferences were offered which pushed my research efforts further to make sure I stayed true to facts pertaining to log buildings. I have no love of the many suppositions such as are widely considered fact by the vast majority of authors on the subject of log houses.

American scholarship lacking

The great irony of all the formal education was the more I learned from the apprenticeship and personal research side of my education, the more I questioned the early academic author's writings about log structures in the US. While their collective works were majestic in reach and depth, many of their conclusions just did not seem quite right when compared to what I was learning from the mountain people, their craft traditions and from investigating log buildings in derelict condition for construction traditions all over the US and Canada. My early suspicions were confirmed when Henry Glassie tried to discern some type of "language" expressed through designs and layouts used by traditional log house builders in his *Folk Housing in Middle Virginia* (Glassie 1975). His book failed since he lacked one very key ingredient to his background; a total lack of understanding of the traditional log building experience. It was very clear to those of us who were engaged in the actual hands-on work of constructing and/or restoring and researching log cribs Glassie had no building experience beyond a do-it-yourself laymen's perspective. It was

4 Zelinsky, Wilbur, 1921–2013, received his doctorate in 1953 at the University of California, Berkeley, made numerous geographical studies of American popular culture. In 1973, he published *The Cultural Geography of the United States* and with other publications made significant contributions in the field of "folk geography".

5 Weslager, C.A., as he was known to his public, Dr. Clinton Albert Weslager was a prolific historian writing fifteen major books one of which was his 1969 work *The Log Cabin in America*. He taught history at Wesley College and the University of Delaware before joining the faculty at Brandywine College north of Wilmington, Delaware.

6 Jordan, Terry, 1938–2003, was named "one of the most productive geographers in the United States for the period 1945 to 1977". He published *The European Cultural Area: A Systematic Geography* in 1973 as an overview of the physical and human geography of the region. From 1969–1982 he was chairman of the Department of Geography at the University of North Texas. Later he was a prominent professor at the University of Texas at Austin as its Walter Prescott Webb Chair of History and Ideas. Ultimately his interests focused on log structures leading him to a study of American log structures. Later he went to Europe to look for the origins of American log building traditions.

apparent he could not write about that which he had no understanding gained through long years of hands-on experience. No one can. As time moved forward it became a major topic of discussion among various historic contractor groups and professional building organizations that writers without prolonged construction experience could not fully understand the buildings of which they wrote. As a result, I began to question more works and authors as well. Even so, I still held certain researchers in high esteem such as Robert Shurtleff, Terry Jordan and Donald Hutslar⁷ among others.

Any hopes of maintaining a high regard for American academic research efforts concerning log structures were nearly dashed in 2007. During what was supposed to be a purely relaxing vacation trip planned by my dear wife to Europe late in my career, I saw for the first time, in person, European log cribs. I was thunder struck. They did not look anything like what we had in the US. If these were the buildings which the early settlers to Delaware's shores had lived in back in their home countries, why did they build their first log houses so differently in the US? More puzzling was why did American writers go to so much trouble to argue over where the log crib technology came from in Europe that was used so predominately in US log buildings during the three century long settlement and expansion periods of our country? Why do American research authors refuse to acknowledge or simply not even recognize that early settlers to our shores were responsible for the beginnings of the American style log house and not for transplanting duplicates of their homeland log structures?

New research findings

With increasing curiosity, a quest for the answers was begun in 2009. A new round of personal travel and research of log buildings throughout Europe was needed to discern how various countries and cultures built their log houses and outbuildings when compared to US log buildings. After four years of extensive on-site surveys from Turkey through southern Europe and then all the way up through the northern Baltic and Scandinavian countries, two important findings have been identified.

First, the subject of log crib development and dissemination has barely begun and cannot be done by one person. The size of this big world was never more apparent when trying to understand even on a minimal scale the types, forms, technologies and dissemination patterns of log buildings on a global basis.

7 Hutslar, Donald, 1932–2014, after receiving his degree from Ohio State University he joined the history division of the Ohio Historical Society from which he retired in 1995. He was later appointed to the Ohio Historic Site Preservation Advisory Board on which he served until his death. His published works included the book *The Architecture of Migration: Log Construction in the Ohio Country 1750–1850*. His long focus on one area of log migration and details gave him insights other authors missed.



Photo 3. Mexican Troje granary bears a strong resemblance to log granaries commonly found in Baltic, Scandinavian and central European countries. *Photo by Doug Reed.*



Photo 4. Log House on Mauna Kea at Keanakolo, Hawaii island, US, built shortly before 1885. The photo depicts a recently erected structure of koa logs, a very rare species of tree, which grows only in Hawaii. Notice the tightly scribed logs one upon another, the lapped corner notches and untrimmed ends. *Courtesy Eduard Arning Collection, Hawaiian Historical Society, Catalog 1.166.*

Log crib technologies circle the globe. Log cribs can be found not only in countries that have forests and climates that supported the development of log house building types, but in other countries where it would seem unlikely to find log houses such as in Hawaii and Mexico to name only two. There are few national historic structure surveys that break out log crib data for separate study. Definitive answers must wait many more years for studies to better understand the types and levels of log crib resources, the extent of their use around the world and the development and dissemination of log crib technologies throughout the globe.

The second big finding confirmed suspicions that Europeans did not directly or immediately transfer their long established log crib technologies intact during the earliest and most difficult settlement and expansion periods along the eastern seaboard and further into the interior of North America. The initial settlers to the Americas left behind in their home countries old world technologies that had been developed over thousands of years. What they built on the shores of the Delaware in their attempt to physically survive the first cruel, harsh years were very crude, economized versions of what evolved into the new American style log cabin. As a result, most log structures built on the North American continent from the 1630s to the 1850s did not resemble the tightly scribed log-on-log crib buildings in Europe. It was mostly after the 1850s when larger groups of immigrants from a few specific areas came to the US and built their familiar cultural houses and out-buildings such as those they left behind in their home countries.

During the early years though, the facts speak for themselves, only a few intact European building processes and traditional construction details came over from the old world while much of the time consuming technology that took long hours or even days and weeks to consummate was left behind due to the exigencies and needs of immediate survival. More surprisingly, many other details seen in Europe are almost completely absent in America. For instance, commonly used American notches number eight with perhaps one or two more additional notch types lurking unobserved under the sidings of the millions of log houses that remain.⁸ Of the eight known commonly used American notches, six notches were common while the other two observed

8 There are approximately eight US notch types and more will be found with further research. The most common are the half round notch often called a saddle, square, flat, "V", half dovetail and dovetail. Early notches used in the US that disappear from the architectural landscape by 1805 are the crude (unnamed notches that are ill formed by amateur builders), diamond and one lonely cogged notch. A later notch type used in the 19th century was the mitered corner notch. The "V" and diamond notch types have not been found on the European continent. A Finnish architectural dictionary refers to the "V" notch as "the American Notch." The Finns also name what we would call a hex notch (six-sided), they call their diamond notch. The US diamond notch is four sided.

notches were developed and became purely American in form matching no known notch types seen in Europe or so far found in any other portion of the world. The variety of European notches in their shapes, variations, even their artistic forms and uses for specific building designs number over sixty notch types. Since no comprehensive study of notch configurations used throughout the world has ever been undertaken, undoubtedly there are many additional notch designs that will be added to the growing list of North American and European notch types.⁹

These discoveries bear witness to the fallacy of single person research efforts that result in claims of origins of log technology from a single source or place in Europe. Most authors who have painted their narratives with broad brush strokes when describing American origins for log crib technologies have largely missed the facts concerning the developmental history of log buildings. These efforts have proven there needs to be far more collaborative research between the multiple disciplines. Scholarly efforts must join with trained master craftsmen who bring insights into the use of tools, processes and materials imbedded in their “muscle memories” in order to better understand the origins, development, dissemination and continued use and sustenance of traditional log building technologies used throughout Estonia and the world.

Terry Jordan is a good example of an American academic who did the best he could as a single person researching a very large subject. As best a single person could, he performed many years of thorough and far reaching research culminating with many notable books (such as Jordan 1978; 1985). His works concerning the American log crib have been on my shelf since many were first published and are worn from use. I have admired his research for decades and was only too surprised to find late in my career some significant aspects of his conclusions were in need of further research and a broader understanding of the European experience concerning log crib structural development. Statements where Jordan claims the American log cabin descends from the first Swedish/Finnish settlers, does not wholly or accurately answer the larger question of where the American log crib hails from. Works such as Jordan, Glassie and other American authors help us to

9 There are regions of late 19th century settlement in the United States where European immigrants had the time and logistical support needed to transfer almost intact their homeland style of log crib construction practices used for their houses and out-buildings. The Swedes and Finns who migrated upwards of 1,300,000 strong to the north central US from 1870 to 1910, Germans who settled in upstate New York and Russians who built their distinctive houses in the then Russian Alaskan territories before they were purchased by the US in 1859 brought with them a few European notches not otherwise to be seen in the US. There are other later immigration groups who built what they knew from the home countries, but all fall after the Civil War and many much later.

understand the need for a more fully integrated partnership at all levels of disciplines necessary to reach more accurate conclusions of developmental locations and disseminations of the very technology from which the entire world has benefitted.

Every researcher, whether document research or craft oriented, in any way concerned with the study of log buildings needs to step back and look at the available data. The existing data needs to be vetted and the remaining somewhat large gaps identified. A coordinated agenda that supports a world wide effort to study and collate log crib development and dissemination information on an international basis must be undertaken to fill in the remaining data gaps. We must keep in mind Robert Shurtleff's posthumously published book *The Log Cabin Myth* in which he cautiously stated "We dare not boast that we have finally put it (the Log Cabin Myth) to sleep.." (Shurtleff 1939: 215). He knew his effort was only a beginning, and all he asked of his readers was to consult his work before more misrepresentations about Colonial housing were made. He considered his work as a platform upon which to build more of the log crib story. Indeed many advances have been made in our knowledge about log buildings since 1939, but I admire those researchers and authors who acknowledge they do not know it all and state that universal truth.

Further Estonian studies needed

Having exposed the need for more integrated, coordinated, multi-disciplined international log building studies, how can further study within Estonia help? Part of the answer came to light after a six-week research trip to Estonia was completed in 2015 focusing on two goals concerning log structures. An initial goal of the Estonian research trip was to try and flush out details of why so few really old log cribs exist in Estonia when so many other European nations have numerous wooden buildings that are from 500 to 900 years old and in rare instances even older. A second and primary goal of the Estonian research trip was to gain an understanding of log crib buildings; their types, technologies and distributions within the country's borders.

Estonia is a nation slightly larger in size than two of America's smaller states of Maryland and Connecticut. Only recently having gained its freedom in 1991, Estonia is home to thousands of historic log structures. There are only a few extant log buildings that date from the late 17th century. A small number of log cribs date to the 18th century. Most of Estonia's remaining log structures were erected during the 19th and 20th centuries. As with many other countries around the world, Estonia faces the challenge of surveying, tracking and devising means to encourage owners to save many of its

standing older structures popularly believed to be out of date and too expensive to retain for any useful purpose.

Estonian territory was settled as early as 9000 years ago. By the 13th century AD, Estonia was conquered by Germanic tribes from the south. Over the next seven centuries, wars, raids, foreign occupations and continuing strife were multiple political causes that continually burned and ravaged the countryside often leaving the peasants homeless. Add to the earlier foreign raids, recent destructions of WWII, Estonia's ancient log crib building stock was further reduced by the Soviet propensity to force abandonment of buildings, allow valuable heritage structures to decay and even forced them to be demolished.¹⁰ Environmental factors from natural lightning fires, accidental fires, and an environment heavy with humidity further added to the destruction of the wooden building stock of the countryside.¹¹ These multiple destructive conditions denied the Estonian cultural landscape of even small numbers of a much older building stock such as can be found in many other continental nations.

Once the political history and natural environmental conditions of Estonia were understood, it was easy to answer research goal number one. Unfortunately, the answer for goal number two was far more elusive. By reviewing hundreds of the existing standing log cribs one can gain knowledge of the types that exist, the technologies used to build the existing and the distributions of the existing within the boundaries of Estonia. Unfortunately with so few early examples of log structures extant for study, no reliable conclusions can be made concerning the evolutions of log crib technology, except to some uncertain degree, for the last two centuries while other aspects of log crib construction go begging for answers.

It is remarkable how Estonians were subjected to everything the world had to offer except for freedom, ownership, personal choice and any other incentive to improve their lot beyond one of survival. Foreign invaders and occupiers held total power over the Estonian peasant for many centuries. Their houses, out-buildings, lands and even most of their possessions were owned by their masters. Since the peasants had no right to pass on the property they built and inhabited, they lacked incentive to build grand structures with highly decorated features such as found in Scandinavia, Eastern Europe and Northwestern Russia. As a result, building traditions remained relatively unchanged, log crib types remained few in number and traditional log

10 Heidmets, Aile, Tamjärv, Maret. Personal communications, email dated 21 November 2015.

11 Metslang, Joosep. Personal communications, meeting 15 September 2015 and email dated 4 December 2015.

structures such as the chimneyless barn-dwelling were still in use well into the early decades of the 20th century.¹² However, there were a few important instances where they contributed to the development of traditional log construction techniques through ingenious adaptations.

The skills of the Estonian peasants can be seen in the very log houses they built. The thatched roofs rose high above the walls of the houses with wide-spread overhangs protecting their structures for generations. While lacking in elaborate decorations, the buildings were erected with remarkable care and precision. The practical Estonian peasants built their houses to incorporate the evolving technologies needed to dry their crops and provide adequate heat in which to protect their animals and sustain human life.

One of the few easily identifiable Estonian peasant contributions to the world's log crib traditions was not so much the physical development of the dwelling type where man and animal lived under one roof, but more the internal functional improvements to and multiple uses of the farmhouse.¹³ Many European countries from Switzerland and Austria to the northern Baltic countries and Russia have such structures. The archaeological record indicates that by the mid-first millennium AD, long before the first foreign occupations in the early 13th century, Estonians had developed the idea of the winter house by adding a stove. It was with the introduction of winter rye as a domesticated crop in the 11th century that caused changes to the older "smoke house."¹⁴ The unique Estonian contribution to the barn-dwelling type structures scattered all over Europe occurred during the course of further developmental alterations made in the heated room to accommodate crop drying in the autumn.¹⁵

The main alteration included the introduction of cross poles located from three to four feet below the ceilings. Moveable, small diameter cross poles spanned from wall to wall to provide maximum storage capacity for crops in the heated room. After the crops had been stacked on the cross

12 A well-preserved chimneyless barn-dwelling was moved into the Põlva Peasantry Museum in 1988. It was last occupied until 1967 by the daughter of the man who erected the house in the late 19th century. Because these early chimneyless house were modernized and renovated with chimneys, proper heating through "hot walls" and better flues, bigger windows, weatherboarding, porches, new roofing materials, etc, the barn-dwellings continued to be widely used in Estonian villages. It is still possible to encounter hundreds of these traditional log structures on the rural landscapes of Estonia.

13 Tamjärv, Maret. Personal communications, email dated 21 November 2015

14 When a fire was burning in the stove of a chimneyless house, the wood smoke hovered just over the occupants' heads creating what is known as a smoke ceiling. The level of the smoke ceiling was regulated by door and/or wall vents where the smoke could escape to the exterior.

15 Heidmets, Aile, Tamjärv, Maret. Personal communications, emails dated 21 November 2015 and 1 December 2015.

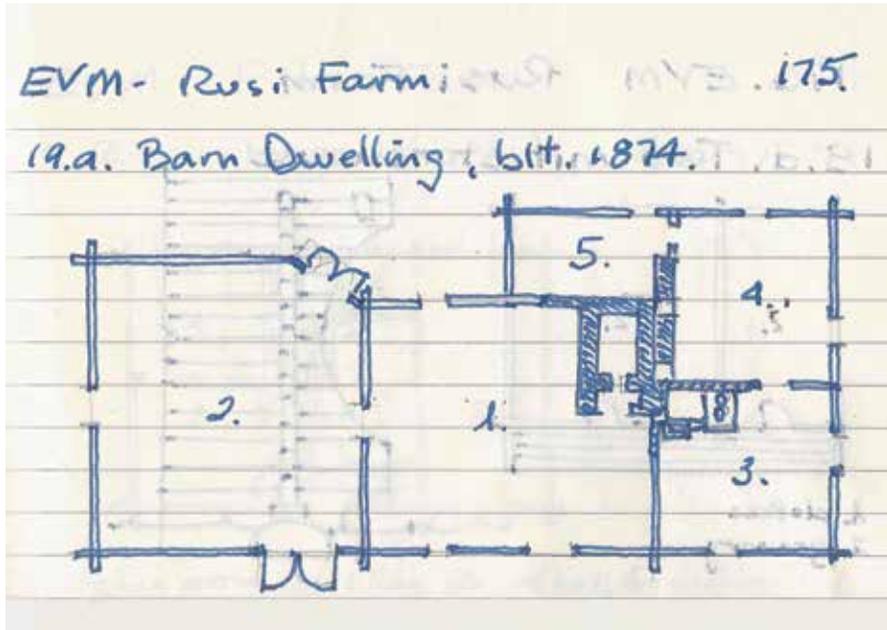


Figure 1. Plan of a barn-dwelling. 1. Kiln room for drying grain. 2. Threshing floor. 3. Big chamber where people worked and slept. 4. Back chamber – a bedroom used for winter weaving. 5. Bed chamber. *Author's field notebook.*

poles, the stoves (also known variously as barn ovens, kilns or drying kilns) were initially fired up for the purposes of drying the grains and grasses. Once all the crops were dried, threshed on the threshing floor and stored, the heated room was cleaned and the farm family along with their hired hands moved into their winter residence. “The kiln room or the grain-drying room served the families as a living room, a bedroom, a work room, a kitchen, a barn, a room to keep one’s farm animals in during the coldest days, and in certain regions even as a sauna, if needed.”¹⁶ The large draught animals (horses and oxen) were usually kept in the threshing room (threshing floor) next to the heated room. The smaller animals such as the chickens in special cages, young piglets and small young calves were brought into the heated room only as needed to keep them alive. After the long winters passed, the family members turned the animals out into pastures and moved to their summer sleeping quarters in the storehouses, hay lofts and private outdoor sleeping rooms. If a chamber was added to the winter house, it first served as a storage area and a summer bedroom into the mid-19th century. It was later rebuilt into year round living quarters.

¹⁶ Tamjärv, Maret. Personal communication, email dated 21 November 2015.



Photo 5. A barn-dwelling (rehemaja) at Põlva Peasantry Museum in Karilatsi village, ca 1860.
Photo by Doug Reed.



Photo 6. Interior view of a kiln-room at Põlva Peasantry Museum, Karilatsi. The area above cross poles (small round logs set perpendicular to cross beams) was used to store crops which were then dried in the heat of the barn oven. *Photo by Doug Reed.*



Photo 7. Põlva Peasantry Museum, Karilatsi. Crop storage area above cross poles floored with small round poles set perpendicular to cross beams. Crops were then dried by the heat of the barn-oven.
Photo by Doug Reed.

There is strong evidence that only in Estonia and a few northern border regions of Latvia were cross poles and barn ovens included during initial construction of the main room for drying crops.¹⁷ Oddly, the barn-dwelling as functionally developed by the Estonians does not appear to have been exported as a preferred building type to other countries. Architectural historians within Estonia see the development of the functional use of the barn-dwelling as a natural consequence and a practical solution to their state of existence under foreign rule and the natural environmental conditions of their national territory.¹⁸

So how did the Estonian multi-purpose barn-dwelling develop and where did it come from? The complete answer is unknown at this time. The current body of evidence concerning worldwide log crib development indicates log structures were in existence at least 8000 years ago in eastern portions of Europe

¹⁷ The existence of the Estonian barn-dwelling type in the northern Latvian territory was due to the strong influences from the Estonian culture on the border area. The distribution of the barn-dwelling type of structure in the neighboring territories needs further investigation. It is known that the traditional Estonian farmhouse was also exported to Russia by the Estonian settlers in the second half of the 19th century, where it occurred in the Estonian settlements.

¹⁸ Tamjärv, Maret. Personal communications, email dated 21 November 2015.



Photo 8. Located at the Viimsi Open Air Museum near Tallinn, the ca 1824 barn-dwelling is on its original location. The centrally heated room was built with stone and log walls.

Photo by Doug Reed.



Photo 9. The kiln room holds cross poles onto which crops were placed for drying before threshing and storing as winter food. The heated room was then used by humans to winter the cold seasons.

Photo by Doug Reed.

and traveled west with migrations of travelers and settlers.¹⁹ It is also well-known that the development and dissemination of log crib technology continued to evolve and spread over the entire continent. New ideas and techniques were traded back and forth between various tribal regions born by invaders, traders, builders, merchants and other travelers who were the agents for transporting the evolving ideas of log crib technology from one place to another.

Each new ruling power brought with them their own appointed power brokers. The foreign occupiers of the land and the rulers of the manors in turn selected master builders to erect their houses and estate buildings. As the power elite settled in, they were followed by traders and merchants with close ties to their occupying power. With few exceptions, the local peasant class was not seen as skilled or good enough to design and guide the constructions needed to build the new masters' houses and significant buildings even though the peasants were used as the labor class. Many of the foreign master builders were drawn mostly from Germany, with additional master carpenters imported from Russia, and Sweden and a few from other countries as well. It was through these multiple importations of master builders, carpenters, traders and merchants from outside Estonia that new technologies were introduced to the peasant class. As a result, most of the Estonian historic log buildings that remain today exhibit a wide range of traditional building techniques common to the empires and nations that once occupied their lands. It is also apparent that in today's world, the modern tradesmen who continue to build traditional log crib houses in Estonia use multiple processes and details that exist throughout the larger European log building community.

Internal Estonian studies by multiple researchers such as Karl Tihase (2007), Heiki Pärdis (2012), Joosep Metslang (2007; 2012) and Andres Uus (2017), to name only a few, have resulted in a broad understanding of the Estonian peasant architecture. This worthwhile research has been aided by multiple organizations such as the Estonian Open Air Museum, the University of Tartu Viljandi Culture Academy, the NGO Vanaajamaja and many other organizations within the country. Even though several of these efforts have covered some aspects of log crib construction details, little has been done to map the origins and dissemination of traditional log crib construction details within Estonia. Almost no research has focused to track the movement of the details over the centuries to and from the European continent at large.

19 A team from Germany, France and Switzerland of which Willy Tegel was the dendrochronologist from Freiburg University recently excavated a Neolithic well site uncovering a log crib well casing. It was dendro dated to 5206–5098 BC. Other evidence uncovered by this team and others indicates log crib technology was at the eastern threshold of Europe in Thrace by 6400 and migrated west to the Atlantic shores of France by 5000 BC.

Further continental and worldwide research needed

Many other nations have studied their internal architectural histories as well. Unfortunately, the current level of research on the continent and the world as a whole has not deemed it necessary to follow specifically targeted building details to establish the dissemination of log crib technology within a particular nation much less over the entire globe or the continent. The result is researchers generally cannot determine what may have been introduced into a specific nation such as Estonia. Likewise, researchers cannot fully determine all of what log building traditions may have originated within a particular country such as within Estonia where the peasant is known to have introduced the use of cross beams and kilns for drying crops in the barn-dwellings principally used as winter quarters for man and animal.

While new studies have been launched to review a few details, and some earlier study efforts have mentioned notches and log walls in passing, researchers to date have only generally studied the basic building forms, types and floor plans of Continental and Estonian log construction. As a result, while the details and processes observed in Estonian log buildings can also be found in many other European countries, no country can be conclusively identified as the place of origin for any particular detail of log crib construction. Until far more innovative cultural resource studies are completed with the goal of tracking details by means of surveys, the details of dissemination and attribution shall remain elusive.

At this stage of research no one knows for sure who developed what much less where things occurred on the earliest portions of the world stage concerning log crib construction. The conclusion to the study of the Estonian barn-dwelling, its details of development and diffusion to or from other international sources, needs additional research. There are many on-going studies concerning log crib architecture within and outside of Estonia that have the potential to fill in some of the blanks in the history of Estonia's log crib development. The world now awaits the results of the current and future research efforts to help complete the story of evolution and dissemination of log crib construction on a global basis. Only then will the picture begin to clarify for the western hemisphere as to where the American log crib details actually originated that were later adapted in North American log structures.

Relevance of global log crib research

With the prospect of so much research awaiting those who study this type of structure, many questions should be asked and answered. Why study wooden house construction or even more specifically log crib construction? What relevance does any study of log crib construction have in the 21st century? With



Photo 10. Japanese log structure in the Azekura-zukuri tradition. Could we have learned something from the Japanese? *Photo by user ignis, Wikimedia commons, licence GFDL, ss-by-sa-2.5, 2.0, 1.0.*

so many modern synthetic materials that purport to be cheap and maintenance free, why do we need to consider the retention of archaic, traditional log crib construction techniques? Why should we study old houses and construction methods that are popularly thought to be a far more expensive to renovate than build new, skimpy modern houses believed to have only a typical thirty year life span? By answering these and other unstated complex questions and successfully broadcasting the answers to a larger worldwide audience, this vital field of study may enjoy a large influx of new researchers and practitioners with a greater appreciation for the retention and repurposing of the huge stock of underutilized older log buildings scattered over the international landscape.

Why should anyone want to study log buildings? Many log crib historians would jump to the conclusion the answer is the historical record is incomplete concerning the development and dissemination of log crib technology. It is true we need to know as much as possible about traditional log assemblies, how the logs were selected, gathered, processed and erected into suitable homes and out-buildings. The easy answer includes the need to know as much as possible of who invented the technology, where it was developed and how it spread to all corners of the earth encircling the entire globe so many thousands of years ago. However, the easy answer as stated above is not the entire answer. What must



Photo 11. A log house in Charleston, West Virginia, is demolished to make way for store parking.
Photo by Doug Reed.

be kept in mind is the easy answer is only partially correct and very shallow in its call for more study if left solely on the doorstep of history.

The log cribs standing throughout the world number into the uncounted millions. In the United States alone an unofficial statistic of standing log structures dating prior to 1960 was estimated at 3,000,000.²⁰ Most US log cribs are covered with various natural and manmade sidings, some even with bricks. Other log cribs have been incorporated into larger structures and are now hidden, buried within the larger buildings' footprints. The existence of most of these covered log crib structures is largely unknown by the current owners. Hidden as most log houses are from visual observation that declare their presence, it is only when renovations or, more sadly, when demolitions occur the log walls are "discovered." Those log buildings that

²⁰ In the mid 1980s a very quick survey was performed of several villages and small towns in Maryland and Pennsylvania regarding the number of standing log structures. After a fair review was completed, the statistical estimate of the number of existing log structures still extant in those two states was placed at nearly 200,000 structures. By tracing the route of log crib dissemination over the national landscape, a conservative estimate of the remaining national log crib building stock in the US pre-dating 1960 was estimated to be between 2,000,000 and 3,000,000 structures. After two more decades of study the original estimate is now considered a very conservative figure. There may be many more log structures than initially estimated.



Photo 12. Andres Uus demonstrates scribing technique at Estonian Traditional Log Building Workshop held at NGO Vanaajamaja, Mooste, April 2014. *Photo by Doug Reed.*

were built and left exposed or were sided and later exposed to the weather conditions of the United States, which are quite different from most of the European Continent, suffer severe and rapid deterioration requiring multiple and ever increasing amounts of costly repair and rehabilitation. This is not the fault of the log buildings. It is the fault of owners who do not know how to keep their buildings covered against the ravages of weather.

Need for log crib craftsmen and training programs

Because the world does not value its log structures except as a source of past remembrances and sturdy pioneer settlements, no international organization dedicated to specific research of the log crib structures has ever been formed. As a result many inexperienced, undertrained and largely uninformed consultants inform the general public what should be done with log buildings. The potentially poor advice from those who are undertrained often results in the eventual loss of the very resource the work was intended to save. The worst result is that the general public and professionals alike often believe the rehabilitation and retention of log structures is expensive and not worth the effort. Sadly, it is all due to their inexperienced efforts and a near total misunderstanding of log crib construction that do indeed raise the costs of

renovation beyond reason. However, the costs usually are not high because log crib structures are expensive to rehab. Rather, the costs are high due to the lack of understanding and training of professionals and the construction community at all levels charged with preserving existing structures. If owners are unable to find properly trained consultants and workmen, everyone loses.

Time and again properly executed renovations initiated by log crib owners have demonstrated that rehabilitated structures can economically compete with new construction costs on a square foot basis. The comparison of log crib renovation costs versus those of building new houses clearly shows the fallacy of national and international perceptions that renovations of older building always result in higher costs. The facts derived from cost comparison studies clearly indicate this perception is just not true in many cases. Only in some cases are the costs greater to rehab than to build new. The final costs depend on the unique set of circumstances of each building under consideration for rehab and the goals for the repurposing of the building. We must all keep in mind there are many instances where the costs to build a new house are greater than the costs to rehab a similar in size existing log house.²¹

It is also unfortunate that too many people think new structures are maintenance free. Not so. They are often much more expensive to maintain when parts or items need repairs. Many new materials are designed with a short life span. Older house materials can, with proper care, be in good use for hundreds of years. The new synthetic materials and assemblies are often not repairable, but need complete replacement. Old building materials can always be repaired if there is enough left of the original to make it worthwhile. Economic studies need to be undertaken that factually establish information comparing renovation and new construction costs. The results will surprise many people and save for reuse millions of existing older buildings.

Environmental considerations

Another factor of grave concern is global warming. One hundred and fifty nations led by the United States and China have recently committed billions to try and stem the tide of rising temperature. Much of this is due to emitting too large a quantity of carbon into the atmosphere beyond the planet's ability to cleanse the air thus creating the green house effect. How can log cribs help reduce or at least not significantly add to global warming?

21 The author was the main estimator for all restoration and rehabilitation projects for his company. For decades I kept track of our costs comparing them to similar size new building projects finding that our programs of sensitive renovation that kept as much as humanly possible of an older structure costs less than most new constructions. There were also those projects that cost more per square foot than a new building.

A 2010 study completed by the author with the assistance of an eco-calculator specialist was performed comparing renovations of good, solid fifty year and older structures versus the demolition of those structures and the building of new similar sized structures in place of the old.²² The study was run three times to check and recheck the rather surprising initial results. The multiple checks of the early results only confirmed what was clear and emphatic. Upwards of nine hundred percent more carbon is sent into the atmosphere when existing salvageable buildings are torn down and dumped in the trash heap and new structures similar in size to those removed are built when compared to the renovation of existing structures. It costs the environment nine hundred percent more in emissions to build new than to renovate an existing structure. These excessive carbon numbers are an environmental cost we must focus on, not only those of dollars, but those of emissions.

Consider that millions of people still reside in log structures. If all those existing log structures around the world were torn down and new buildings were erected in their place, not only would the negative impact on the environment and natural resource be nearly impossible to calculate, but the rise in housing costs would push more people into utter poverty and bring many national budgets deeper into debt in support of those newly destitute people. Hyperbole you say, I can only hope to be proven wrong.

On a more positive note, the salvation of existing log crib buildings that can be successfully repurposed into new uses can and should be accomplished. The log crib is a solid, self-insulated, flexible building type. It was man's first well-built, long-lasting, permanent housing type. It is the world's oldest, continuously inhabited housing type still in use around the world today. The actual invention or birth date of the log crib is unknown and likely to elude identification. The date of its inception is not important, but the technology certainly is important.

Global organization dedicated to log crib study

In order for the world to benefit from this old building technology, to better track and identify where it was invented, to understand how the technology spread around the globe, to pinpoint the best log crib construction practices for the different environments, to study the economics of renovation and restoration, to better train and sustain the workmen and women needed

22 Reed, Douglass. *Footer Mansion Eco Calculations; Carbon Foot Printing*. Unpublished report and power point presentation, Preservation Maryland conference, Easton, Maryland, April 2010. Materials in the possession of the author.

to maintain these structures, to build new log crib buildings at reasonable prices, and to establish better management practices to protect and regenerate our global forests, the world's log crib communities need to form an international association dedicated to the study of log cribs around the globe. There must be a central organization where papers, studies and information gathered locally, nationally and internationally can be sent, digested, collated and disseminated to the global community at large.

A worldwide organization dedicated to the study and dissemination of old and new log crib construction technologies can have far reaching, long term impacts at many national and international levels of concern all over the globe. More researchers are needed at all levels and in many disciplines. New innovative studies should be launched to devise effective craft training programs. Research into better and more productive means of natural resource conservation and forest management must be undertaken. Along with a better understanding on how the earlier log cribs were actually manufactured and erected, detailed surveys and reviews of techniques used in current renovations of log cribs in various environments must be undertaken. Research needs to be completed to develop and identify techniques for constructing new log dwellings that are more economically executed. We need more studies that will help us sell the facts that log cribs are environmentally friendly, sustainable, low maintenance and not nearly as expensive as the poorly trained and misinformed contractors, professionals and the general public lead themselves to believe. Due to inadequate training and the utilization of poor grade materials, processes and techniques to renovate existing or build new log crib structures, all these myths are perpetuated and many perfectly useable historic log houses are lost.

The international community needs to join together to meet the research challenge of studying the early development and spread of log crib technology, performing surveys on national levels and submitting those surveys to an international body to further research the global context. It is imperative we train and sustain the ranks of craftsmen who will be needed to renovate, restore, and maintain the standing structures and who will build the new log structures that will be built in the future. A global study to assess the impact of continued use of log cribs will have on the environment is necessary to sell the idea of log crib construction as vital for all parties concerned.

This ambitious proposal can be accomplished only if personal attitudes and national agendas are aligned to support an international organization that guides research and understanding of log crib as sustainable structures

for the next 9000 years. When the goal of an international organization dedicated to the study of log buildings has been realized, it can guide and nurture the log crib industry. Only a few of its important functions are listed below:

- A dedicated organization can be a repository for all information concerning log cribs and make it available to those who seek reliable sources in their quest to learn more and/or save log buildings.
- Researchers will be able to track log crib technology and how it was developed.
- Appropriate training programs for all aspects of and construction can be devised.
- Minimum professional standards for all practitioners can be devised to certify qualifications.
- An international list of certified professionals and craftsmen can be posted for owners to contact for repairs, restoration and repurposing rehabilitations of log buildings.
- Guidelines can be developed for all regions on how best to care for log buildings.

We must join forces to promote the future of log buildings old and new. It is imperative that we inform the world on how important log structures are to all peoples and regions of the world where log structures have been constructed.

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Douglass C. Reed raises old log addition to new timber frame (Upton, Pennsylvania, USA).
Photo by Mary Jo Reed.

Douglass C. Reed (b 1948) is an American log crib builder and researcher. Apprenticed under master craftsman Paul Lewis (18th and 19th century log house building techniques; 1972–1977) he graduated Antioch College with BA in Early American Cultural Arts (1975). He completed Masters work at George Washington University (1980) and completed PhD fields at George Washington University, 1982. By 1977 he incorporated as Preservation Associates, Inc. and expanded into a full range

of services offered from National Register nominations, historic and cultural resource surveys, consulting, condition assessments and preparation of historic structure reports, educational courses. He has 48 years of experience as a vernacular architectural historian, craftsman and technical consultant to architects, engineers and owners on a wide range of historic building types. Reed has been in the forefront of developing the investigative processes used for initial condition assessments of historic structures. He targets saving derelict buildings, creates adaptive reuses for under-utilized buildings and is uniquely qualified and experienced at unobtrusively inserting modern infrastructures into historic buildings. Reed was one of the first practitioners of preservation in the US to see the value of carbon footprint analysis in selling preservation and repurposing of older buildings versus demolition and building new. He has spent the last five years extensively traveling through Europe seeking the early knowledge of log crib builders, traditions and origins. He is writing a large book concerning log cribs of all types and uses.